INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.

Michael R. Pence
Governor

Thomas W. Easterly
Commissioner

100 North Senate Avenue
Indianapolis, Indiana 46204
(317) 232-8603
Toll Free (800) 451-6027
www.idem.IN.gov

TO: Interested Parties / Applicant

DATE: April 16, 2013

RE: Magnetation LLC / 181-32081-00054

FROM: Matthew Stuckey, Branch Chief
Permits Branch
Office of Air Quality

Notice of Decision: Approval – Effective Immediately

Please be advised that on behalf of the Commissioner of the Department of Environmental Management, I have issued a decision regarding the enclosed matter. Pursuant to IC 13-15-5-3, this permit is effective immediately, unless a petition for stay of effectiveness is filed and granted, and may be revoked or modified in accordance with the provisions of IC 13-15-7-1.

If you wish to challenge this decision, IC 4-21.5-3-7 and IC 13-15-6-1(b) or IC 13-15-6-1(a) require that you file a petition for administrative review. This petition may include a request for stay of effectiveness and must be submitted to the Office of Environmental Adjudication, 100 North Senate Avenue, Government Center North, Suite N 501E, Indianapolis, IN 46204.

For an **initial Title V Operating Permit**, a petition for administrative review must be submitted to the Office of Environmental Adjudication within **thirty (30)** days from the receipt of this notice provided under IC 13-15-5-3, pursuant to IC 13-15-6-1(b).

For a **Title V Operating Permit renewal**, a petition for administrative review must be submitted to the Office of Environmental Adjudication within **fifteen (15)** days from the receipt of this notice provided under IC 13-15-5-3, pursuant to IC 13-15-6-1(a).

The filing of a petition for administrative review is complete on the earliest of the following dates that apply to the filing:

(1) the date the document is delivered to the Office of Environmental Adjudication (OEA);
(2) the date of the postmark on the envelope containing the document, if the document is mailed to OEA by U.S. mail; or
(3) The date on which the document is deposited with a private carrier, as shown by receipt issued by the carrier, if the document is sent to the OEA by private carrier.

The petition must include facts demonstrating that you are either the applicant, a person aggrieved or adversely affected by the decision or otherwise entitled to review by law. Please identify the permit, decision, or other order for which you seek review by permit number, name of the applicant, location, date of this notice and all of the following:

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(1) the name and address of the person making the request;
(2) the interest of the person making the request;
(3) identification of any persons represented by the person making the request;
(4) the reasons, with particularity, for the request;
(5) the issues, with particularity, proposed for considerations at any hearing; and
(6) identification of the terms and conditions which, in the judgment of the person making the request, would be appropriate in the case in question to satisfy the requirements of the law governing documents of the type issued by the Commissioner.

Pursuant to 326 IAC 2-7-18(d), any person may petition the U.S. EPA to object to the issuance of an initial Title V operating permit, permit renewal, or modification within sixty (60) days of the end of the forty-five (45) day EPA review period. Such an objection must be based only on issues that were raised with reasonable specificity during the public comment period, unless the petitioner demonstrates that it was impractible to raise such issues, or if the grounds for such objection arose after the comment period.

To petition the U.S. EPA to object to the issuance of a Title V operating permit, contact:

U.S. Environmental Protection Agency
401 M Street
Washington, D.C. 20406

If you have technical questions regarding the enclosed documents, please contact the Office of Air Quality, Permits Branch at (317) 233-0178. Callers from within Indiana may call toll-free at 1-800-451-6027, ext. 3-0178.

Enclosures
FNTVOP.dot12/3/07

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Prevention of Significant Deterioration (PSD) and Part 70 Operating Permit OFFICE OF AIR QUALITY

Magnetation LLC
64 East 100 North
Reynolds, Indiana 47980

(herein known as the Permittee) is hereby authorized to construct and operate subject to the conditions contained herein, the source described in Section A (Source Summary) of this permit.

The Permittee must comply with all conditions of this permit. Noncompliance with any provisions of this permit is grounds for enforcement action; permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. Noncompliance with any provision of this permit, except any provision specifically designated as not federally enforceable, constitutes a violation of the Clean Air Act. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. An emergency does constitute an affirmative defense in an enforcement action provided the Permittee complies with the applicable requirements set forth in Section B, Emergency Provisions.

This permit is issued in accordance with 326 IAC 2 and 40 CFR Part 70 Appendix A and contains the conditions and provisions specified in 326 IAC 2-7 as required by 42 U.S.C. 7401, et. seq. (Clean Air Act as amended by the 1990 Clean Air Act Amendments), 40 CFR Part 70.6, IC 13-15 and IC 13-17.

Operation Permit No.: T181-32081-00054	
Issued by: Matt Stuckey, Branch Chief Permits Branch Office of Air Quality	Issuance Date: April 16, 2013 Expiration Date: April 16, 2018

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Attachment C - NESHAP, 40 CFR 63, Subpart ZZZZ— National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

SECTION A SOURCE SUMMARY

This permit is based on information requested by the Indiana Department of Environmental Management (IDEM), Office of Air Quality (OAQ). The information describing the source contained in conditions A.1 through A.3 is descriptive information and does not constitute enforceable conditions. However, the Permittee should be aware that a physical change or a change in the method of operation that may render this descriptive information obsolete or inaccurate may trigger requirements for the Permittee to obtain additional permits or seek modification of this permit pursuant to 326 IAC 2, or change other applicable requirements presented in the permit application.

A.1 General Information [326 IAC 2-7-4(c)] [326 IAC 2-7-5(14)] [326 IAC 2-7-1(22)]

The Permittee owns and operates a stationary iron ore concenrtate pelletizing plant.

Source Address:	64 East 100 North, Reynolds, Indiana 47980
General Source Phone Number:	To Be Provided
SIC Code:	1011
County Location:	White
Source Location Status:	Attainment for all criteria pollutants
Source Status:	Part 70 Operating Permit Program Major Source, under PSD Rules Major Source, Section 112 of the Clean Air Act Not 1 of 28 Source Categories

A.2 Emission Units and Pollution Control Equipment Summary [326 IAC 2-7-4(c)(3)] [326 IAC 2-7-5(14)]

This stationary source consists of the following emission units and pollution control devices:

Note: All references to "ton" used throughout this document are short tons (i.e. One short ton equals 2,000 pounds).

(a) One (1) iron ore concentrate unloading and storage area, identified as EU001, approved in 2013 for construction, with a maximum capacity of 4,950 tons per hour, consisting of the following:

(1) One (1) thaw shed, one (1) rotary rail car dumper, one (1) pedestal mount breaker, two (2) grizzlies, two (2) apron feeders, one (1) dribble conveyor, one (1) breaker, identified as EU001a, using baghouse CE001 as control, exhausting to stack SV001.

(2) One (1) covered conveyor transferring to concentrate storage building which contains four (4) covered conveyors, four (4) load hoppers, and a storage pile identified as EU001b, exhausting inside the building.

(b) One (1) limestone unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU002a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU002b, exhausting inside the limestone storage pile enclosure. Under 40 CFR 60, Subpart OOO, the limestone unloading and storage area conveyor is considered an affected facility.

(c) One (1) dolomite unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU003a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU003b, exhausting inside the dolomite storage pile enclosure. Under 40 CFR 60, Subpart OOO, the dolomite unloading and storage area conveyor is considered an affected facility.

(d) One (1) coke breeze unloading and storage area, approved in 2013 for construction, with a maximum capacity of 7 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU004a, exhausting uncontrolled to atmosphere.

(2) One (1) pneumatic conveyance system and one (1) coke breeze grinding mill bin identified as EU004b, with a maximum capacity of 1,100 tons, using baghouse CE004 as control, exhausting to stack SV004.

(e) One (1) bentonite unloading and storage area, identified as EU005, approved in 2013 for construction, consisting of one (1) bentonite storage bin with a maximum capacity of 440 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE005 as control, exhausting inside the building.

(f) One (1) organic binder unloading and storage area, identified as EU006, approved in 2013 for construction, consisting of one (1) organic binder feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE006 as control, exhausting inside the building.

(g) One (1) soda ash unloading and storage area, identified as EU007, approved in 2013 for construction, consisting of one (1) soda ash feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE007 as control, exhausting inside the building.

(h) One (1) bentonite additive system, identified as EU008, approved in 2013 for construction, consisting of one (1) bentonite feed bin with a maximum capacity of 220 ton, with a maximum capacity of 3.0 tons per hour, using bin vent CE008 as control, exhausting inside the building.

(i) One (1) coke breeze additive system, identified as EU009, approved in 2013 for construction, with a maximum capacity of 16.5 tons per hour, using baghouse CE009 as control, exhausting to stack SV009, consisting of one (1) coke breeze conveyor, one (1) roller mill for coke breeze grinding with a nominal capacity of 11 tons per hour, one (1) product separation cyclone, and one (1) coke breeze bin with a maximum capacity of 220 tons.

(j) One (1) limestone and dolomite grinding mill bin area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) load hopper, one (1) enclosed vibrating grizzly feeder/screener, and one (1) covered belt feeder, identified as EU025a, exhausting uncontrolled to the atmosphere.

(2) One (1) additive conveyor, one (1) dolomite grinding mill bin with a maximum capacity of 440 tons, and one (1) limestone grinding mill bin with a maximum capacity of 440 tons, identified as EU025b, using baghouse CE023 as control, exhausting inside the building. Under 40 CFR 60, Subpart OOO, these units of

the limestone and dolomite grinding mill bin area are considered affected facilities.

(k) One (1) ground limestone and dolomite additive system, identified as EU010, approved in 2013 for construction, with a maximum capacity of 132 tons per hour, using baghouse CE010 as control, exhausting to stack SV010, consisting of the following:

(1) One (1) limestone feed conveyor, one (1) dolomite feed conveyor, one (1) roller mill feed conveyor, one (1) roller mill for limestone and dolomite, one (1) product separation cyclone, and one (1) limestone and dolomite bin with a maximum capacity of 1,100 tons. Under 40 CFR 60, Subpart OOO, these units of the ground limestone and dolomite additive system are considered affected facilities.

(2) One (1) natural gas fired air heater, with a maximum heat input capacity of 19 MMBtu per hour.

(l) One (1) mixing area material handling system, identified as EU011, approved in 2013 for construction, with a maximum capacity of 780 tons per hour, using baghouse CE011 as control, exhausting inside the building, consisting of two (2) filter cake feed conveyors, two (2) mixer feed conveyors, and two (2) mixers.

(m) One (1) hearth layer bin system, identified as EU012, approved in 2013 for construction, with a maximum capacity of 660 tons of iron oxide pellets per hour, using baghouse CE012 as control, exhausting to stack SV012, consisting of two (2) hearth layer conveyors and one (1) hearth layer bin.

(n) One (1) induration machine, approved in 2013 for construction, consisting of one (1) natural gas fired pellet hardening furnace, with a maximum heat input capacity of 436 MMBtu per hour and a maximum throughput rate of 450 tons per hour of iron oxide pellets, equipped with the following:

(1) One (1) furnace hood exhaust, identified as EU013, using hood exhaust baghouse CE013 as control, exhausting to stack SV013A.

(2) One (1) furnace windbox exhaust (WBE), identified as EU014, using one (1) gas suspension absorber (GSA) (CE015) and one (1) WBE baghouse (CE016) as control, exhausting to stack SV013B.

(3) One (1) furnace discharge system, identified as EU015, using baghouse CE017 as control, exhausting to stack SV014, consisting of one (1) dribble conveyor, one (1) discharge hopper, and two (2) discharge vibrating feeders each with a maximum throughput of 1,155 tons per hour.

(4) One (1) induced draft cross flow wet cooling tower, identified as EU024, with a capacity of 4,600 gallons of circulating water per minute and a maximum drift rate of 0.001%, exhausting to stack SV022.

(o) One (1) hearth layer separation system, identified as EU016, approved in 2013 for construction, using baghouse CE018 as control, exhausting inside the building, consisting of the following:

(1) Two (2) product conveyors, identified as P1 and P2, with a maximum capacity of 660 and 770 tons per hour respectively.

(2) Two (2) hearth layer conveyors, identified as HL-1 and HL-2, each with a maximum capacity of 440 tons per hour.

(3) One (1) hearth layer separation bin, one (1) hearth layer separation grizzly, and two (2) reclaim hoppers.

(p) One (1) oxide pellet storage and loadout system, identified as EU019, approved in 2013 for construction, with a maximum capacity of 550 tons per hour, using baghouse CE019 as control, exhausting to stack SV018, consisting of two (2) conveyors, two (2) 8800-ton storage bins, and two (2) 99-ton storage bins.

(q) One (1) WBE lime storage area, identified as EU020, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) lime feed conveyor and one (1) 80 cubic meter lime storage silo, using bin vent CE020 as control, exhausting inside the building.

(r) One (1) WBE residual product loading area, identified as EU022, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) GSA reactor conveyor, one (1) GSA product conveyor, one (1) WBE conveyor, and one (1) 100 cubic meter storage silo, using bin vent CE021 as control, exhausting inside the building.

(s) One (1) recycled dust storage area, identified as EU026, approved in 2013 for construction, consisting of one (1) 55-ton storage bin, with a maximum capacity of 7.0 tons per hour, using dust recycle baghouse CE024 as control, exhausting inside the building.

A.3 Specifically Regulated Insignificant Activities [326 IAC 2-7-1(21)] [326 IAC 2-7-4(c)] [326 IAC 2-7-5(14)]

This stationary source also includes the following specifically regulated insignificant activities, as defined in 326 IAC 2-7-1(21):

(a) Natural gas-fired combustion sources with heat input equal to or less than ten million (10,000,000) Btu per hour, including the following:

(1) Seven (7) natural gas fired space heaters, identified as EU021, approved in 2013 for construction, each with a maximum heat input capacity of 1.0 MMBtu per hour. [326 IAC 2-2]

(2) One (1) coke breeze additive system (EU009) natural gas fired air heater, approved in 2013 for construction, with a maximum heat input capacity of 1.7 MMBtu per hour. [326 IAC 2-2]

(b) A petroleum fuel (other than gasoline) dispensing facility, having a storage tank capacity less than or equal to ten thousand five hundred (10,500) gallons, and dispensing three thousand five hundred (3,500) gallons per day or less. [326 IAC 2-2]

(c) Paved and unpaved roads and parking lots with public access. [326 IAC 2-2] [326 IAC 6-4]

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(f) Other emission units, not regulated by a NESHAP, with PM_{10}, NO_x, and SO_2 emissions less than five (5) pounds per hour or twenty-five (25) pounds per day, CO emissions less than twenty-five (25) pounds per day, VOC emissions less than three (3) pounds per hour or fifteen (15) pounds per day, lead emissions less than six-tenths (0.6) tons per year or three and twenty-nine hundredths (3.29) pounds per day, and emitting greater than one (1) pound per day but less than five (5) pounds per day or one (1) ton per year of a single HAP, or emitting greater than one (1) pound per day but less than twelve and five tenths (12.5) pounds per day or two and five tenths (2.5) ton per year of any combination of HAPs:

(1) One (1) iron ore concentrate wet grinding and filter cake production system, approved in 2013 for construction, with a maximum capacity of 700 tons per hour, consisting of three (3) conveyors, and a filter cake feed bin, exhausting uncontrolled into a building. [326 IAC 2-2] [326 IAC 6-3-2]

(2) One (1) greenball production system, approved in 2013 for construction, with a maximum capacity of 900 tons per hour, using a wet spray process as control, consisting of six (6) 110-ton balling disc feed bins, six (6) balling discs, six (6) green pellet roller screens, six (6) shredders, one (1) single deck roller screen, and thirty-one (31) conveyors, exhausting into a building. [326 IAC 2-2] [326 IAC 6-3-2

A.4 Insignificant Activities [326 IAC 2-7-1(21)] [326 IAC 2-7-4(c)] [326 IAC 2-7-5(14)]

This stationary source also includes the following insignificant activities, as defined in 326 IAC 2-7-1(21):

(a) Combustion source flame safety purging on startup.

(b) Refractory storage not requiring air pollution control equipment.

(c) Activities associated with the treatment of wastewater streams with an oil and grease content less than or equal to 1% by volume.

(d) Replacement or repair of electrostatic precipitators, bags in baghouses, and filters in other air filtration equipment.

(e) Cooling tower quench water blowdown.

(f) Process water blowdown.

(g) A laboratory, as defined in 326 IAC 2-7-1(21)(H).

A.5 Part 70 Permit Applicability [326 IAC 2-7-2]

This stationary source is required to have a Part 70 permit by 326 IAC 2-7-2 (Applicability) because:

(a) It is a major source, as defined in 326 IAC 2-7-1(22);

(b) It is a source in a source category designated by the United States Environmental Protection Agency (U.S. EPA) under 40 CFR 70.3 (Part 70 - Applicability).

SECTION B GENERAL CONDITIONS

B.1 Definitions [326 IAC 2-7-1]

Terms in this permit shall have the definition assigned to such terms in the referenced regulation. In the absence of definitions in the referenced regulation, the applicable definitions found in the statutes or regulations (IC 13-11, 326 IAC 1-2 and 326 IAC 2-7) shall prevail.

B.2 Revocation of Permits [326 IAC 2-1.1-9(5)]

Pursuant to 326 IAC 2-1.1-9(5)(Revocation of Permits), the Commissioner may revoke this permit if construction is not commenced within eighteen (18) months after receipt of this approval or if construction is suspended for a continuous period of one (1) year or more.

B.3 Affidavit of Construction [326 IAC 2-5.1-3(h)] [326 IAC 2-5.1-4]

This document shall also become the approval to operate pursuant to 326 IAC 2-5.1-4 when prior to the start of operation, the following requirements are met:

(a) The attached Affidavit of Construction shall be submitted to the Office of Air Quality (OAQ), verifying that the emission units were constructed as proposed in the application or the permit. The emission units covered in this permit may begin operating on the date the Affidavit of Construction is postmarked or hand delivered to IDEM if constructed as proposed.

(b) If actual construction of the emission units differs from the construction proposed in the application, the source may not begin operation until the permit has been revised pursuant to 326 IAC 2 and an Operation Permit Validation Letter is issued.

(c) The Permittee shall attach the Operation Permit Validation Letter received from the Office of Air Quality (OAQ) to this permit.

B.4 Permit Term [326 IAC 2-7-5(2)] [326 IAC 2-1.1-9.5] [326 IAC 2-7-4(a)(1)(D)] [IC 13-15-3-6(a)]

(a) This permit, T181-32081-00054, is issued for a fixed term of five (5) years from the issuance date of this permit, as determined in accordance with IC 4-21.5-3-5(f) and IC 13-15-5-3. Subsequent revisions, modifications, or amendments of this permit do not affect the expiration date of this permit.

(b) If IDEM, OAQ, upon receiving a timely and complete renewal permit application, fails to issue or deny the permit renewal prior to the expiration date of this permit, this existing permit shall not expire and all terms and conditions shall continue in effect, including any permit shield provided in 326 IAC 2-7-15, until the renewal permit has been issued or denied.

B.5 Term of Conditions [326 IAC 2-1.1-9.5]

Notwithstanding the permit term of a permit to construct, a permit to operate, or a permit modification, any condition established in a permit issued pursuant to a permitting program approved in the state implementation plan shall remain in effect until:

(a) the condition is modified in a subsequent permit action pursuant to Title I of the Clean Air Act; or

(b) the emission unit to which the condition pertains permanently ceases operation.

B.6 Enforceability [326 IAC 2-7-7] [IC 13-17-12]

Unless otherwise stated, all terms and conditions in this permit, including any provisions designed to limit the source's potential to emit, are enforceable by IDEM, the United States Environmental Protection Agency (U.S. EPA) and by citizens in accordance with the Clean Air Act.

B.7 Severability [326 IAC 2-7-5(5)]

The provisions of this permit are severable; a determination that any portion of this permit is invalid shall not affect the validity of the remainder of the permit.

B.8 Property Rights or Exclusive Privilege [326 IAC 2-7-5(6)(D)]

This permit does not convey any property rights of any sort or any exclusive privilege.

B.9 Duty to Provide Information [326 IAC 2-7-5(6)(E)]

(a) The Permittee shall furnish to IDEM, OAQ, within a reasonable time, any information that IDEM, OAQ may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. Upon request, the Permittee shall also furnish to IDEM, OAQ copies of records required to be kept by this permit.

(b) For information furnished by the Permittee to IDEM, OAQ, the Permittee may include a claim of confidentiality in accordance with 326 IAC 17.1. When furnishing copies of requested records directly to U. S. EPA, the Permittee may assert a claim of confidentiality in accordance with 40 CFR 2, Subpart B.

B.10 Certification [326 IAC 2-7-4(f)] [326 IAC 2-7-6(1)] [326 IAC 2-7-5(3)(C)]

(a) A certification required by this permit meets the requirements of 326 IAC 2-7-6(1) if:

(1) it contains a certification by a "responsible official" as defined by 326 IAC 2-7-1(35), and

(2) the certification states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

(b) The Permittee may use the attached Certification Form, or its equivalent with each submittal requiring certification. One (1) certification may cover multiple forms in one (1) submittal.

(c) A "responsible official" is defined at 326 IAC 2-7-1(35).

B.11 Annual Compliance Certification [326 IAC 2-7-6(5)]

(a) The Permittee shall annually submit a compliance certification report which addresses the status of the source's compliance with the terms and conditions contained in this permit, including emission limitations, standards, or work practices. The initial certification shall cover the time period from the date of final permit issuance through December 31 of the same year. All subsequent certifications shall cover the time period from January 1 to December 31 of the previous year, and shall be submitted no later than July 1 of each year to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

and

United States Environmental Protection Agency, Region V
Air and Radiation Division, Air Enforcement Branch - Indiana (AE-17J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

(b) The annual compliance certification report required by this permit shall be considered timely if the date postmarked on the envelope or certified mail receipt, or affixed by the shipper on the private shipping receipt, is on or before the date it is due. If the document is submitted by any other means, it shall be considered timely if received by IDEM, OAQ, on or before the date it is due.

(c) The annual compliance certification report shall include the following:

(1) The appropriate identification of each term or condition of this permit that is the basis of the certification;

(2) The compliance status;

(3) Whether compliance was continuous or intermittent;

(4) The methods used for determining the compliance status of the source, currently and over the reporting period consistent with 326 IAC 2-7-5(3); and

(5) Such other facts, as specified in Sections D of this permit, as IDEM, OAQ may require to determine the compliance status of the source.

The submittal by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

B.12 Preventive Maintenance Plan [326 IAC 2-7-5(12)] [326 IAC 1-6-3]

(a) If required by specific condition(s) in Section D of this permit, the Permittee shall prepare and maintain Preventive Maintenance Plans (PMPs) no later than ninety (90) days after issuance of this permit or ninety (90) days after initial start-up, whichever is later, including the following information on each facility:

(1) Identification of the individual(s) responsible for inspecting, maintaining, and repairing emission control devices;

(2) A description of the items or conditions that will be inspected and the inspection schedule for said items or conditions; and

(3) Identification and quantification of the replacement parts that will be maintained in inventory for quick replacement.

If, due to circumstances beyond the Permittee's control, the PMPs cannot be prepared and maintained within the above time frame, the Permittee may extend the date an additional ninety (90) days provided the Permittee notifies:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

The PMP extension notification does not require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

The Permittee shall implement the PMPs.

(b) A copy of the PMPs shall be submitted to IDEM, OAQ upon request and within a reasonable time, and shall be subject to review and approval by IDEM, OAQ. IDEM, OAQ may require the Permittee to revise its PMPs whenever lack of proper maintenance causes or is the primary contributor to an exceedance of any limitation on emissions. The PMPs and their submittal do not require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(c) To the extent the Permittee is required by 40 CFR Part 60/63 to have an Operation Maintenance, and Monitoring (OMM) Plan for a unit, such Plan is deemed to satisfy the PMP requirements of 326 IAC 1-6-3 for that unit.

B.13 Emergency Provisions [326 IAC 2-7-16]

(a) An emergency, as defined in 326 IAC 2-7-1(12), is not an affirmative defense for an action brought for noncompliance with a federal or state health-based emission limitation.

(b) An emergency, as defined in 326 IAC 2-7-1(12), constitutes an affirmative defense to an action brought for noncompliance with a technology-based emission limitation if the affirmative defense of an emergency is demonstrated through properly signed, contemporaneous operating logs or other relevant evidence that describe the following:

(1) An emergency occurred and the Permittee can, to the extent possible, identify the causes of the emergency;

(2) The permitted facility was at the time being properly operated;

(3) During the period of an emergency, the Permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards or other requirements in this permit;

(4) For each emergency lasting one (1) hour or more, the Permittee notified IDEM, OAQ, within four (4) daytime business hours after the beginning of the emergency, or after the emergency was discovered or reasonably should have been discovered;

Telephone Number: 1-800-451-6027 (ask for Office of Air Quality, Compliance and Enforcement Branch), or
Telephone Number: 317-233-0178 (ask for Office of Air Quality, Compliance and Enforcement Branch)
Facsimile Number: 317-233-6865

(5) For each emergency lasting one (1) hour or more, the Permittee submitted the attached Emergency Occurrence Report Form or its equivalent, either by mail or facsimile to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

within two (2) working days of the time when emission limitations were exceeded due to the emergency.

The notice fulfills the requirement of 326 IAC 2-7-5(3)(C)(ii) and must contain the following:

(A) A description of the emergency;

(B) Any steps taken to mitigate the emissions; and

(C) Corrective actions taken.

The notification which shall be submitted by the Permittee does not require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(6) The Permittee immediately took all reasonable steps to correct the emergency.

(c) In any enforcement proceeding, the Permittee seeking to establish the occurrence of an emergency has the burden of proof.

(d) This emergency provision supersedes 326 IAC 1-6 (Malfunctions). This permit condition is in addition to any emergency or upset provision contained in any applicable requirement.

(e) The Permittee seeking to establish the occurrence of an emergency shall make records available upon request to ensure that failure to implement a PMP did not cause or contribute to an exceedance of any limitations on emissions. However, IDEM, OAQ may require that the Preventive Maintenance Plans required under 326 IAC 2-7-4(c)(8) be revised in response to an emergency.

(f) Failure to notify IDEM, OAQ by telephone or facsimile of an emergency lasting more than one (1) hour in accordance with (b)(4) and (5) of this condition shall constitute a violation of 326 IAC 2-7 and any other applicable rules.

(g) If the emergency situation causes a deviation from a technology-based limit, the Permittee may continue to operate the affected emitting facilities during the emergency provided the Permittee immediately takes all reasonable steps to correct the emergency and minimize emissions.

B.14 Permit Shield [326 IAC 2-7-15] [326 IAC 2-7-20] [326 IAC 2-7-12]

(a) Pursuant to 326 IAC 2-7-15, the Permittee has been granted a permit shield. The permit shield provides that compliance with the conditions of this permit shall be deemed compliance with any applicable requirements as of the date of permit issuance, provided that either the applicable requirements are included and specifically identified in this permit or the permit contains an explicit determination or concise summary of a determination that other specifically identified requirements are not applicable. The Indiana statutes from IC 13 and rules from 326 IAC, referenced in conditions in this permit, are those applicable at the time the permit was issued. The issuance or

possession of this permit shall not alone constitute a defense against an alleged violation of any law, regulation or standard, except for the requirement to obtain a Part 70 permit under 326 IAC 2-7 or for applicable requirements for which a permit shield has been granted.

This permit shield does not extend to applicable requirements which are promulgated after the date of issuance of this permit unless this permit has been modified to reflect such new requirements.

(b) If, after issuance of this permit, it is determined that the permit is in nonconformance with an applicable requirement that applied to the source on the date of permit issuance, IDEM, OAQ, shall immediately take steps to reopen and revise this permit and issue a compliance order to the Permittee to ensure expeditious compliance with the applicable requirement until the permit is reissued. The permit shield shall continue in effect so long as the Permittee is in compliance with the compliance order.

(c) No permit shield shall apply to any permit term or condition that is determined after issuance of this permit to have been based on erroneous information supplied in the permit application. Erroneous information means information that the Permittee knew to be false, or in the exercise of reasonable care should have been known to be false, at the time the information was submitted.

(d) Nothing in 326 IAC 2-7-15 or in this permit shall alter or affect the following:

(1) The provisions of Section 303 of the Clean Air Act (emergency orders), including the authority of the U.S. EPA under Section 303 of the Clean Air Act;

(2) The liability of the Permittee for any violation of applicable requirements prior to or at the time of this permit's issuance;

(3) The applicable requirements of the acid rain program, consistent with Section 408(a) of the Clean Air Act; and

(4) The ability of U.S. EPA to obtain information from the Permittee under Section 114 of the Clean Air Act.

(e) This permit shield is not applicable to any change made under 326 IAC 2-7-20(b)(2) (Sections 502(b)(10) of the Clean Air Act changes) and 326 IAC 2-7-20(c)(2) (trading based on State Implementation Plan (SIP) provisions).

(f) This permit shield is not applicable to modifications eligible for group processing until after IDEM, OAQ, has issued the modifications. [326 IAC 2-7-12(c)(7)]

(g) This permit shield is not applicable to minor Part 70 permit modifications until after IDEM, OAQ, has issued the modification. [326 IAC 2-7-12(b)(8)]

B.15 Prior Permits Superseded [326 IAC 2-1.1-9.5] [326 IAC 2-7-10.5]

(a) All terms and conditions of permits established prior to T181-32081-00054 and issued pursuant to permitting programs approved into the state implementation plan have been either:

(1) incorporated as originally stated,

(2) revised under 326 IAC 2-7-10.5, or

(3) deleted under 326 IAC 2-7-10.5.

(b) Provided that all terms and conditions are accurately reflected in this combined permit, all previous registrations and permits are superseded by this combined new source review and part 70 operating permit.

B.16 Termination of Right to Operate [326 IAC 2-7-10] [326 IAC 2-7-4(a)]

The Permittee's right to operate this source terminates with the expiration of this permit unless a timely and complete renewal application is submitted at least nine (9) months prior to the date of expiration of the source's existing permit, consistent with 326 IAC 2-7-3 and 326 IAC 2-7-4(a).

B.17 Permit Modification, Reopening, Revocation and Reissuance, or Termination [326 IAC 2-7-5(6)(C)] [326 IAC 2-7-8(a)] [326 IAC 2-7-9]

(a) This permit may be modified, reopened, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a Part 70 Operating Permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any condition of this permit. [326 IAC 2-7-5(6)(C)] The notification by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(b) This permit shall be reopened and revised under any of the circumstances listed in IC 13-15-7-2 or if IDEM, OAQ determines any of the following:

(1) That this permit contains a material mistake.

(2) That inaccurate statements were made in establishing the emissions standards or other terms or conditions.

(3) That this permit must be revised or revoked to assure compliance with an applicable requirement. [326 IAC 2-7-9(a)(3)]

(c) Proceedings by IDEM, OAQ to reopen and revise this permit shall follow the same procedures as apply to initial permit issuance and shall affect only those parts of this permit for which cause to reopen exists. Such reopening and revision shall be made as expeditiously as practicable. [326 IAC 2-7-9(b)]

(d) The reopening and revision of this permit, under 326 IAC 2-7-9(a), shall not be initiated before notice of such intent is provided to the Permittee by IDEM, OAQ at least thirty (30) days in advance of the date this permit is to be reopened, except that IDEM, OAQ may provide a shorter time period in the case of an emergency. [326 IAC 2-7-9(c)]

B.18 Permit Renewal [326 IAC 2-7-3] [326 IAC 2-7-4] [326 IAC 2-7-8(e)]

(a) The application for renewal shall be submitted using the application form or forms prescribed by IDEM, OAQ and shall include the information specified in 326 IAC 2-7-4. Such information shall be included in the application for each emission unit at this source, except those emission units included on the trivial or insignificant activities list contained in 326 IAC 2-7-1(21) and 326 IAC 2-7-1(40). The renewal application does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

Request for renewal shall be submitted to:

Indiana Department of Environmental Management
Permit Administration and Support Section, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

(b) A timely renewal application is one that is:

(1) Submitted at least nine (9) months prior to the date of the expiration of this permit; and

(2) If the date postmarked on the envelope or certified mail receipt, or affixed by the shipper on the private shipping receipt, is on or before the date it is due. If the document is submitted by any other means, it shall be considered timely if received by IDEM, OAQ on or before the date it is due.

(c) If the Permittee submits a timely and complete application for renewal of this permit, the source's failure to have a permit is not a violation of 326 IAC 2-7 until IDEM, OAQ takes final action on the renewal application, except that this protection shall cease to apply if, subsequent to the completeness determination, the Permittee fails to submit by the deadline specified, pursuant to 326 IAC 2-7-4(a)(2)(D), in writing by IDEM, OAQ any additional information identified as being needed to process the application.

B.19 Permit Amendment or Modification [326 IAC 2-7-11] [326 IAC 2-7-12]

(a) Permit amendments and modifications are governed by the requirements of 326 IAC 2-7-11 or 326 IAC 2-7-12 whenever the Permittee seeks to amend or modify this permit.

(b) Any application requesting an amendment or modification of this permit shall be submitted to:

Indiana Department of Environmental Management
Permit Administration and Support Section, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

Any such application does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(c) The Permittee may implement administrative amendment changes addressed in the request for an administrative amendment immediately upon submittal of the request. [326 IAC 2-7-11(c)(3)]

B.20 Permit Revision Under Economic Incentives and Other Programs [326 IAC 2-7-5(8)] [326 IAC 2-7-12(b)(2)]

(a) No Part 70 permit revision or notice shall be required under any approved economic incentives, marketable Part 70 permits, emissions trading, and other similar programs or processes for changes that are provided for in a Part 70 permit.

(b) Notwithstanding 326 IAC 2-7-12(b)(1) and 326 IAC 2-7-12(c)(1), minor Part 70 permit modification procedures may be used for Part 70 modifications involving the use of economic incentives, marketable Part 70 permits, emissions trading, and other similar approaches to the extent that such minor Part 70 permit modification procedures are

explicitly provided for in the applicable State Implementation Plan (SIP) or in applicable requirements promulgated or approved by the U.S. EPA.

B.21 Operational Flexibility [326 IAC 2-7-20] [326 IAC 2-7-10.5]

(a) The Permittee may make any change or changes at the source that are described in 326 IAC 2-7-20(b) or (c) without a prior permit revision, if each of the following conditions is met:

(1) The changes are not modifications under any provision of Title I of the Clean Air Act;

(2) Any preconstruction approval required by 326 IAC 2-7-10.5 has been obtained;

(3) The changes do not result in emissions which exceed the limitations provided in this permit (whether expressed herein as a rate of emissions or in terms of total emissions);

(4) The Permittee notifies the:

Indiana Department of Environmental Management
Permit Administration and Support Section, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

and

United States Environmental Protection Agency, Region V
Air and Radiation Division, Regulation Development Branch - Indiana (AR-18J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

in advance of the change by written notification at least ten (10) days in advance of the proposed change. The Permittee shall attach every such notice to the Permittee's copy of this permit; and

(5) The Permittee maintains records on-site, on a rolling five (5) year basis, which document all such changes and emission trades that are subject to 326 IAC 2-7-20(b)(1) and (c)(1). The Permittee shall make such records available, upon reasonable request, for public review.

Such records shall consist of all information required to be submitted to IDEM, OAQ in the notices specified in 326 IAC 2-7-20(b)(1) and (c)(1).

(b) The Permittee may make Section 502(b)(10) of the Clean Air Act changes (this term is defined at 326 IAC 2-7-1(36)) without a permit revision, subject to the constraint of 326 IAC 2-7-20(a). For each such Section 502(b)(10) of the Clean Air Act change, the required written notification shall include the following:

(1) A brief description of the change within the source;

(2) The date on which the change will occur;

(3) Any change in emissions; and

(4) Any permit term or condition that is no longer applicable as a result of the change.

The notification which shall be submitted is not considered an application form, report or compliance certification. Therefore, the notification by the Permittee does not require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(c) Emission Trades [326 IAC 2-7-20(c)]
The Permittee may trade emissions increases and decreases at the source, where the applicable SIP provides for such emission trades without requiring a permit revision, subject to the constraints of Section (a) of this condition and those in 326 IAC 2-7-20(c).

(d) Alternative Operating Scenarios [326 IAC 2-7-20(d)]
The Permittee may make changes at the source within the range of alternative operating scenarios that are described in the terms and conditions of this permit in accordance with 326 IAC 2-7-5(9). No prior notification of IDEM, OAQ, or U.S. EPA is required.

(e) Backup fuel switches specifically addressed in, and limited under, Section D of this permit shall not be considered alternative operating scenarios. Therefore, the notification requirements of part (a) of this condition do not apply.

B.22 Source Modification Requirement [326 IAC 2-7-10.5]

A modification, construction, or reconstruction is governed by the requirements of 326 IAC 2.

B.23 Inspection and Entry [326 IAC 2-7-6] [IC 13-14-2-2] [IC 13-30-3-1] [IC 13-17-3-2]

Upon presentation of proper identification cards, credentials, and other documents as may be required by law, and subject to the Permittee’s right under all applicable laws and regulations to assert that the information collected by the agency is confidential and entitled to be treated as such, the Permittee shall allow IDEM, OAQ, U.S. EPA, or an authorized representative to perform the following:

(a) Enter upon the Permittee's premises where a Part 70 source is located, or emissions related activity is conducted, or where records must be kept under the conditions of this permit;

(b) As authorized by the Clean Air Act, IC 13-14-2-2, IC 13-17-3-2, and IC 13-30-3-1, have access to and copy any records that must be kept under the conditions of this permit;

(c) As authorized by the Clean Air Act, IC 13-14-2-2, IC 13-17-3-2, and IC 13-30-3-1, inspect any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit;

(d) As authorized by the Clean Air Act, IC 13-14-2-2, IC 13-17-3-2, and IC 13-30-3-1, sample or monitor substances or parameters for the purpose of assuring compliance with this permit or applicable requirements; and

(e) As authorized by the Clean Air Act, IC 13-14-2-2, IC 13-17-3-2, and IC 13-30-3-1, utilize any photographic, recording, testing, monitoring, or other equipment for the purpose of assuring compliance with this permit or applicable requirements.

B.24 Transfer of Ownership or Operational Control [326 IAC 2-7-11]

(a) The Permittee must comply with the requirements of 326 IAC 2-7-11 whenever the Permittee seeks to change the ownership or operational control of the source and no other change in the permit is necessary.

(b) Any application requesting a change in the ownership or operational control of the source shall contain a written agreement containing a specific date for transfer of permit responsibility, coverage and liability between the current and new Permittee. The application shall be submitted to:

Indiana Department of Environmental Management
Permit Administration and Support Section, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

Any such application does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(c) The Permittee may implement administrative amendment changes addressed in the request for an administrative amendment immediately upon submittal of the request. [326 IAC 2-7-11(c)(3)]

B.25 Annual Fee Payment [326 IAC 2-7-19] [326 IAC 2-7-5(7)] [326 IAC 2-1.1-7]

(a) The Permittee shall pay annual fees to IDEM, OAQ within thirty (30) calendar days of receipt of a billing. Pursuant to 326 IAC 2-7-19(b), if the Permittee does not receive a bill from IDEM, OAQ the applicable fee is due April 1 of each year.

(b) Except as provided in 326 IAC 2-7-19(e), failure to pay may result in administrative enforcement action or revocation of this permit.

(c) The Permittee may call the following telephone numbers: 1-800-451-6027 or 317-233-4230 (ask for OAQ, Billing, Licensing, and Training Section), to determine the appropriate permit fee.

B.26 Credible Evidence [326 IAC 2-7-5(3)] [326 IAC 2-7-6] [62 FR 8314] [326 IAC 1-1-6]

For the purpose of submitting compliance certifications or establishing whether or not the Permittee has violated or is in violation of any condition of this permit, nothing in this permit shall preclude the use, including the exclusive use, of any credible evidence or information relevant to whether the Permittee would have been in compliance with the condition of this permit if the appropriate performance or compliance test or procedure had been performed.

SECTION C SOURCE OPERATION CONDITIONS

Entire Source

Emission Limitations and Standards [326 IAC 2-7-5(1)]

C.1 Particulate Emission Limitations For Processes with Process Weight Rates Less Than One Hundred (100) Pounds per Hour [326 IAC 6-3-2]

Pursuant to 326 IAC 6-3-2(e)(2), particulate emissions from any process not exempt under 326 IAC 6-3-1(b) or (c) which has a maximum process weight rate less than 100 pounds per hour and the methods in 326 IAC 6-3-2(b) through (d) do not apply shall not exceed 0.551 pounds per hour.

C.2 Opacity [326 IAC 5-1]

Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-1 (Applicability) and 326 IAC 5-1-3 (Temporary Alternative Opacity Limitations), opacity shall meet the following, unless otherwise stated in this permit:

(a) Opacity shall not exceed an average of forty percent (40%) in any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.

(b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

C.3 Open Burning [326 IAC 4-1] [IC 13-17-9]

The Permittee shall not open burn any material except as provided in 326 IAC 4-1-3, 326 IAC 4-1-4 or 326 IAC 4-1-6. The previous sentence notwithstanding, the Permittee may open burn in accordance with an open burning approval issued by the Commissioner under 326 IAC 4-1-4.1.

C.4 Incineration [326 IAC 4-2] [326 IAC 9-1-2]

The Permittee shall not operate an incinerator except as provided in 326 IAC 4-2 or in this permit. The Permittee shall not operate a refuse incinerator or refuse burning equipment except as provided in 326 IAC 9-1-2 or in this permit.

C.5 Fugitive Dust Emissions [326 IAC 6-4]

The Permittee shall not allow fugitive dust to escape beyond the property line or boundaries of the property, right-of-way, or easement on which the source is located, in a manner that would violate 326 IAC 6-4 (Fugitive Dust Emissions). 326 IAC 6-4-2(4) is not federally enforceable.

C.6 Stack Height [326 IAC 1-7]

The Permittee shall comply with the applicable provisions of 326 IAC 1-7 (Stack Height Provisions), for all exhaust stacks through which a potential (before controls) of twenty-five (25) tons per year or more of particulate matter or sulfur dioxide is emitted. The provisions of 326 IAC 1-7-1(3), 326 IAC 1-7-2, 326 IAC 1-7-3(c) and (d), 326 IAC 1-7-4, and 326 IAC 1-7-5(a), (b), and (d) are not federally enforceable.

C.7 Asbestos Abatement Projects [326 IAC 14-10] [326 IAC 18] [40 CFR 61, Subpart M]

(a) Notification requirements apply to each owner or operator. If the combined amount of regulated asbestos containing material (RACM) to be stripped, removed or disturbed is at least 260 linear feet on pipes or 160 square feet on other facility components, or at least

thirty-five (35) cubic feet on all facility components, then the notification requirements of 326 IAC 14-10-3 are mandatory. All demolition projects require notification whether or not asbestos is present.

(b) The Permittee shall ensure that a written notification is sent on a form provided by the Commissioner at least ten (10) working days before asbestos stripping or removal work or before demolition begins, per 326 IAC 14-10-3, and shall update such notice as necessary, including, but not limited to the following:

(1) When the amount of affected asbestos containing material increases or decreases by at least twenty percent (20%); or

(2) If there is a change in the following:

(A) Asbestos removal or demolition start date;

(B) Removal or demolition contractor; or

(C) Waste disposal site.

(c) The Permittee shall ensure that the notice is postmarked or delivered according to the guidelines set forth in 326 IAC 14-10-3(2).

(d) The notice to be submitted shall include the information enumerated in 326 IAC 14-10-3(3).

All required notifications shall be submitted to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

The notice shall include a signed certification from the owner or operator that the information provided in this notification is correct and that only Indiana licensed workers and project supervisors will be used to implement the asbestos removal project. The notifications do not require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(e) Procedures for Asbestos Emission Control
The Permittee shall comply with the applicable emission control procedures in 326 IAC 14-10-4 and 40 CFR 61.145(c). Per 326 IAC 14-10-1, emission control requirements are applicable for any removal or disturbance of RACM greater than three (3) linear feet on pipes or three (3) square feet on any other facility components or a total of at least 0.75 cubic feet on all facility components.

(f) Demolition and Renovation
The Permittee shall thoroughly inspect the affected facility or part of the facility where the demolition or renovation will occur for the presence of asbestos pursuant to 40 CFR 61.145(a).

(g) Indiana Licensed Asbestos Inspector
The Permittee shall comply with 326 IAC 14-10-1(a) that requires the owner or operator, prior to a renovation/demolition, to use an Indiana Licensed Asbestos Inspector to

thoroughly inspect the affected portion of the facility for the presence of asbestos. The requirement to use an Indiana Licensed Asbestos inspector is not federally enforceable.

Testing Requirements [326 IAC 2-7-6(1)]

C.8 Performance Testing [326 IAC 3-6]

(a) For performance testing required by this permit, a test protocol, except as provided elsewhere in this permit, shall be submitted to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

no later than thirty-five (35) days prior to the intended test date. The protocol submitted by the Permittee does not require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(b) The Permittee shall notify IDEM, OAQ of the actual test date at least fourteen (14) days prior to the actual test date. The notification submitted by the Permittee does not require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(c) Pursuant to 326 IAC 3-6-4(b), all test reports must be received by IDEM, OAQ not later than forty-five (45) days after the completion of the testing. An extension may be granted by IDEM, OAQ if the Permittee submits to IDEM, OAQ a reasonable written explanation not later than five (5) days prior to the end of the initial forty-five (45) day period.

Compliance Requirements [326 IAC 2-1.1-11]

C.9 Compliance Requirements [326 IAC 2-1.1-11]

The commissioner may require stack testing, monitoring, or reporting at any time to assure compliance with all applicable requirements by issuing an order under 326 IAC 2-1.1-11. Any monitoring or testing shall be performed in accordance with 326 IAC 3 or other methods approved by the commissioner or the U. S. EPA.

Compliance Monitoring Requirements [326 IAC 2-7-5(1)] [326 IAC 2-7-6(1)]

C.10 Compliance Monitoring [326 IAC 2-7-5(3)] [326 IAC 2-7-6(1)] [40 CFR 64] [326 IAC 3-8]

(a) Unless otherwise specified in this permit, for all monitoring requirements not already legally required, the Permittee shall be allowed up to ninety (90) days from the date of permit issuance or of initial start-up, whichever is later, to begin such monitoring. If due to circumstances beyond the Permittee's control, any monitoring equipment required by this permit cannot be installed and operated no later than ninety (90) days after permit issuance or the date of initial startup, whichever is later, the Permittee may extend the compliance schedule related to the equipment for an additional ninety (90) days provided the Permittee notifies:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

in writing, prior to the end of the initial ninety (90) day compliance schedule, with full justification of the reasons for the inability to meet this date.

The notification which shall be submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

Unless otherwise specified in the approval for the new emission unit(s), compliance monitoring for new emission units or emission units added through a source modification shall be implemented when operation begins.

C.11 Instrument Specifications [326 IAC 2-1.1-11] [326 IAC 2-7-5(3)] [326 IAC 2-7-6(1)]

(a) When required by any condition of this permit, an analog instrument used to measure a parameter related to the operation of an air pollution control device shall have a scale such that the expected maximum reading for the normal range shall be no less than twenty percent (20%) of full scale.

(b) The Permittee may request that the IDEM, OAQ approve the use of an instrument that does not meet the above specifications provided the Permittee can demonstrate that an alternative instrument specification will adequately ensure compliance with permit conditions requiring the measurement of the parameters.

Corrective Actions and Response Steps [326 IAC 2-7-5] [326 IAC 2-7-6]

C.12 Emergency Reduction Plans [326 IAC 1-5-2] [326 IAC 1-5-3]

Pursuant to 326 IAC 1-5-2 (Emergency Reduction Plans; Submission):

(a) The Permittee shall prepare written emergency reduction plans (ERPs) consistent with safe operating procedures.

(b) These ERPs shall be submitted for approval to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

no later than 180 days from the date on which this source commences operation.

The ERP does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

(c) If the ERP is disapproved by IDEM, OAQ, the Permittee shall have an additional thirty (30) days to resolve the differences and submit an approvable ERP.

(d) These ERPs shall state those actions that will be taken, when each episode level is declared, to reduce or eliminate emissions of the appropriate air pollutants.

(e) Said ERPs shall also identify the sources of air pollutants, the approximate amount of reduction of the pollutants, and a brief description of the manner in which the reduction will be achieved.

(f) Upon direct notification by IDEM, OAQ that a specific air pollution episode level is in effect, the Permittee shall immediately put into effect the actions stipulated in the approved ERP for the appropriate episode level. [326 IAC 1-5-3]

C.13 Risk Management Plan [326 IAC 2-7-5(12)] [40 CFR 68]

If a regulated substance, as defined in 40 CFR 68, is present at a source in more than a threshold quantity, the Permittee must comply with the applicable requirements of 40 CFR 68.

C.14 Response to Excursions or Exceedances [40 CFR 64] [326 IAC 3-8] [326 IAC 2-7-5] [326 IAC 2-7-6]

(l) Upon detecting an excursion where a response step is required by the D Section, or an exceedance of a limitation, in this permit:

(a) The Permittee shall take reasonable response steps to restore operation of the emissions unit (including any control device and associated capture system) to its normal or usual manner of operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing excess emissions.

(b) The response shall include minimizing the period of any startup, shutdown or malfunction. The response may include, but is not limited to, the following:

(1) initial inspection and evaluation;

(2) recording that operations returned or are returning to normal without operator action (such as through response by a computerized distribution control system); or

(3) any necessary follow-up actions to return operation to normal or usual manner of operation.

(c) A determination of whether the Permittee has used acceptable procedures in response to an excursion or exceedance will be based on information available, which may include, but is not limited to, the following:

(1) monitoring results;

(2) review of operation and maintenance procedures and records; and/or

(3) inspection of the control device, associated capture system, and the process.

(d) Failure to take reasonable response steps shall be considered a deviation from the permit.

(e) The Permittee shall record the reasonable response steps taken.

C.15 Actions Related to Noncompliance Demonstrated by a Stack Test [326 IAC 2-7-5] [326 IAC 2-7-6]

(a) When the results of a stack test performed in conformance with Section C - Performance Testing, of this permit exceed the level specified in any condition of this permit, the Permittee shall submit a description of its response actions to IDEM, OAQ, no later than seventy-five (75) days after the date of the test.

(b) A retest to demonstrate compliance shall be performed no later than one hundred eighty (180) days after the date of the test. Should the Permittee demonstrate to IDEM, OAQ

that retesting in one hundred eighty (180) days is not practicable, IDEM, OAQ may extend the retesting deadline

(c) IDEM, OAQ reserves the authority to take any actions allowed under law in response to noncompliant stack tests.

The response action documents submitted pursuant to this condition do require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

C.16 Emission Statement [326 IAC 2-7-5(3)(C)(iii)] [326 IAC 2-7-5(7)] [326 IAC 2-7-19(c)] [326 IAC 2-6]

In accordance with the compliance schedule specified in 326 IAC 2-6-3(b)(1), starting in 2004 and every three (3) years thereafter, the Permittee shall submit by July 1 an emission statement covering the previous calendar year. The emission statement shall contain, at a minimum, the information specified in 326 IAC 2-6-4(c) and shall meet the following requirements:

(1) Indicate estimated actual emissions of all pollutants listed in 326 IAC 2-6-4(a);

(2) Indicate estimated actual emissions of regulated pollutants as defined by 326 IAC 2-7-1(32) (“Regulated pollutant, which is used only for purposes of Section 19 of this rule”) from the source, for purpose of fee assessment.

The statement must be submitted to:

Indiana Department of Environmental Management
Technical Support and Modeling Section, Office of Air Quality
100 North Senate Avenue
MC 61-50 IGCN 1003
Indianapolis, Indiana 46204-2251

The emission statement does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35).

C.17 General Record Keeping Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-6] [326 IAC 2-2] [326 IAC 2-3]

(a) Records of all required monitoring data, reports and support information required by this permit shall be retained for a period of at least five (5) years from the date of monitoring sample, measurement, report, or application. Support information includes the following:
- (AA) All calibration and maintenance records.
- (BB) All original strip chart recordings for continuous monitoring instrumentation.
- (CC) Copies of all reports required by the Part 70 permit.

Records of required monitoring information include the following:
- (AA) The date, place, as defined in this permit, and time of sampling or measurements.
- (BB) The dates analyses were performed.
- (CC) The company or entity that performed the analyses.
- (DD) The analytical techniques or methods used.
- (EE) The results of such analyses.
- (FF) The operating conditions as existing at the time of sampling or measurement.

These records shall be physically present or electronically accessible at the source location for a minimum of three (3) years. The records may be stored elsewhere for the

remaining two (2) years as long as they are available upon request. If the Commissioner makes a request for records to the Permittee, the Permittee shall furnish the records to the Commissioner within a reasonable time.

(b) Unless otherwise specified in this permit, for all record keeping requirements not already legally required, the Permittee shall be allowed up to ninety (90) days from the date of permit issuance or the date of initial start-up, whichever is later, to begin such record keeping.

(c) If there is a reasonable possibility (as defined in 326 IAC 2-2-8 (b)(6)(A), 326 IAC 2-2-8 (b)(6)(B), 326 IAC 2-3-2 (l)(6)(A), and/or 326 IAC 2-3-2 (l)(6)(B)) that a "project" (as defined in 326 IAC 2-2-1(oo) and/or 326 IAC 2-3-1(jj)) at an existing emissions unit, other than projects at a source with a Plantwide Applicability Limitation (PAL), which is not part of a "major modification" (as defined in 326 IAC 2-2-1(dd) and/or 326 IAC 2-3-1(y)) may result in significant emissions increase and the Permittee elects to utilize the "projected actual emissions" (as defined in 326 IAC 2-2-1(pp) and/or 326 IAC 2-3-1(kk)), the Permittee shall comply with following:

(1) Before beginning actual construction of the "project" (as defined in 326 IAC 2-2-1(oo) and/or 326 IAC 2-3-1(jj)) at an existing emissions unit, document and maintain the following records:

(A) A description of the project.

(B) Identification of any emissions unit whose emissions of a regulated new source review pollutant could be affected by the project.

(C) A description of the applicability test used to determine that the project is not a major modification for any regulated NSR pollutant, including:

(i) Baseline actual emissions;

(ii) Projected actual emissions;

(iii) Amount of emissions excluded under section 326 IAC 2-2-1(pp)(2)(A)(iii) and/or 326 IAC 2-3-1 (kk)(2)(A)(iii); and

(iv) An explanation for why the amount was excluded, and any netting calculations, if applicable.

(d) If there is a reasonable possibility (as defined in 326 IAC 2-2-8 (b)(6)(A) and/or 326 IAC 2-3-2 (l)(6)(A)) that a "project" (as defined in 326 IAC 2-2-1(oo) and/or 326 IAC 2-3-1(jj)) at an existing emissions unit, other than projects at a source with a Plantwide Applicability Limitation (PAL), which is not part of a "major modification" (as defined in 326 IAC 2-2-1(dd) and/or 326 IAC 2-3-1(y)) may result in significant emissions increase and the Permittee elects to utilize the "projected actual emissions" (as defined in 326 IAC 2-2-1(pp) and/or 326 IAC 2-3-1(kk)), the Permittee shall comply with following:

(1) Monitor the emissions of any regulated NSR pollutant that could increase as a result of the project and that is emitted by any existing emissions unit identified in (1)(B) above; and

(2) Calculate and maintain a record of the annual emissions, in tons per year on a calendar year basis, for a period of five (5) years following resumption of regular operations after the change, or for a period of ten (10) years following resumption

of regular operations after the change if the project increases the design capacity of or the potential to emit that regulated NSR pollutant at the emissions unit.

C.18 General Reporting Requirements [326 IAC 2-7-5(3)(C)] [326 IAC 2-1.1-11] [326 IAC 2-2] [40 CFR 64] [326 IAC 3-8]

(a) The Permittee shall submit the attached Quarterly Deviation and Compliance Monitoring Report or its equivalent. Proper notice submittal under Section B –Emergency Provisions satisfies the reporting requirements of this paragraph. Any deviation from permit requirements, the date(s) of each deviation, the cause of the deviation, and the response steps taken must be reported except that a deviation required to be reported pursuant to an applicable requirement that exists independent of this permit, shall be reported according to the schedule stated in the applicable requirement and does not need to be included in this report. This report shall be submitted not later than thirty (30) days after the end of the reporting period. The Quarterly Deviation and Compliance Monitoring Report shall include a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official" as defined by 326 IAC 2-7-1(35). A deviation is an exceedance of a permit limitation or a failure to comply with a requirement of the permit.

(b) The address for report submittal is:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

(c) Unless otherwise specified in this permit, any notice, report, or other submission required by this permit shall be considered timely if the date postmarked on the envelope or certified mail receipt, or affixed by the shipper on the private shipping receipt, is on or before the date it is due. If the document is submitted by any other means, it shall be considered timely if received by IDEM, OAQ on or before the date it is due.

(d) The first report shall cover the period commencing on the date of issuance of this permit or the date of initial start-up, whichever is later, and ending on the last day of the reporting period. Reporting periods are based on calendar years, unless otherwise specified in this permit. For the purpose of this permit, “calendar year” means the twelve (12) month period from January 1 to December 31 inclusive.

(e) If the Permittee is required to comply with the recordkeeping provisions of (d) in Section C - General Record Keeping Requirements for any “project” (as defined in 326 IAC 2-2-1 (oo) and/or 326 IAC 2-3-1 (jj)) at an existing emissions unit, and the project meets the following criteria, then the Permittee shall submit a report to IDEM, OAQ:

(1) The annual emissions, in tons per year, from the project identified in (c)(1) in Section C- General Record Keeping Requirements exceed the baseline actual emissions, as documented and maintained under Section C- General Record Keeping Requirements (c)(1)(C)(i), by a significant amount, as defined in 326 IAC 2-2-1 (ww) and/or 326 IAC 2-3-1 (pp), for that regulated NSR pollutant, and

(2) The emissions differ from the preconstruction projection as documented and maintained under Section C - General Record Keeping Requirements (c)(1)(C)(ii).

(f) The report for project at an existing emissions unit shall be submitted no later than sixty (60) days after the end of the year and contain the following:

(1) The name, address, and telephone number of the major stationary source.

(2) The annual emissions calculated in accordance with (d)(1) and (2) in Section C - General Record Keeping Requirements.

(3) The emissions calculated under the actual-to-projected actual test stated in 326 IAC 2-2-2(d)(3) and/or 326 IAC 2-3-2(c)(3).

(4) Any other information that the Permittee wishes to include in this report such as an explanation as to why the emissions differ from the preconstruction projection.

Reports required in this part shall be submitted to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

(g) The Permittee shall make the information required to be documented and maintained in accordance with (c) in Section C- General Record Keeping Requirements available for review upon a request for inspection by IDEM, OAQ. The general public may request this information from the IDEM, OAQ under 326 IAC 17.1.

Stratospheric Ozone Protection

C.19 Compliance with 40 CFR 82 and 326 IAC 22-1

Pursuant to 40 CFR 82 (Protection of Stratospheric Ozone), Subpart F, except as provided for motor vehicle air conditioners in Subpart B, the Permittee shall comply with applicable standards for recycling and emissions reduction.

SECTION D.1 EMISSIONS UNIT OPERATION CONDITIONS

Emissions Unit Description: Raw Material Handling

(a) One (1) iron ore concentrate unloading and storage area, identified as EU001, approved in 2013 for construction, with a maximum capacity of 4,950 tons per hour, consisting of the following:

(1) One (1) thaw shed, one (1) rotary rail car dumper, one (1) pedestal mount breaker, two (2) grizzlies, two (2) apron feeders, one (1) dribble conveyor, one (1) breaker, identified as EU001a, using baghouse CE001 as control, exhausting to stack SV001.

(2) One (1) covered conveyor transferring to concentrate storage building which contains four (4) covered conveyors, four (4) load hoppers, and a storage pile identified as EU001b, exhausting inside the building.

(b) One (1) limestone unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU002a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU002b, exhausting inside the limestone storage pile enclosure. Under 40 CFR 60, Subpart OOO, the limestone unloading and storage area conveyor is considered an affected facility.

(c) One (1) dolomite unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU003a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU003b, exhausting inside the dolomite storage pile enclosure. Under 40 CFR 60, Subpart OOO, the dolomite unloading and storage area conveyor is considered an affected facility.

(d) One (1) coke breeze unloading and storage area, approved in 2013 for construction, with a maximum capacity of 7 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU004a, exhausting uncontrolled to atmosphere.

(2) One (1) pneumatic conveyance system and one (1) coke breeze grinding mill bin identified as EU004b, with a maximum capacity of 1,100 tons, using baghouse CE004 as control, exhausting to stack SV004.

(e) One (1) bentonite unloading and storage area, identified as EU005, approved in 2013 for construction, consisting of one (1) bentonite storage bin with a maximum capacity of 440 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE005 as control, exhausting inside the building.

(f) One (1) organic binder unloading and storage area, identified as EU006, approved in 2013 for construction, consisting of one (1) organic binder feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE006 as control, exhausting inside the building.

(g) One (1) soda ash unloading and storage area, identified as EU007, approved in 2013 for construction, consisting of one (1) soda ash feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE007 as control, exhausting inside the building.

(The information describing the process contained in this emissions unit description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.1.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Raw Material Handling operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations		
		Pollutant	Gr/dscf	Lb/hr
Iron Ore Concentrate Unloading (EU001a)	Baghouse CE001 (SV001)	PM	0.002	0.95
		PM_{10}*	0.002	0.95
		$PM_{2.5}$*	0.002	0.95
Coke Breeze Unloading and Storage Area (EU004b)	Baghouse CE004 (SV004)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429
Bentonite Unloading and Storage Area (EU005)	Bin Vent Filter CE005 (inside building)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429
Organic Binder Unloading and Storage Area (EU006)	Bin Vent Filter CE006 (inside building)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429
Soda Ash Unloading and Storage Area (EU007)	Bin Vent Filter CE007 (inside building)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the following Raw Material Handling operations shall be a fugitive dust control plan, an enclosure, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Iron Ore Concentrate Transfer and Storage Area	EU001b	PM	3.93	17.21
		PM_{10}*	1.57	6.88
		$PM_{2.5}$*	1.57	6.88
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	PM	0.05	0.10
		PM_{10}*	0.02	0.04
		$PM_{2.5}$*	0.02	0.04
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	PM	0.03	0.06
		PM_{10}*	0.01	0.02
		$PM_{2.5}$*	0.01	0.02

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the following Truck Unloading operations shall be a fugitive dust

control plan, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM	1.07 E-03	2.20 E-03
		PM_{10}*	1.07 E-03	2.20 E-03
		$PM_{2.5}$*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM	5.33 E-04	1.22 E-03
		PM_{10}*	5.33 E-04	1.22 E-03
		$PM_{2.5}$*	5.33 E-04	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM	7.45 E-04	3.26 E-03
		PM_{10}*	3.52 E-04	1.54 E-03
		$PM_{2.5}$*	1.02 E-04	4.45 E-04

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Raw Material Handling operations shall be as follows:

(1) The weighted average Fluoride Concentration in the Iron Ore Concentrate shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and the following:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Iron Ore Concentrate Unloading (EU001a)	Baghouse CE001 (SV001)	F	4.73 E-05

D.1.2 Particulate [326 IAC 6-3-2]

Pursuant to 326 IAC 6-3-2 (Particulate Emissions Limitations for Manufacturing Processing), the allowable particulate emission rate (E) shall not exceed the listed pounds per hour when operating at the associated process weight rate (P) tons per hour:

Unit Description	Max. Process Weight Rate (tons/hr)	Particulate Emission Limit (lb/hr)
Iron Ore Concentrate Transfer and Storage Area (EU001b)	4,950	100.2
Limestone Unloading and Storage (EU002a)	495	68.8
Dolomite Unloading and Storage (EU003a)	495	68.8
Coke Breeze Unloading (EU004a)	7	15.1

(a) The pounds per hour limitation (E) was calculated with the following equation:

Interpolation of the data for the process weight rate up to 60,000 pounds per hour shall be accomplished by use of the equation:

$$E = 4.10\ P^{0.67}$$

Where E = rate of emission in pounds per hour; and
P = process weight rate in tons per hour

Interpolation and extrapolation of the data for the process weight rate in excess of sixty thousand (60,000) pounds per hour shall be accomplished by use of the equation:

$$E = 55.0\ P^{0.11} - 40$$

Where E = rate of emission in pounds per hour; and
P = process weight rate in tons per hour

(b) Pursuant to 326 IAC 6-3-2(e)(3), when the process weight exceeds 200 tons per hour, the maximum allowable emissions may exceed the emission limits shown paragraph (a), provided the concentration of particulate matter in the gas discharged to the atmosphere is less than 0.10 pounds per 1,000 pounds of gases.

D.1.3 Preventive Maintenance Plan [326 IAC 2-7-5(12)]

A Preventive Maintenance Plan is required for these facilities and their control devices. Section B - Preventive Maintenance Plan contains the Permittee's obligation with regard to the preventive maintenance plan required by this condition.

Compliance Determination Requirements

D.1.4 Particulate Control

(a) In order to comply with Conditions D.1.1, the following control devices for particulate control shall be in operation and control particulate emissions from the associated emission units at all times those emission units are in operation:

Emission Unit Description	Emission Unit ID	Control Device
Iron Ore Concentrate Unloading & Storage Area	EU001	Baghouse CE001
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	Baghouse CE004
Bentonite Unloading & Storage Area	EU005	Bin Vent CE005
Organic Binder Unloading & Storage Area	EU006	Bin Vent CE006
Soda Ash Unloading & Storage Area	EU007	Bin Vent CE007

(b) In the event that bag failure is observed in a multi-compartment baghouse, if operations will continue for ten (10) days or more after the failure is observed before the failed units will be repaired or replaced, the Permittee shall promptly notify the IDEM, OAQ of the expected date the failed units will be repaired or replaced. The notification shall also include the status of the applicable compliance monitoring parameters with respect to normal, and the results of any response actions taken up to the time of notification.

D.1.5 Testing Requirements [326 IAC 2-7-6(1), (6)] [326 IAC 2-1.1-11]

(a) Group 1 Testing Requirements

Not later than 180 days from plant startup, in order to demonstrate compliance with Condition D.1.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouse CE001 utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

(b) Group 2 Testing Requirements

Not later than 180 days from the date the last of the tests required in Conditions D.1.5(a), D.2.6(a), D.3.8, and D.4.4(a) is completed or not later than 360 days from plant startup, whichever is later, in order to demonstrate compliance with Condition D.1.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouse CE004 utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

D.1.6 Total Fluorides Emissions and Fluoride Content

(I) In order to ensure compliance with Condition D.1.1(d), the Permittee shall utilize one of the following options:

(a) Providing vendor analysis of iron ore concentrate delivered. The certification shall include:

(1) The name of the iron ore concentrate supplier; and

(2) The location of the ore concentrate when the sample was collected for analysis to determine the properties of the iron ore concentrate, specifically including whether the iron ore concentrate was sampled as delivered to the affected facility or whether the iron ore concentrate was collected from iron ore concentrate in storage at an iron ore concentrate preparation plant, at a iron ore concentrate supplier's facility, or at another location. The certification shall include the name of the iron ore concentrate storage facility, or iron ore concentrate preparation plant (where the sample was collected); and

(3) The results of the analysis of the iron ore concentrate from which the shipment came (or of the shipment itself).

(4) The methods used to determine the fluoride concentration of the iron ore concentrate; or

(b) Sampling and analyzing the iron ore concentrate by using the following procedures:

(1) Minimum Iron Ore Concentrate Sampling Requirements and Analysis Methods:

(A) The iron ore concentrate sample acquisition point shall be at a location where representative samples of the total iron ore concentrate are delivered to Magnetation, LLC;

(B) Iron ore concentrate shall be sampled at least one (1) time per delivery;

(C) Preparation of the iron ore concentrate sample and fluoride concentration analysis shall be conducted utilizing methods as approved by the commissioner.

For samples for which the fluoride concentration is less than the detection limit, the Permittee shall use a fluoride concentration level equal to one-half the detection limit.

(II) Compliance with the Fluoride Concentration limit in Condition D.1.1(d) shall be determined using a monthly weighted average. The monthly weighted average shall be determined by the following equation:

$$WA_{Month} = \left[\sum_i \left(A_i \times S_i \right) \right] \div \left[\sum_i S_i \right]$$

Where:

WA_{MONTH} = the Fluoride Concentrate weighted average in mg/kg for the month
A_i = the Fluoride concentration of the iron ore concentrate shipment (i) as determined under Condition D.1.6(I).
S_i = the weight of the iron ore concentrate shipment (i).

Compliance Monitoring Requirements [326 IAC 2-7-5(1)] [326 IAC 2-7-6(1)]

D.1.7 Visible Emissions Notations

(a) Visible emission notations of the exhausts from baghouses CE001 and CE004 shall be performed once per day during normal daylight operations. A trained employee shall record whether emissions are normal or abnormal.

(b) For processes operated continuously, "normal" means those conditions prevailing, or expected to prevail, eighty percent (80%) of the time the process is in operation, not counting startup or shut down time.

(c) In the case of batch or discontinuous operations, readings shall be taken during that part of the operation that would normally be expected to cause the greatest emissions.

(d) A trained employee is an employee who has worked at the plant at least one (1) month and has been trained in the appearance and characteristics of normal visible emissions for that specific process.

(e) If abnormal emissions are observed, the Permittee shall take a reasonable response. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the reasonable response steps required by this condition. Failure to take response steps shall be considered a deviation from this permit.

D.1.8 Baghouse Parametric Monitoring

The Permittee shall record the pressure drop across baghouses CE001 and CE004 at least once per day when the associated emission unit is in operation. When, for any one reading, the pressure drop across the baghouse is outside of the normal range, the Permittee shall take a reasonable response. The normal range for this unit is a pressure drop of 0.5 and 8.0 inches of water unless a different upper-bound or lower-bound value for this range is determined during the latest stack test. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the reasonable response steps required by this condition. A pressure reading that is outside the above mentioned range is not a deviation from this permit. Failure to take response steps shall be considered a deviation from this permit.

The instruments used for determining the pressure drop shall comply with Section C - Instrument Specifications, of this permit, shall be subject to approval by IDEM, OAQ and shall be calibrated

or replaced at least once every six (6) months or other time period specified by the manufacturer. The Permittee shall maintain records of the manufacturer's specifications, if used.

D.1.9 Bin Vent Inspections

The Permittee shall perform semi-annual bin vent inspections for bin vents CE005, CE006, and CE007. All defective filters shall be replaced.

D.1.10 Broken or Failed Bag Detection

(a) For a single compartment baghouse controlling emissions from a process operated continuously, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

(b) For a single compartment baghouse controlling emissions from a batch process, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. The emissions unit shall be shut down no later than the completion of the processing of the material in the emissions unit. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

Bag failure can be indicated by a significant drop in the baghouse's pressure reading with abnormal visible emissions, by an opacity violation, or by other means such as gas temperature, flow rate, air infiltration, leaks, dust traces, or triboflows.

D.1.11 Bin Vent Filter Failure Detection

In the event that a bin vent filter malfunction has been observed:

Failed units and the associated process will be shut down immediately until the failed units have been repaired or replaced. The emissions unit shall be shut down no later than the completion of the processing of the material in the line. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

D.1.12 Record Keeping Requirements

(a) Weighted Average Fluoride Concentration

To document the compliance status with Condition D.1.1(d) and D.1.6, the Permittee shall maintain monthly records in accordance with (1) through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.1.1(d).

(1) Calendar dates covered in the compliance determination period.

(2) Fluoride concentration of the iron ore concentrate from each shipment.

(3) The weight of each shipment of iron ore concentrate.

(4) The weighted average Fluoride concentration in the iron ore concentrate for the compliance period.

(b) To document the compliance status with Condition D.1.7, the Permittee shall maintain a daily record of visible emission notations of the exhausts from baghouses CE001 and

CE004. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(c) To document the compliance status with Condition D.1.8, the Permittee shall maintain a daily record of the pressure drop across baghouses CE001 and CE004. The Permittee shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).-

(d) To document the compliance status with Condition D.1.9, the Permittee shall maintain a record of the semi-annual inspections of bin vents CE005, CE006, and CE007.

(e) To document compliance status with Condition D.1.1(a), the Permittee shall maintain records of the manufacturer's specifications for bin vents CE005, CE006, and CE007.

(g) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.1.13 Reporting Requirements

(a) A quarterly report of the weighted average fluoride concentration of the iron ore concentrate delivered to EU001 and a quarterly summary of the information to document the compliance status with D.1.1(d) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

SECTION D.2 EMISSIONS UNIT OPERATION CONDITIONS

Emissions Unit Description: Additive Grinding and Mixing

(h) One (1) bentonite additive system, identified as EU008, approved in 2013 for construction, consisting of one (1) bentonite feed bin with a maximum capacity of 220 ton, with a maximum capacity of 3.0 tons per hour, using bin vent CE008 as control, exhausting inside the building.

(i) One (1) coke breeze additive system, identified as EU009, approved in 2013 for construction, with a maximum capacity of 16.5 tons per hour, using baghouse CE009 as control, exhausting to stack SV009, consisting of one (1) coke breeze conveyor, one (1) roller mill for coke breeze grinding with a nominal capacity of 11 tons per hour, one (1) product separation cyclone, and one (1) coke breeze bin with a maximum capacity of 220 tons.

(j) One (1) limestone and dolomite grinding mill bin area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) load hopper, one (1) enclosed vibrating grizzly feeder/screener, and one (1) covered belt feeder, identified as EU025a, exhausting uncontrolled to the atmosphere.

(2) One (1) additive conveyor, one (1) dolomite grinding mill bin with a maximum capacity of 440 tons, and one (1) limestone grinding mill bin with a maximum capacity of 440 tons, identified as EU025b, using baghouse CE023 as control, exhausting inside the building. Under 40 CFR 60, Subpart OOO, these units of the limestone and dolomite grinding mill bin area are considered affected facilities.

(k) One (1) ground limestone and dolomite additive system, identified as EU010, approved in 2013 for construction, with a maximum capacity of 132 tons per hour, using baghouse CE010 as control, exhausting to stack SV010, consisting of the following:

(1) One (1) limestone feed conveyor, one (1) dolomite feed conveyor, one (1) roller mill feed conveyor, one (1) roller mill for limestone and dolomite, one (1) product separation cyclone, and one (1) limestone and dolomite bin with a maximum capacity of 1,100 tons. Under 40 CFR 60, Subpart OOO, these units of the ground limestone and dolomite additive system are considered affected facilities.

(2) One (1) natural gas fired air heater, with a maximum heat input capacity of 19 MMBtu per hour.

(l) One (1) mixing area material handling system, identified as EU011, approved in 2013 for construction, with a maximum capacity of 780 tons per hour, using baghouse CE011 as control, exhausting inside the building, consisting of two (2) filter cake feed conveyors, two (2) mixer feed conveyors, and two (2) mixers.

(m) One (1) hearth layer bin system, identified as EU012, approved in 2013 for construction, with a maximum capacity of 660 tons of iron oxide pellets per hour, using baghouse CE012 as control, exhausting to stack SV012, consisting of two (2) hearth layer conveyors and one (1) hearth layer bin.

(The information describing the process contained in this emissions unit description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.2.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Additive Grinding and Mixing operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations		
		Pollutant	Gr/dscf	Lb/hr
Bentonite Additive System (EU008)	Bin Vent Filter CE008 (inside building)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429
Coke Breeze Additive System (EU009)	Baghouse CE009 (SV009)	PM	0.002	0.09
		PM_{10}*	0.002	0.09
		$PM_{2.5}$*	0.002	0.09
Limestone and Dolomite Grinding Mill Bin Area (EU025b)	Baghouse CE023 (inside building)	PM	0.002	0.22
		PM_{10}*	0.002	0.22
		$PM_{2.5}$*	0.002	0.22
Ground Limestone and Dolomite Area Additive System (EU010)	Baghouse CE010 (SV010)	PM	0.002	0.32
		PM_{10}*	0.002	0.32
		$PM_{2.5}$*	0.002	0.32
Mixing Area Material Handling System (EU011)	Baghouse CE011 (inside building)	PM	0.002	0.34
		PM_{10}*	0.002	0.34
		$PM_{2.5}$*	0.002	0.34
Hearth Layer Bin System (EU012)	Baghouse CE012 (SV012)	PM	0.002	0.15
		PM_{10}*	0.002	0.15
		$PM_{2.5}$*	0.002	0.15

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Additive Grinding and Mixing operations shall be an enclosure conveyor and Grizzly Feeder, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone/Dolomite Hopper &Grizzly Feeder/Screener and Belt Feeder	EU025a	PM	0.90	1.92
		PM_{10}*	0.33	0.70
		$PM_{2.5}$*	0.33	0.70

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for the Additive Grinding and Mixing operations shall be as follows:

Emission Unit Description (ID)	Control Device	Pollutant	Emission Limitations
Ground Limestone/ Dolomite Additive System Air Heater (EU010)	No Control	SO_2	0.00048 lb/MMBtu
	Low NO_x Burners	NO_x	0.012 lb/MMBtu
	No Control	F	9.40×10^{-6} lb/MMBtu
		GHG (as CO_2e)	9,737 tons per 12-month period

*Note: PM, PM10, and PM2.5 combustion emissions for EU010 are accounted for in the material handling limits under Condition D.2.1(a).

This unit shall only combust natural gas, and the Permittee shall practice good combustion practices when this unit is combusting natural gas.

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Additive Grinding and Mixing operations shall be as follows:

(1) The weighted average Fluoride Concentration in the blended filter cake handled by the mixing area material handling system (EU011) and hearth layer bin system (EU012) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Mixing Area Material Handling System (EU011)	Baghouse CE011 (inside building)	F	1.71 E-05
Hearth Layer Bin System (EU012)	Baghouse CE012 (SV012)	F	7.55 E-06

D.2.2 Particulate [326 IAC 6-3-2]

Pursuant to 326 IAC 6-3-2 (Particulate Emissions Limitations for Manufacturing Processing), the allowable particulate emission rate (E) shall not exceed the listed pounds per hour when operating at the associated process weight rate (P) tons per hour:

Unit Description	Max. Process Weight Rate (tons/hr)	Particulate Emission Limit (lb/hr)
Limestone and Dolomite Grinding Mill Bin Area (EU025a)	495	68.8

(a) The pounds per hour limitation (E) was calculated with the following equation:

Interpolation and extrapolation of the data for the process weight rate in excess of sixty thousand (60,000) pounds per hour shall be accomplished by use of the equation:

$$E = 55.0\ P^{0.11} - 40$$

Where E = rate of emission in pounds per hour; and
P = process weight rate in tons per hour

(b) Pursuant to 326 IAC 6-3-2(e)(3), when the process weight exceeds 200 tons per hour, the maximum allowable emissions may exceed the emission limits shown paragraph (a), provided the concentration of particulate matter in the gas discharged to the atmosphere is less than 0.10 pounds per 1,000 pounds of gases.

D.2.3 Preventive Maintenance Plan [326 IAC 2-7-5(12)]

A Preventive Maintenance Plan is required for these facilities and their control devices. Section B - Preventive Maintenance Plan contains the Permittee's obligation with regard to the preventive maintenance plan required by this condition.

Compliance Determination Requirements

D.2.4 Particulate Control

(a) In order to comply with Conditions D.2.1, the following control devices for particulate control shall be in operation and control particulate emissions from the associated emission units at all times those emission units are in operation:

Emission Unit Description	Emission Unit ID	Control Device
Bentonite Additive System	EU008	Bin Vent Filter CE008
Coke Breeze Additive System	EU009	Baghouse CE009
Limestone/Dolomite Grinding Mill Bin Area	EU025b	Baghouse CE023
Ground Limestone/ Dolomite Additive System	EU010	Baghouse CE010
Mixing Area Material Handling System	EU011	Baghouse CE011
Hearth Layer Bin System	EU012	Baghouse CE012

(b) In the event that bag failure is observed in a multi-compartment baghouse, if operations will continue for ten (10) days or more after the failure is observed before the failed units will be repaired or replaced, the Permittee shall promptly notify the IDEM, OAQ of the expected date the failed units will be repaired or replaced. The notification shall also include the status of the applicable compliance monitoring parameters with respect to normal, and the results of any response actions taken up to the time of notification.

D.2.5 NOx Control

In order to comply with Condition D.2.1(c), low NO_x burners for NO_x control shall be in operation and control NO_x emissions from the Ground Limestone/ Dolomite Additive System Air Heater (EU010) at all times the emission unit is in operation.

D.2.6 Testing Requirements [326 IAC 2-7-6(1), (6)] [326 IAC 2-1.1-11]

(a) Group 1 Testing Requirements

Not later than 180 days from plant startup, in order to demonstrate compliance with Conditions D.2.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouses CE009, CE023, and CE010 utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

(b) Group 2 Testing Requirements

Not later than 180 days from the date the last of the tests required in Conditions D.1.5(a), D.2.6(a), D.3.8, and D.4.4(a) is completed or not later than 360 days from plant startup, whichever is later, in order to demonstrate compliance with Condition D.2.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouses CE011 and CE012 utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

D.2.7 Total Fluorides Emissions and Fluoride Content

In order to ensure compliance with Condition D.2.1(d), the Permittee shall comply with the requirements of Condition D.1.6 (Total Fluorides Emissions and Fluoride Content).

D.2.8 Greenhouse Gases (GHGs)

To determine the compliance status with Condition D.2.1(c), the following equation shall be used to determine the CO_2e emissions from the Ground Limestone/ Dolomite Additive System Air Heater, identified as EU010:

CO_2e emissions (tons/month) = Fuel Usage (mmscf/month) x Heat Content (mmbtu/mmscf) x [CO_2 EF (kg/mmbtu) x CO_2 GWP + CH_4 EF (kg/mmbtu) x CH_4 GWP + N_2O EF (kg/mmbtu) x N_2O GWP] x 2.2046 (lb/kg) x 1/2000 (ton/lb)

Where:
Fuel Usage (mmscf/month) = monthly fuel usage data from company records
Heat Content (mmbtu/mmscf) = standard value in AP-42 for natural gas or vendor data, if available
CO_2 EF (kg/mmbtu) = emission factor from GHG Mandatory Reporting Rule (MRR) (40 CFR 98, Subpart C) for natural gas
CH_4 EF (kg/mmbtu) = emission factor from GHG MRR (40 CFR 98, Subpart C) for natural gas
N_2O EF (kg/mmbtu) = emission factor from GHG MRR (40 CFR 98, Subpart C) for natural gas
CO_2 GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)
CH_4 GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)
N_2O GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)

Compliance Monitoring Requirements [326 IAC 2-7-5(1)] [326 IAC 2-7-6(1)]

D.2.9 Visible Emissions Notations

(a) Visible emission notations of the exhausts from baghouses CE009, CE010, and CE012 shall be performed once per day during normal daylight operations. A trained employee shall record whether emissions are normal or abnormal.

(b) For processes operated continuously, "normal" means those conditions prevailing, or expected to prevail, eighty percent (80%) of the time the process is in operation, not counting startup or shut down time.

(c) In the case of batch or discontinuous operations, readings shall be taken during that part of the operation that would normally be expected to cause the greatest emissions.

(d) A trained employee is an employee who has worked at the plant at least one (1) month and has been trained in the appearance and characteristics of normal visible emissions for that specific process.

(e) If abnormal emissions are observed, the Permittee shall take a reasonable response. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the reasonable response steps required by this condition. Failure to take response steps shall be considered a deviation from this permit.

D.2.10 Baghouse Parametric Monitoring

The Permittee shall record the pressure drop across baghouses CE009, CE010, and CE012 at least once per day when the associated emission unit is in operation. When, for any one reading, the pressure drop across the baghouse is outside of the normal range, the Permittee shall take a reasonable response. The normal range for this unit is a pressure drop of 0.5 and 8.0 inches of water unless a different upper-bound or lower-bound value for this range is determined during the latest stack test. Section C - Response to Excursions or Exceedances contains the Permittee's

obligation with regard to the reasonable response steps required by this condition. A pressure reading that is outside the above mentioned range is not a deviation from this permit. Failure to take response steps shall be considered a deviation from this permit.

The instruments used for determining the pressure drop shall comply with Section C - Instrument Specifications, of this permit, shall be subject to approval by IDEM, OAQ and shall be calibrated or replaced at least once every six (6) months or other time period specified by the manufacturer. The Permittee shall maintain records of the manufacturer's specifications, if used.

D.2.11 Baghouse and Bin Vent Inspections

(a) The Permittee shall perform semi-annual inspections for baghouses CE023 and CE011. All defective bags shall be replaced.

(b) The Permittee shall perform semi-annual inspections for bin vent CE008. All defective filters shall be replaced.

D.2.12 Broken or Failed Bag Detection

(a) For a single compartment baghouse controlling emissions from a process operated continuously, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

(b) For a single compartment baghouse controlling emissions from a batch process, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. The emissions unit shall be shut down no later than the completion of the processing of the material in the emissions unit. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

Bag failure can be indicated by a significant drop in the baghouse's pressure reading with abnormal visible emissions, by an opacity violation, or by other means such as gas temperature, flow rate, air infiltration, leaks, dust traces, or triboflows.

D.2.13 Bin Vent Filter Failure Detection

In the event that a bin vent filter malfunction has been observed:

Failed units and the associated process will be shut down immediately until the failed units have been repaired or replaced. The emissions unit shall be shut down no later than the completion of the processing of the material in the line. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

D.2.14 Record Keeping Requirements

(a) To document the compliance status with Conditions D.2.1(c) and D.2.8 the Permittee shall maintain records in accordance with (1) through (3) below. Records maintained for (1) through (3) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.2.1(c).

(1) Calendar dates covered in the compliance determination period.

(2) Natural gas usage for the Ground Limestone/ Dolomite Additive System Air Heater (EU010).

(3) Monthly records of the CO_2e emissions.

(b) To document the compliance status with Conditions D.2.1(d) and D.2.7, the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.2.1(d).

(c) To document the compliance status with Condition D.2.9, the Permittee shall maintain a daily record of visible emission notations of the exhausts from baghouses CE009, CE010, and CE012. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(d) To document the compliance status with Condition D.2.10, the Permittee shall maintain a daily record of the pressure drop across baghouses CE009, CE010, and CE012. The Permittee shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).

(e) To document the compliance status with Condition D.2.11, the Permittee shall maintain a record of the semi-annual inspections of bin vent CE008 and baghouses CE023 and CE011.

(f) To document compliance status with Condition D.2.1(a), the Permittee shall maintain records of the manufacturer's specifications for bin vent CE008 and baghouses CE023 and CE011.

(g) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.2.15 Reporting Requirements

(a) A quarterly report of CO_2e emissions and a quarterly summary of the information to document the compliance status with Condition D.2.1(c) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) A quarterly report of the weighted average fluoride concentration of the iron ore concentrate, utilized at EU011 and EU012, and a quarterly summary of the information to document the compliance status with D.2.1(d) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(c) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

SECTION D.3 EMISSIONS UNIT OPERATION CONDITIONS

Emissions Unit Description: Induration

(n) One (1) induration machine, approved in 2013 for construction, consisting of one (1) natural gas fired pellet hardening furnace, with a maximum heat input capacity of 436 MMBtu per hour and a maximum throughput rate of 450 tons per hour of iron oxide pellets, equipped with the following:

(1) One (1) furnace hood exhaust, identified as EU013, using hood exhaust baghouse CE013 as control, exhausting to stack SV013A.

(2) One (1) furnace windbox exhaust (WBE), identified as EU014, using one (1) gas suspension absorber (GSA) (CE015) and one (1) WBE baghouse (CE016) as control, exhausting to stack SV013B.

(3) One (1) furnace discharge system, identified as EU015, using baghouse CE017 as control, exhausting to stack SV014, consisting of one (1) dribble conveyor, one (1) discharge hopper, and two (2) discharge vibrating feeders each with a maximum throughput of 1155 tons per hour

(4) One (1) induced draft cross flow wet cooling tower, identified as EU24, with a capacity of 4,600 gallons of circulating water per minute and a maximum drift rate of 0.001%, exhausting to stack SV022.

(The information describing the process contained in this emissions unit description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.3.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for the Induration operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Pollutant	Emission Limitations
Furnace Hood Exhaust (EU013)	Baghouse CE013 (SV013A)	PM	0.004 gr/dscf
		PM	10.12 lb/hr
		PM_{10}*	0.008 gr/dscf
		PM_{10}*	20.23 lb/hr
		$PM_{2.5}$*	0.008 gr/dscf
		$PM_{2.5}$*	20.23 lb/hr
		Opacity	5% (6-min average)
	No Control	SO_2	7.1 ppmv wet corrected to 20% O_2 and 21.68 lb/hr
	Low NO_x Burners	NO_x	0.25 lb NO_x/MMBtu and 109 lb/hr (combined emissions SV013A and SV013B)
	No Control	F	2.1 ppmv wet corrected to 20% O_2 and 1.98 lb/hr

Emission Unit Description (ID)	Control Device (Stack ID)	Pollutant	Emission Limitations
Furnace Windbox Exhaust (EU014)	Baghouse CE016 (SV013B)	PM	0.004 gr/dscf
		PM	12.12 lb/hr
		PM_{10}*	0.008 gr/dscf
		PM_{10}*	24.25 lb/hr
		$PM_{2.5}$*	0.008 gr/dscf
		$PM_{2.5}$*	24.25 lb/hr
		Opacity	5% (6-min average)
	GSA Dry Scrubber	SO_2	5.0 ppmv wet corrected to 15% O_2 and 19.61 lb/hr
	Low NO_x Burners	NO_x	0.25 lb NO_x/MMBtu and 109 lb/hr (combined emissions SV013A and SV013B)
	GSA Dry Scrubber	F	11.4 ppmv wet corrected to 15% O_2 and 12.34 lb/hr
Furnace Discharge System (EU015)	Baghouse CE017 (SV014)	PM	0.002 gr/dscf
		PM	0.73 lb/hr
		PM_{10}*	0.002 gr/dscf
		PM_{10}*	0.73 lb/hr
		$PM_{2.5}$*	0.002 gr/dscf
		$PM_{2.5}$*	0.73 lb/hr

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Furnace Discharge System (EU015) shall be as follows:

(1) The weighted average Fluoride Concentration in the oxide pellets handled by the furnace discharge system (EU015) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Furnace Discharge System (EU015)	Baghouse CE017 (SV014)	F	3.65 E-05

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for greenhouse gases (as CO_2e) for the Induration operations shall be as follows:

Emission Unit Description	GHG (as CO_2e) Emission Limit (tons per 12-month period)
Hardening Furnace	661,208

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the cooling tower shall be the use of drift eliminators with a maximum drift rate of 0.001%, the use of cooling water with less than 6,009 milligrams per liter TDS concentration, and a 0.138 pound per hour limitation.

D.3.2 Prevention of Significant Deterioration (PSD) Minor Limit for Lead [326 IAC 2-2]

The Lead emissions from the following emission shall not exceed the emission limits in the table below:

Emission Unit Description (ID)	Control Device (Stack ID)	Pollutant	Emission Limitations
Furnace Hood Exhaust (EU013)	Baghouse CE013 (SV013A)	Lead	0.03 lb/hr
Furnace Windbox Exhaust (EU014)	Baghouse CE016 (SV013B)	Lead	0.05 lb/hr

Compliance with the above Lead emission limits, in conjunction with the unrestricted PTE from this source, shall limit the potential to emit of Lead from the entire source to less than 0.6 tons per twelve (12) consecutive month period.. Therefore, the requirements of 326 IAC 2-2, Prevention of Significant Deterioration (PSD), are not applicable to the source for Lead.

D.3.3 Major Sources of Hazardous Air Pollutants (HAPs) [326 IAC 2-4.1]

Pursuant to 326 IAC 2-4.1, the Maximum Available Control Technology (MACT) for hydrogen fluoride (HF) emissions for the Furnace Windbox Exhaust (EU014) shall be the use of a GSA dry scrubber with a maximum outlet HF concentration of 11.4 ppmv wet and a corresponding 12.34 lb/hr limit.

D.3.4 Preventive Maintenance Plan [326 IAC 2-7-5(12)]

A Preventive Maintenance Plan is required for these facilities and their control devices. Section B - Preventive Maintenance Plan contains the Permittee's obligation with regard to the preventive maintenance plan required by this condition.

Compliance Determination Requirements

D.3.5 Particulate and Lead Control

(a) In order to comply with Condition D.3.1, the following control devices for particulate control shall be in operation and control particulate emissions from the associated emission units at all times those emission units are in operation:

Emission Unit Description	Emission Unit ID	Control Device
Furnace Hood Exhaust	EU013	Baghouse CE013
Furnace Windbox Exhaust	EU014	Baghouse CE016
Furnace Discharge System	EU015	Baghouse CE017

(b) In order to comply with Condition D.3.2, the following control devices for lead control shall be in operation and control lead emissions from the associated emission units at all times those emission units are in operation:

Emission Unit Description	Emission Unit ID	Control Device
Furnace Hood Exhaust	EU013	Baghouse CE013
Furnace Windbox Exhaust	EU014	Baghouse CE016

(c) In the event that bag failure is observed in a multi-compartment baghouse, if operations will continue for ten (10) days or more after the failure is observed before the failed units will be repaired or replaced, the Permittee shall promptly notify the IDEM, OAQ of the expected date the failed units will be repaired or replaced. The notification shall also include the status of the applicable compliance monitoring parameters with respect to normal, and the results of any response actions taken up to the time of notification.

D.3.6 SO2, Fluorides, and HF Control

In order to comply with Conditions D.3.1 and D.3.3, gas suspension absorber CE015 for SO_2, fluorides, and HF control shall be in operation and control SO_2, fluorides, and HF emissions from emission unit EU014 at all times the emission unit is in operation.

D.3.7 NOx Control

In order to comply with Condition D.3.1, low NO_x LE burners for NO_x control shall be in operation and control NO_x emissions from emission units EU013 and EU014 at all times those emission units are in operation.

D.3.8 Testing Requirements [326 IAC 2-7-6(1),(6)] [326 IAC 2-1.1-11]

Group 1 Testing Requirements

(a) Not later than 180 days from plant startup, in order to demonstrate compliance with Condition D.3.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for stacks SV013A, SV013B and SV014 utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

(b) Not later than 180 days from plant startup, in order to demonstrate compliance with Condition D.3.1, the Permittee shall perform SO_2, NO_X, and Fluoride testing for stacks SV013A and SV013B utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section.

(c) Not later than 180 days from plant startup, in order to demonstrate compliance with Condition D.3.2, the Permittee shall perform lead testing for stacks SV013A and SV013B utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section.

(d) Not later than 180 days from plant startup, in order to demonstrate compliance with Condition D.3.3, the Permittee shall perform HF testing for stack SV013B utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section.

(e) Not later than 180 days from plant startup, in order to demonstrate compliance with Condition D.3.1(c), the Permittee shall perform CO2 testing for stacks SV013A and SV013B utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section.

D.3.9 Total Fluorides Emissions and Fluoride Content

In order to ensure compliance with Condition D.3.1(b), for the Furnace Discharge System (EU015), the Permittee shall comply with the requirements of Condition D.1.6 (Total Fluorides Emissions and Fluoride Content).

D.3.10 Greenhouse Gases (GHGs)

To determine the compliance status with Condition D.3.1(c), the Permittee shall calculate the CO_2e emissions from the hardening furnace using the following equation:

CO_2e emissions (tons/month) =
{Natural Gas Usage (mmscf/month) x Heat Content (mmbtu/mmscf) x [CO_2 EF_{NG} (kg/mmbtu) x CO_2 GWP + CH_4 EF_{NG} (kg/mmbtu) x CH_4 GWP + N_2O EF_{NG} (kg/mmbtu) x N_2O GWP] x 2.2046 (lb/kg) x 1/2000 (ton/lb)}
+ {Iron Ore Concentrate Usage (metric tonnes/month) x CO_2 EF_{IRN} (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}
+ {Limestone Usage (metric tonnes/month) x CO_2 EF_{LMST} (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}
+ {Dolomite Usage (metric tonnes/month) x CO_2 EF_{DOL} (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}
+ {Coke Breeze Usage (metric tonnes/month) x CO_2 EF_{CKBZ} (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}
+ {Soda Ash Usage (metric tonnes/month) x CO_2 EF_{SODA} (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}

Where:

Parameter	Numerical Value	Source
Fuel Usage (mmscf/month)	**	Monthly natural gas usage from company records.
Heat Content (mmbtu/mmscf)	1020	or vendor data
CO_2 EF_{NG} (kg/mmbtu)	53.02	40 CFR 98, Subpart C
CH_4 EF_{NG} (kg/mmbtu)	1.0E-03	40 CFR 98, Subpart C
N_2O EF_{NG} (kg/mmbtu)	1.0E-04	40 CFR 98, Subpart C
CO_2 GWP	1	40 CFR 98, Subpart A
CH_4 GWP	21	40 CFR 98, Subpart A
N_2O GWP	310	40 CFR 98, Subpart A
Iron Ore Concentrate Usage (metric tonnes / month)	**	Monthly iron ore concentrate usage data from company records.
Iron Ore Concentrate CO_2 EF_{IRN} (metric tonne CO_2/metric tonne material)	0.006	Midland Research Center analysis obtained from 1998 Minnesota Iron & Steel pilot study.
Limestone Usage (metric tonnes / month)	**	Monthly limestone usage data from company records.
Limestone CO_2 EF_{LMST} (metric tonne CO_2/metric tonne material)	0.43971	40 CFR 98, Subpart U
Dolomite Usage (metric tonnes / month)	**	Monthly dolomite usage data from company records.
Dolomite CO_2 EF_{DOL} (metric tonne CO_2/metric tonne material)	0.47732	40 CFR 98, Subpart U
Coke Breeze Usage (metric tonnes / month)	**	Monthly coke breeze usage data from company records.

Parameter	Numerical Value	Source
Coke Breeze CO_2 EF_{CKBZ} (metric tonne CO_2/metric tonne material)	3.66	Assume coke breeze is 100% carbon and it all converts to CO_2.
Soda Ash Usage (metric tonnes / month)	**	Monthly soda ash usage data from company records.
Soda Ash CO_2 EF_{SODA} (metric tonne CO_2/metric tonne material)	0.41492	40 CFR 98, Subpart U

** Value based on monthly data.

D.3.11 Cooling Tower Total Dissolved Solids

(a) To determine the compliance status with Condition D.3.1(d), the Permittee shall perform tests of the total dissolved solids (TDS) in the blow-down water on a weekly basis using an EPA approved test. The Permittee shall make a notation of water circulation rate at the time of the test.

(b) The Permittee shall calculate the PM, PM_{10}, and $PM_{2.5}$ emission rates using an EPA-approved calculation based on the TDS testing results and the water circulation rate at the time of the TDS testing.

(c) This test shall not be required for any seven (7) day period in which the cooling tower is not in operation provided the Permittee maintains a log of the cooling tower operation.

When for any one reading the TDS exceeds 6,009 milligrams per liter, the Permittee shall take a reasonable response. Section C- Response to Excursions or Exceedances contains the Permittee's obligation.

D.3.12 Sulfur Content

In order to demonstrate compliance with Condition D.3.1(a), the input of sulfur, as a component of coke breeze, shall not exceed 101 pounds on a three (3) hour average.

(a) The Permittee shall calculate the three (3) hour average sulfur input from the hardening furnace using the following equation:

$$S(lb/3hr-ave) = [(\%SCCB) \times CB(ton/3hr-ave) \times \left(\frac{2000lb}{1ton}\right)] \div 3$$

Where:

S (lbs/3hr-ave)	=	3-hr rolling average of Sulfur input to the hardening furnace as a component of coke breeze
% SCCB	=	0.74% Sulfur Content of Coke Breeze
CB (ton/3 hr-ave)	=	3-hr rolling average of coke breeze usage from company records

(b) The sulfur content of the coke breeze (% SCCB) shall not exceed 0.74%.

D.3.13 Sulfur Content of Coke Breeze

The sulfur content of the coke breeze shall be determined using one of the following options:

(a) Providing vendor analysis of coke breeze delivered. The certification shall include:

(1) The name of the coke breeze supplier; and

(2) The location of the coke breeze when the sample was collected for analysis to determine the properties of the coke breeze, specifically including whether the coke breeze was sampled as delivered to the affected facility or whether the coke breeze was collected from coke breeze in storage at a coke breeze preparation plant, at a coke breeze supplier's facility, or at another location. The certification shall include the name of the coke breeze storage facility, or coke breeze preparation plant (where the sample was collected); and

(3) The results of the analysis of the coke breeze from which the shipment came (or of the shipment itself); and

(4) The methods used to determine the sulfur concentration of the coke breeze; or

(b) Sampling and analyzing the coke breeze by using the following procedures:

(1) Minimum coke breeze Sampling Requirements and Analysis Methods:

(A) The coke breeze sample acquisition point shall be at a location where representative samples of the total coke breeze are delivered to Magnetation, LLC;

(B) Coke breeze shall be sampled at least one (1) time per delivery;

(C) Preparation of the coke breeze sample and sulfur concentration analysis shall be conducted utilizing methods as approved by the commissioner.

Compliance Monitoring Requirements [326 IAC 2-7-5(1)] [326 IAC 2-7-6(1)]

D.3.14 Visible Emissions Notations

(a) Visible emission notations of the exhausts from baghouses CE013, CE016, and CE017 shall be performed once per day during normal daylight operations. A trained employee shall record whether emissions are normal or abnormal.

(b) For processes operated continuously, "normal" means those conditions prevailing, or expected to prevail, eighty percent (80%) of the time the process is in operation, not counting startup or shut down time.

(c) In the case of batch or discontinuous operations, readings shall be taken during that part of the operation that would normally be expected to cause the greatest emissions.

(d) A trained employee is an employee who has worked at the plant at least one (1) month and has been trained in the appearance and characteristics of normal visible emissions for that specific process.

(e) If abnormal emissions are observed, the Permittee shall take a reasonable response. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the reasonable response steps required by this condition. Failure to take response steps shall be considered a deviation from this permit.

D.3.15 Baghouse Parametric Monitoring

The Permittee shall record the pressure drop across baghouses CE013, CE016, and CE017 at least once per day when the associated emission unit is in operation. When, for any one reading, the pressure drop across the baghouse is outside of the normal range, the Permittee shall take a reasonable response. The normal range for this unit is a pressure drop of 5.0 and 10.0 inches of water unless a different upper-bound or lower-bound value for this range is determined during the

latest stack test. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the reasonable response steps required by this condition. A pressure reading that is outside the above mentioned range is not a deviation from this permit. Failure to take response steps shall be considered a deviation from this permit.

The instruments used for determining the pressure drop shall comply with Section C - Instrument Specifications, of this permit, shall be subject to approval by IDEM, OAQ and shall be calibrated or replaced at least once every six (6) months or other time period specified by the manufacturer. The Permittee shall maintain records of the manufacturer's specifications, if used.

D.3.16 Broken or Failed Bag Detection

(a) For a single compartment baghouse controlling emissions from a process operated continuously, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

(b) For a single compartment baghouse controlling emissions from a batch process, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. The emissions unit shall be shut down no later than the completion of the processing of the material in the emissions unit. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

Bag failure can be indicated by a significant drop in the baghouse's pressure reading with abnormal visible emissions, by an opacity violation, or by other means such as gas temperature, flow rate, air infiltration, leaks, dust traces, or triboflows.

D.3.17 Gas Suspension Absorber Parametric Monitoring

(a) The Permittee shall monitor and record the air flow rate through the reactor of gas suspension absorber CE015, as determined by the static pressure of the venturi, at least once per day when the hardening furnace is in operation. From the date of startup until the stack test results are available, the Permittee shall maintain the air flow rate at or above the minimum of 250,000 dscfm (68°F and 1 atm).

(b) The Permittee shall determine the minimum air flow rate from the latest valid stack test that demonstrates compliance with limits in Conditions D.3.1 and D.3.3.

(c) On and after the date the stack test results are available, the Permittee shall maintain an air flow rate at or above the minimum rate as observed during the latest compliant stack test.

(d) When for any one reading, the air flow rate is below the above mentioned minimum, the Permittee shall take a reasonable response. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the response steps required by this condition. Failure to take response steps shall be considered a deviation from this permit.

The instruments used for determining the minimum air flow rate shall comply with Section C - Instrument Specifications, of this permit, shall be subject to approval by IDEM, OAQ and shall be calibrated or replaced at least once every six (6) months or other time period specified by the manufacturer. The Permittee shall maintain records of the manufacturer's specifications, if used.

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

D.3.18 Record Keeping Requirements

(a) To document the compliance status with Conditions D.3.1(b) and D.3.9, the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(b).

(b) To document the compliance status with Conditions D.3.1(a), D.3.12, and D.3.13, the Permitee shall maintain monthly records in accordance with (10 through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(a).

(1) Calendar dates and times covered in the compliance period.

(2) Sulfur content of coke breeze for each shipment and the documentation and methodology for how the content was obtained.

(3) 3-hr rolling average of coke breeze usage.

(4) 3-hr rolling average sulfur input to the hardening furnace.

(c) To document the compliance status with Conditions D.3.1(c) and D.3.10, the Permittee shall maintain monthly records in accordance with (1) through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(c).

(1) Calendar dates covered in the compliance determination period.

(2) Natural gas usage for the induction hardening furnace.

(3) Monthly usage (metric tonnes) of iron ore concentrate, limestone, dolomite, coke breeze, and soda ash.

(4) Monthly records of CO2e emissions.

(d) To document the compliance status with Conditions D.3.1(d) and D.3.11, the Permittee shall maintain a log that contains the date and result of each TDS test, the water circulation rate at the time of the test, and the resulting mass emission rates. The Permittee shall include in its log when the testing in not conducted and the reason for the lack of a log (e.g. the cooling tower was not operational for the prescribed period.)

(e) To document the compliance status with Condition D.3.14, the Permittee shall maintain a daily record of visible emission notations of the exhausts from the hardening furnace and baghouse CE013, CE016, CE017. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(f) To document the compliance status with Condition D.3.15, the Permittee shall maintain a daily record of the pressure drop across baghouses CE013, CE016, and CE017. The Permittee shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).

(g) To document the compliance status with Condition D.3.17, the Permittee shall maintain a daily record of the minimum air flow rate through the reactor of gas suspension absorber CE015. The Permittee shall include in its daily record when a minimum air flow rate reading is not taken and the reason for the lack of a minimum air flow rate reading (e.g. the process did not operate that day).

(h) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.3.19 Reporting Requirements

(a) A quarterly report of the weighted average fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.3.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) A quarterly report of the 3- hr rolling average sulfur input to the indurating furnace and a quarterly summary of the information to document the compliance status with D.3.1(a) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(c) A quarterly report of CO2e emissions to document the compliance status with Condition D.3.1(c) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(d) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

SECTION D.4 EMISSIONS UNIT OPERATION CONDITIONS

Emissions Unit Description: Separation and Loadout

(o) One (1) hearth layer separation system, identified as EU016, approved in 2013 for construction, using baghouse CE018 as control, exhausting inside the building, consisting of the following:

(1) Two (2) product conveyors, identified as P1 and P2, with a maximum capacity of 660 and 770 tons per hour respectively.

(2) Two (2) hearth layer conveyors, identified as HL-1 and HL-2, each with a maximum capacity of 440 tons per hour.

(3) One (1) hearth layer separation bin, one (1) hearth layer separation grizzly, and two (2) reclaim hoppers.

(p) One (1) oxide pellet storage and loadout system, identified as EU019, approved in 2013 for construction, with a maximum capacity of 550 tons per hour, using baghouse CE019 as control, exhausting to stack SV018, consisting of two (2) conveyors, two (2) 8800-ton storage bins, and two (2) 99-ton storage bins.

(The information describing the process contained in this emissions unit description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.4.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Separation and Loadout operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations		
		Pollutant	Gr/dscf	Lb/hr
Hearth Layer Separation System (EU016)	Baghouse CE018 (inside building)	PM	0.002	0.79
		PM_{10}*	0.002	0.79
		$PM_{2.5}$*	0.002	0.79
Oxide Pellet Storage and Unloading System (EU019)	Baghouse CE019 (SV018)	PM	0.002	0.63
		PM_{10}*	0.002	0.63
		$PM_{2.5}$*	0.002	0.63

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Separation and Loadout operations shall be as follows:

(1) The weighted average Fluoride Concentration in the finished oxide pellets handled by the hearth layer separation system (EU016) and the oxide pellet storage and unloading system (EU019) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Hearth Layer Separation System (EU016)	Baghouse CE018 (inside building)	F	3.94 E-05

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Oxide Pellet Storage and Unloading System (EU019)	Baghouse CE019 (SV018)	F	3.15 E-05

D.4.2 Preventive Maintenance Plan [326 IAC 2-7-5(12)]

A Preventive Maintenance Plan is required for these facilities and their control devices. Section B - Preventive Maintenance Plan contains the Permittee's obligation with regard to the preventive maintenance plan required by this condition.

Compliance Determination Requirements

D.4.3 Particulate Control

(a) In order to comply with Conditions D.4.1, the following control devices for particulate control shall be in operation and control particulate emissions from the associated emission units at all times those emission units are in operation:

Emission Unit Description	Emission Unit ID	Control Device
Hearth Layer Separation System	EU016	Baghouse CE018
Oxide Pellet Storage and Unloading System	EU019	Baghouse CE019

(b) In the event that bag failure is observed in a multi-compartment baghouse, if operations will continue for ten (10) days or more after the failure is observed before the failed units will be repaired or replaced, the Permittee shall promptly notify the IDEM, OAQ of the expected date the failed units will be repaired or replaced. The notification shall also include the status of the applicable compliance monitoring parameters with respect to normal, and the results of any response actions taken up to the time of notification.

D.4.4 Testing Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]

(a) Group 1 Testing Requirements

Not later than 180 days from plant startup, in order to demonstrate compliance with Condition D.4.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouse CE019 utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

(b) Group 2 Testing Requirements

Not later than 180 days from the date the last of the tests required in Conditions D.1.5(a), D.2.6(a), D.3.8, and D.4.4(a) is completed or not later than 360 days from plant startup, whichever is later, in order to demonstrate compliance with Condition D.4.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouse CE018 utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

D.4.5 Total Fluorides Emissions and Fluoride Content

In order to ensure compliance with Condition D.4.1(b), the Permittee shall comply with the requirements of Condition D.1.6 (Total Fluorides Emissions and Fluoride Content).

Compliance Monitoring Requirements [326 IAC 2-7-5(1)] [326 IAC 2-7-6(1)]

D.4.6 Visible Emissions Notations

(a) Visible emission notations of the exhausts from baghouse CE019 shall be performed once per day during normal daylight operations. A trained employee shall record whether emissions are normal or abnormal.

(b) For processes operated continuously, "normal" means those conditions prevailing, or expected to prevail, eighty percent (80%) of the time the process is in operation, not counting startup or shut down time.

(c) In the case of batch or discontinuous operations, readings shall be taken during that part of the operation that would normally be expected to cause the greatest emissions.

(d) A trained employee is an employee who has worked at the plant at least one (1) month and has been trained in the appearance and characteristics of normal visible emissions for that specific process.

(e) If abnormal emissions are observed, the Permittee shall take reasonable response. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the reasonable response steps required by this condition. Failure to take response steps shall be considered a deviation from this permit.

D.4.7 Baghouse Parametric Monitoring

(a) The Permittee shall record the pressure drop across baghouses CE019 at least once per day when the associated emission unit is in operation.

(b) When, for any one reading, the pressure drop across the baghouse is outside of the normal range, the Permittee shall take a reasonable response. The normal range for this unit is a pressure drop of 5.0 and 10.0 inches of water unless a different upper-bound or lower-bound value for this range is determined during the latest stack test. Section C - Response to Excursions or Exceedances contains the Permittee's obligation with regard to the reasonable response steps required by this condition. A pressure reading that is outside the above mentioned range is not a deviation from this permit. Failure to take response steps shall be considered a deviation from this permit.

(c) The instruments used for determining the pressure drop shall comply with Section C - Instrument Specifications, of this permit, shall be subject to approval by IDEM, OAQ and shall be calibrated or replaced at least once every six (6) months or other time period specified by the manufacturer. The Permittee shall maintain records of the manufacturer's specifications, if used.

D.4.8 Baghouse Inspections

The Permittee shall perform semi-annual inspections for baghouse CE018. All defective bags shall be replaced.

D.4.9 Broken or Failed Bag Detection

(a) For a single compartment baghouse controlling emissions from a process operated continuously, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. Operations may continue only if the event qualifies as an

emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

(b) For a single compartment baghouse controlling emissions from a batch process, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. The emissions unit shall be shut down no later than the completion of the processing of the material in the emissions unit. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

Bag failure can be indicated by a significant drop in the baghouse's pressure reading with abnormal visible emissions, by an opacity violation, or by other means such as gas temperature, flow rate, air infiltration, leaks, dust traces, or triboflows.

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

D.4.10 Record Keeping Requirements

(a) To document the compliance status with Condition D.4.1(b) and D.4.5, the Permittee shall the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.4.1(b).

(b) To document the compliance status with Condition D.4.6, the Permittee shall maintain a daily record of visible emission notations of the exhausts from baghouse CE019. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(c) To document the compliance status with Condition D.4.7, the Permittee shall maintain a daily record of the pressure drop across baghouses CE018 and CE019. The Permittee shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).

(d) To document the compliance status with Condition D.4.8, the Permittee shall maintain a record of the semi-annual inspections of baghouse CE018.

(e) To document compliance status with Condition D.4.1(a), the Permittee shall maintain records of the manufacturer's specifications for baghouse CE018.

(f) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.4.11 Reporting Requirements

(a) A quarterly report of the weighted average fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.4.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

SECTION D.5 EMISSIONS UNIT OPERATION CONDITIONS

Emissions Unit Description: Windbox Exhaust Air Pollution Control Equipment

(q) One (1) WBE lime storage area, identified as EU020, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) lime feed conveyor and one (1) 80 cubic meter lime storage silo, using bin vent CE020 as control, exhausting inside the building.

(r) One (1) WBE residual product loading area, identified as EU022, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) GSA reactor conveyor, one (1) GSA product conveyor, one (1) WBE conveyor, and one (1) 100 cubic meter storage silo, using bin vent CE021 as control, exhausting inside the building.

(s) One (1) recycled dust storage area, identified as EU026, approved in 2013 for construction, consisting of one (1) 55-ton storage bin, with a maximum capacity of 7.0 tons per hour, using dust recycle baghouse CE024 as control, exhausting inside the building.

(The information describing the process contained in this emissions unit description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.5.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Windbox Exhaust Air Pollution Control Equipment operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations		
		Pollutant	Gr/dscf	Lb/hr
WBE Lime Storage Area (EU020)	Bin Vent CE020 (inside building)	PM	0.002	0.02
		PM_{10}*	0.002	0.02
		$PM_{2.5}$*	0.002	0.02
WBE Residual Product Loading Area (EU022)	Bin Vent CE021 (inside building)	PM	0.002	0.02
		PM_{10}*	0.002	0.02
		$PM_{2.5}$*	0.002	0.02
Recycled Dust Storage Area (EU026)	Baghouse CE024 (inside building)	PM	0.002	0.16
		PM_{10}*	0.002	0.16
		$PM_{2.5}$*	0.002	0.16

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Windbox Exhaust Air Pollution Control Equipment shall be as follows:

(1) The weighted average Fluoride Concentration in the recycled handled by the recycled dust storage areas (EU026) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Recycled Dust Storage Area (EU026)	Baghouse CE024 (inside building)	F	7.88 E-06

D.5.2 Preventive Maintenance Plan [326 IAC 2-7-5(12)]

A Preventive Maintenance Plan is required for these facilities and their control devices. Section B - Preventive Maintenance Plan contains the Permittee's obligation with regard to the preventive maintenance plan required by this condition.

Compliance Determination Requirements

D.5.3 Particulate Control

(a) In order to comply with Conditions D.5.1, the following control devices for particulate control shall be in operation and control particulate emissions from the associated emission units at all times those emission units are in operation:

Emission Unit Description	Emission Unit ID	Control Device
WBE Lime Storage Silo	EU020	Bin Vent CE020
WBE Residual Product Loading Area	EU022	Bin Vent CE021
Recycled Dust Storage Area	EU026	Baghouse CE024

(b) In the event that bag failure is observed in a multi-compartment baghouse, if operations will continue for ten (10) days or more after the failure is observed before the failed units will be repaired or replaced, the Permittee shall promptly notify the IDEM, OAQ of the expected date the failed units will be repaired or replaced. The notification shall also include the status of the applicable compliance monitoring parameters with respect to normal, and the results of any response actions taken up to the time of notification.

D.5.4 Testing Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]

Group 2 Testing Requirements

Not later than 180 days from the date the last of the tests required in Conditions D.1.5(a), D.2.6(a), D.3.8, and D.4.4(a) is completed or not later than 360 days from plant startup, whichever is later, in order to demonstrate compliance with Condition D.5.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouse CE024, utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

D.5.5 Total Fluorides Emissions and Fluoride Content

In order to ensure compliance with Condition D.5.1(b), the Permittee shall comply with the requirements of Condition D.1.6 ((Total Fluorides Emissions and Fluoride Content).

Compliance Monitoring Requirements [326 IAC 2-7-5(1)] [326 IAC 2-7-6(1)]

D.5.6 Baghouse and Bin Vent Inspections

(a) The Permittee shall perform semi-annual inspections for baghouse CE024. All defective bags shall be replaced.

(b) The Permittee shall perform semi-annual inspections for bin vents CE020 and CE021. All defective filters shall be replaced.

D.5.7 Broken or Failed Bag Detection

(a) For a single compartment baghouse controlling emissions from a process operated continuously, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. Operations may continue only if the event qualifies as an

emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

(b) For a single compartment baghouse controlling emissions from a batch process, the feed to the process shall be shut down immediately until the failed unit has been repaired or replaced. The emissions unit shall be shut down no later than the completion of the processing of the material in the emissions unit. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

Bag failure can be indicated by a significant drop in the baghouse's pressure reading with abnormal visible emissions, by an opacity violation, or by other means such as gas temperature, flow rate, air infiltration, leaks, dust traces, or triboflows.

D.5.8 Bin Vent Filter Failure Detection

In the event that a bin vent filter malfunction has been observed:

Failed units and the associated process will be shut down immediately until the failed units have been repaired or replaced. The emissions unit shall be shut down no later than the completion of the processing of the material in the line. Operations may continue only if the event qualifies as an emergency and the Permittee satisfies the requirements of the emergency provisions of this permit (Section B - Emergency Provisions).

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

D.5.9 Record Keeping Requirements

(a) To document the compliance status with Conditions D.5.1(b) and D.5.5, the Permittee shall the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.5.1(b).

(b) To document the compliance status with Condition D.5.6, the Permittee shall maintain a record of the semi-annual inspections of bin vents CE020 and CE021 and baghouse CE024.

(c) To document compliance status with Condition D.5.1(a), the Permittee shall maintain records of the manufacturer's specifications for bin vents CE020 and CE021 and for baghouse CE024.

(d) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.5.10 Reporting Requirements

(a) A quarterly report of the weighted average fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.5.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

SECTION D.6 EMISSIONS UNIT OPERATION CONDITIONS

Emissions Unit Description: Insignificant Activities

(a) Natural gas-fired combustion sources with heat input equal to or less than ten million (10,000,000) Btu per hour, including the following:

(1) Seven (7) natural gas fired space heaters, identified as EU021, approved in 2013 for construction, each with a maximum heat input capacity of 1.0 MMBtu per hour. [326 IAC 2-2]

(2) One (1) coke breeze additive system (EU009) natural gas fired air heater, approved in 2013 for construction, with a maximum heat input capacity of 1.7 MMBtu per hour. [326 IAC 2-2]

(c) Paved and unpaved roads and parking lots with public access. [326 IAC 2-2] [326 IAC 6-4]

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(f) Other emission units, not regulated by a NESHAP, with PM_{10}, NO_x, and SO_2 emissions less than five (5) pounds per hour or twenty-five (25) pounds per day, CO emissions less than twenty-five (25) pounds per day, VOC emissions less than three (3) pounds per hour or fifteen (15) pounds per day, lead emissions less than six-tenths (0.6) tons per year or three and twenty-nine hundredths (3.29) pounds per day, and emitting greater than one (1) pound per day but less than five (5) pounds per day or one (1) ton per year of a single HAP, or emitting greater than one (1) pound per day but less than twelve and five tenths (12.5) pounds per day or two and five tenths (2.5) ton per year of any combination of HAPs:

(1) One (1) iron ore concentrate wet grinding and filter cake production system, approved in 2013 for construction, with a maximum capacity of 700 tons per hour, consisting of three (3) conveyors, and a filter cake feed bin, exhausting uncontrolled into a building. [326 IAC 2-2] [326 IAC 6-3-2]

(2) One (1) greenball production system, approved in 2013 for construction, with a maximum capacity of 900 tons per hour, using a wet spray process as control, consisting of six (6) 110-ton balling disc feed bins, six (6) balling discs, six (6) green pellet roller screens, six (6) shredders, one (1) single deck roller screen, and thirty-one (31) conveyors, exhausting into a building. [326 IAC 2-2] [326 IAC 6-3-2]

(The information describing the process contained in this emissions unit description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.6.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for the insignificant activities shall be as follows:

Emission Unit Description (ID)	Control Device	Pollutant	Emission Limitations
Emergency Generator (EU017), Fire Pump (EU018)	No Control	PM	0.20 g/kw-hr, each
		PM_{10}*	0.20 g/kw-hr, each
		$PM_{2.5}$*	0.20 g/kw-hr, each
		SO_2	0.0015 g/kw-hr, each
		NO_x	0.50 g/hp-hr, each
		F	6.95×10^{-6} lb/MMBtu, each
Space Heaters (EU021), Coke Breeze Additive System Air Heater (EU009)	No Control	PM	0.0072 lb/MMBtu, each
		PM_{10}*	0.0072 lb/MMBtu, each
		$PM_{2.5}$*	0.0072 lb/MMBtu, each
		SO_2	0.00048 lb/MMBtu, each
	Low NO_x Burners	NO_x	0.05 lb/MMBtu, each
	No Control	F	9.40×10^{-6} lb/MMBtu, each

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(1) These units shall only combust natural gas, and the Permittee shall practice good combustion practices when these units are combusting natural gas.

(2) The emergency generator (EU017) shall not exceed 500 hours of operation per 12-month period.

(3) The fire pump (EU018) shall not exceed 500 hours of operation per 12-month period.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for greenhouse gases (as CO_2e) for the insignificant activities shall be as follows:

Emission Unit		GHG (as CO_2e) Emission Limit (tons per 12-month period)
Description	Unit No.	
Emergency Generator	EU017	144
Fire Pump	EU018	66
Space Heaters	EU021	3,587
Coke Breeze Additive System Air Heater	EU009	871

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System shall be that the opacity shall not exceed five percent (5%) on a six (6) minute average and the following:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Iron Ore Wet Grinding and Filter Cake Production	PM	0.77	3.37
	PM_{10}*	0.07	0.31
	$PM_{2.5}$*	0.07	0.31

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Greenball Production System	PM	0.77	3.37
	PM_{10}*	0.07	0.31
	$PM_{2.5}$*	0.07	0.31

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the insignificant activities shall be as follows:

(1) The weighted average Fluoride Concentration in the material handled by the iron ore concentrate wet grinding and filter cake production and greenball production system shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly.

(e) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Paved Roads shall be controlled through the development, maintenance, and implementation of a fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

D.6.2 Particulate [326 IAC 6-3-2]

Pursuant to 326 IAC 6-3-2 (Particulate Emissions Limitations for Manufacturing Processing), the allowable particulate emission rate (E) shall not exceed the listed pounds per hour when operating at the associated process weight rate (P) tons per hour:

Unit Description	Max. Process Weight Rate (tons/hr)	Particulate Emission Limit (lb/hr)
Iron Ore Concentrate Wet Grinding and Filter Cake Production System	900	76.2
Greenball Production System	700	73.0

(a) The pounds per hour limitation (E) was calculated with the following equation:

Interpolation and extrapolation of the data for the process weight rate in excess of sixty thousand (60,000) pounds per hour shall be accomplished by use of the equation:

$$E = 55.0\ P^{0.11} - 40$$

Where E = rate of emission in pounds per hour; and
P = process weight rate in tons per hour

(b) Pursuant to 326 IAC 6-3-2(e)(3), when the process weight exceeds 200 tons per hour, the maximum allowable emissions may exceed the emission limits shown paragraph (a), provided the concentration of particulate matter in the gas discharged to the atmosphere is less than 0.10 pounds per 1,000 pounds of gases.

D.6.3 Preventive Maintenance Plan [326 IAC 2-7-5(12)]

A Preventive Maintenance Plan is required for these facilities and their control devices. Section B - Preventive Maintenance Plan contains the Permittee's obligation with regard to the preventive maintenance plan required by this condition.

Compliance Determination Requirements

D.6.4 Particulate Control

In order to comply with Conditions D.6.1, the following control devices for particulate control shall be in operation and control particulate emissions from the associated emission units at all times those emission units are in operation:

Emission Unit Description	Control Device
Iron Ore Concentrate Wet Grinding and Filter Cake Production System	Wet Spray
Greenball Production System	Wet Spray

D.6.5 NOx Control

In order to comply with Condition D.6.1, low NO_x burners for NO_x control shall be in operation and control NO_x emissions from emission units EU021 and EU009 at all times those emission units are in operation.

D.6.6 Total Fluorides Emissions and Fluoride Content

In order to ensure compliance with Condition D.6.1(d), the Permittee shall comply with the requirements of Condition D.1.6 (Total Fluorides Emissions and Fluoride Content).

D.6.7 Greenhouse Gases (GHGs)

To determine the compliance status with Condition D.6.1(b), the following equation shall be used to determine the CO_2e emissions from the Emergency Generator (EU017), Fire Pump (EU018), Space Heaters (EU021), and Coke Breeze Additive System Air Heater (EU009):

CO_2e emissions (tons/month) = Fuel Usage (mmscf/month) x Heat Content (mmbtu/mmscf) x [CO_2 EF (kg/mmbtu) x CO_2 GWP + CH_4 EF (kg/mmbtu) x CH_4 GWP + N_2O EF (kg/mmbtu) x N_2O GWP] x 2.2046 (lb/kg) x 1/2000 (ton/lb)

Where:
Fuel Usage (mmscf/month) = monthly fuel usage data from company records
Heat Content (mmbtu/mmscf) = standard value in AP-42 for natural gas or vendor data, if available
CO_2 EF (kg/mmbtu) = emission factor from GHG Mandatory Reporting Rule (MRR) (40 CFR 98, Subpart C) for natural gas
CH_4 EF (kg/mmbtu) = emission factor from GHG MRR (40 CFR 98, Subpart C) for natural gas
N_2O EF (kg/mmbtu) = emission factor from GHG MRR (40 CFR 98, Subpart C) for natural gas
CO_2 GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)
CH_4 GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)
N_2O GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

D.6.8 Record Keeping Requirements

(a) To document the compliance status with Conditions D.6.1(b) and D.6.7, the Permittee shall maintain records in accordance with (1) through (4) below. Records maintained for (1) through (4) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.6.1(b).

(1) Calendar dates covered in the compliance determination period;

(2) Hours of operation for the Emergency Generator (EU017) and Fire Pump (EU018).

(3) Natural gas usage for the Emergency Generator (EU017), Fire Pump (EU018), Space Heaters (EU021), and Coke Breeze Additive System Air Heater (EU009).

(4) Monthly records of the CO_2e emissions.

(b) To document the compliance status with Conditions D.6.1(d) and D.6.6, the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.6.1(d).

(c) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.6.9 Reporting Requirements

(a) A quarterly report of the weighted average fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.6.1(d) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) A quarterly report of hours of operation to document the compliance status with Conditions D.6.1(a)(2) and D.6.1(a)(3) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(c) A quarterly report of CO_2e emissions to document the compliance status with Condition D.6.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(d) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

SECTION E.1 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(14)]: Nonmetallic Mineral Processing Plants

(b) One (1) limestone unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(2) One (1) covered conveyor, identified as EU002b, exhausting inside the limestone storage pile enclosure. Under 40 CFR 60, Subpart OOO, the limestone unloading and storage area conveyor is considered an affected facility.

(c) One (1) dolomite unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(2) One (1) covered conveyor, identified as EU003b, exhausting inside the dolomite storage pile enclosure. Under 40 CFR 60, Subpart OOO, the dolomite unloading and storage area conveyor is considered an affected facility.

(j) One (1) limestone and dolomite grinding mill bin area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(2) One (1) additive conveyor, one (1) dolomite grinding mill bin with a maximum capacity of 440 tons, and one (1) limestone grinding mill bin with a maximum capacity of 440 tons, identified as EU025b, using baghouse CE023 as control, exhausting inside the building. Under 40 CFR 60, Subpart OOO, these units of the limestone and dolomite grinding mill bin area are considered affected facilities.

(k) One (1) ground limestone and dolomite additive system, identified as EU010, approved in 2013 for construction, with a maximum capacity of 132 tons per hour, using baghouse CE010 as control, exhausting to stack SV010, consisting of the following:

(1) One (1) limestone feed conveyor, one (1) dolomite feed conveyor, one (1) roller mill feed conveyor, one (1) roller mill for limestone and dolomite, one (1) product separation cyclone, and one (1) limestone and dolomite bin with a maximum capacity of 1,100 tons. Under 40 CFR 60, Subpart OOO, these units of the ground limestone and dolomite additive system are considered affected facilities.

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

E.1.1 General Provisions Relating to New Source Performance Standards [326 IAC 12-1] [40 CFR Part 60, Subpart A]

(a) Pursuant to 40 CFR 60.1, the Permittee shall comply with the provisions of 40 CFR Part 60 Subpart A – General Provisions, which are incorporated by reference as 326 IAC 12-1 for emission units EU002, EU003, EU025, and EU010 except as otherwise specified in 40 CFR Part 60, Subpart OOO.

(b) Pursuant to 40 CFR 60.19, the Permittee shall submit all required notifications and reports to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

E.1.2 New Source Performance Standard for Nonmetallic Mineral Processing Plants [40 CFR Part 60, Subpart OOO]

The Permittee which engages in nonmetallic mineral processing shall comply with the following provisions of 40 CFR Part 60, Subpart OOO, which are incorporated by reference as 326 IAC 12 (included as Attachment A of this permit):

(a) 40 CFR 60.670(a), (e), (f);
(b) 40 CFR 60.671;
(c) 40 CFR 60.672(a), (b), (d), (e);
(d) 40 CFR 60.673;
(e) 40 CFR 60.674(c), (d);
(f) 40 CFR 60.675(a), (b), (c)(1)(i), (c)(1)(ii), (c)(3), (d), (e), (g), (i);
(g) 40 CFR 60.676(b), (f), (h), (i)(1), (j), (k);
(h) Table 1 to 40 CFR 63, Subpart OOO;
(i) Table 2 to 40 CFR 63, Subpart OOO; and
(j) Table 3 to 40 CFR 63, Subpart OOO.

SECTION E.2 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(14)]: Spark Ignition Internal Combustion Engines

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

E.2.1 General Provisions Relating to New Source Performance Standards [326 IAC 12-1] [40 CFR Part 60, Subpart A]

(a) Pursuant to 40 CFR 60.1, the Permittee shall comply with the provisions of 40 CFR Part 60 Subpart A – General Provisions, which are incorporated by reference as 326 IAC 12-1 for emission units EU017 and EU018 except as otherwise specified in 40 CFR Part 60, Subpart JJJJ.

(b) Pursuant to 40 CFR 60.19, the Permittee shall submit all required notifications and reports to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

E.2.2 New Source Performance Standards for Spark Ignition Internal Combustion Engines [40 CFR Part 60, Subpart JJJJ]

The Permittee which utilizes spark ignition internal combustion engines shall comply with the following provisions of 40 CFR Part 60, Subpart JJJJ, which are incorporated by reference as 326 IAC 12 (included as Attachment B of this permit):

(a) 40 CFR 60.4230(a)(3)(iv), (a)(4)(iv), (a)(6);
(b) 40 CFR 60.4233(e), (h);
(c) 40 CFR 60.4234;
(d) 40 CFR 60.4236;
(e) 40 CFR 60.4237(a), (b);
(f) 40 CFR 60.4243(b), (d), (e), (f), (g);
(g) 40 CFR 60.4244;
(h) 40 CFR 60.4245;
(i) 40 CFR 60.4246;
(j) 40 CFR 60.4248;
(k) Table 1 to 40 CFR 60, Subpart JJJJ; and
(l) Table 2 to 40 CFR 60, Subpart JJJJ.

SECTION E.3 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(14)]: Reciprocating Internal Combustion Engines

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

E.3.1 General Provisions Relating to NESHAP ZZZZ [326 IAC 20-1] [40 CFR Part 63, Subpart A]

(a) Pursuant to 40 CFR 63.6580, the Permittee shall comply with the provisions of 40 CFR Part 63, Subpart A – General Provisions, which are incorporated by reference as 326 IAC 20-1-1, as specified in 40 CFR 63, Subpart ZZZZ in accordance with Table 8 in 40 CFR Part 63, Subpart ZZZZ.

(b) Pursuant to 40 CFR 63.10, the Permittee shall submit all required notifications and reports to:

Indiana Department of Environmental Management
Compliance and Enforcement Branch, Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

and

United States Environmental Protection Agency, Region V
Air and Radiation Division, Air Enforcement Branch - Indiana (AE-17J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

E.3.2 National Emission Standards for Hazardous Air Pollutants: Stationary Reciprocating Internal Combustion Engines [40 CFR Part 63, Subpart ZZZZ] [326 IAC 20-82]

The Permittee which utilizes reciprocating internal combustion engines shall comply with the following provisions of 40 CFR Part 63, Subpart ZZZZ (included as Attachment C of this permit):

(a) 40 CFR 63.6580;
(b) 40 CFR 63.6585(a), (b);
(c) 40 CFR 63.6590(a)(2)(i), (a)(2)(ii), (b)(1)(i), (c)(6);
(d) 40 CFR 63.6645(f);
(e) 40 CFR 63.6665;
(f) 40 CFR 63.6670; and
(g) 40 CFR 63.6675.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH
PART 70 OPERATING PERMIT
CERTIFICATION

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054

This certification shall be included when submitting monitoring, testing reports/results or other documents as required by this permit.

Please check what document is being certified:

☐ Annual Compliance Certification Letter

☐ Test Result (specify)

☐ Report (specify)

☐ Notification (specify)

☐ Affidavit (specify)

☐ Other (specify)

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.
Signature:
Printed Name:
Title/Position:
Phone:
Date:

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251
Phone: (317) 233-0178
Fax: (317) 233-6865

PART 70 OPERATING PERMIT
EMERGENCY OCCURRENCE REPORT

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054

This form consists of 2 pages **Page 1 of 2**

☐ This is an emergency as defined in 326 IAC 2-7-1(12)

- The Permittee must notify the Office of Air Quality (OAQ), within four (**4**) business hours (1-800-451-6027 or 317-233-0178, ask for Compliance Section); and
- The Permittee must submit notice in writing or by facsimile within two (**2**) working days (Facsimile Number: 317-233-6865), and follow the other requirements of 326 IAC 2-7-16.

If any of the following are not applicable, mark N/A

Facility/Equipment/Operation:
Control Equipment:
Permit Condition or Operation Limitation in Permit:
Description of the Emergency:
Describe the cause of the Emergency:

If any of the following are not applicable, mark N/A **Page 2 of 2**

Date/Time Emergency started:
Date/Time Emergency was corrected:
Was the facility being properly operated at the time of the emergency? Y N
Type of Pollutants Emitted: TSP, PM-10, SO_2, VOC, NO_X, CO, Pb, other:
Estimated amount of pollutant(s) emitted during emergency:
Describe the steps taken to mitigate the problem:
Describe the corrective actions/response steps taken:
Describe the measures taken to minimize emissions:
If applicable, describe the reasons why continued operation of the facilities are necessary to prevent imminent injury to persons, severe damage to equipment, substantial loss of capital investment, or loss of product or raw materials of substantial economic value:

Form Completed by:_____

Title / Position: _____

Date:_____

Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Usage Report
(Submit Report Quarterly)

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054
Facility: Induration Machine
Parameter: Input of Sulfur as a component of Coke Breeze
Limit: Shall not exceed 101 pounds on a three (3) hour average.

Month: _____ Day: _____ Year: _____

Hour	3-hr Average	Hour	3-hr Average
1		13	
2		14	
3		15	
4		16	
5		17	
6		18	
7		19	
8		20	
9		21	
10		22	
11		23	
12		24	

☐ No deviation occurred in this month.

☐ Deviation/s occurred in this month.
Deviation has been reported on_____

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name:	Magnetation LLC
Source Address:	64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.:	T181-32081-00054
Facility:	Iron Ore Concentrate Unloading and Storage Area (EU001), Mixing Area Material Handling System (EU011), Hearth Layer Bin System (EU012), Furnace Discharge System (EU015), Hearth Layer Separation System (EU016), Oxide Pellet Storage and Unloading System (EU019), Recycled Dust Storage Area (EU026), Iron Ore Concentrate Wet Grinding and Filter Cake Production, Greenball Production System
Parameter:	Weighted Average Fluoride Concentration of Iron Ore Concentrate
Limit:	Shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	[Column 1 + Column 2]/ 12
	This Month	Previous 11 Months	12 Month Average
Month 1			
Month 2			
Month 3			

☐ No deviation occurred in this quarter.

☐ Deviation/s occurred in this quarter.
Deviation has been reported on:

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054
Facility: Ground Limestone/Dolomite Additive System Air Heater (EU010)
Parameter: GHG (as CO_2e) Emissions
Limit: Shall not exceed 9,737 tons per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	Column 1 + Column 2
	This Month	Previous 11 Months	12 Month Total
Month 1			
Month 2			
Month 3			

☐ No deviation occurred in this quarter.

☐ Deviation/s occurred in this quarter.
Deviation has been reported on:

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054
Facility: Hardening Furnace
Parameter: GHG (as CO_2e) Emissions
Limit: Shall not exceed 661,208 tons per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	Column 1 + Column 2
	This Month	Previous 11 Months	12 Month Total
Month 1			
Month 2			
Month 3			

☐ No deviation occurred in this quarter.

☐ Deviation/s occurred in this quarter.
Deviation has been reported on:

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054
Facility: Emergency Generator (EU017)
Fire Pump (EU018)
Parameter: Hours of Operation
Limit: Shall not exceed 500 hours, each, per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	Column 1 + Column 2
	This Month	Previous 11 Months	12 Month Total
Month 1			
Month 2			
Month 3			

☐ No deviation occurred in this quarter.

☐ Deviation/s occurred in this quarter.
Deviation has been reported on:

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054
Facility: Emergency Generator (EU017)
Parameter: GHG (as CO_2e) Emissions
Limit: Shall not exceed 144 tons per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	Column 1 + Column 2
	This Month	Previous 11 Months	12 Month Total
Month 1			
Month 2			
Month 3			

☐ No deviation occurred in this quarter.

☐ Deviation/s occurred in this quarter.
Deviation has been reported on:

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054
Facility: Fire Pump (EU018)
Parameter: GHG (as CO_2e) Emissions
Limit: Shall not exceed 66 tons per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	Column 1 + Column 2
	This Month	Previous 11 Months	12 Month Total
Month 1			
Month 2			
Month 3			

☐ No deviation occurred in this quarter.

☐ Deviation/s occurred in this quarter.
Deviation has been reported on:

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054
Facility: Space Heaters (EU021)
Parameter: GHG (as CO_2e) Emissions
Limit: Shall not exceed 3,587 tons per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	Column 1 + Column 2
	This Month	Previous 11 Months	12 Month Total
Month 1			
Month 2			
Month 3			

☐ No deviation occurred in this quarter.

☐ Deviation/s occurred in this quarter.
Deviation has been reported on:

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054
Facility: Coke Breeze Additive System Air Heater (EU009)
Parameter: GHG (as CO_2e) Emissions
Limit: Shall not exceed 871 tons per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	Column 1 + Column 2
	This Month	Previous 11 Months	12 Month Total
Month 1			
Month 2			
Month 3			

☐ No deviation occurred in this quarter.

☐ Deviation/s occurred in this quarter.
Deviation has been reported on:

Submitted by: _____
Title / Position: _____
Signature:_____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH
PART 70 OPERATING PERMIT
QUARTERLY DEVIATION AND COMPLIANCE MONITORING REPORT

Source Name: Magnetation LLC
Source Address: 64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.: T181-32081-00054

Months: _____ to _____ Year: _____

Page 1 of 2

This report shall be submitted quarterly based on a calendar year. Proper notice submittal under Section B –Emergency Provisions satisfies the reporting requirements of paragraph (a) of Section C-General Reporting. Any deviation from the requirements of this permit, the date(s) of each deviation, the probable cause of the deviation, and the response steps taken must be reported. A deviation required to be reported pursuant to an applicable requirement that exists independent of the permit, shall be reported according to the schedule stated in the applicable requirement and does not need to be included in this report. Additional pages may be attached if necessary. If no deviations occurred, please specify in the box marked "No deviations occurred this reporting period".	
☐ NO DEVIATIONS OCCURRED THIS REPORTING PERIOD.	
☐ THE FOLLOWING DEVIATIONS OCCURRED THIS REPORTING PERIOD	
Permit Requirement (specify permit condition #)	
Date of Deviation:	**Duration of Deviation:**
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	
Permit Requirement (specify permit condition #)	
Date of Deviation:	**Duration of Deviation:**
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	

Permit Requirement (specify permit condition #)	
Date of Deviation:	**Duration of Deviation:**
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	
Permit Requirement (specify permit condition #)	
Date of Deviation:	**Duration of Deviation:**
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	
Permit Requirement (specify permit condition #)	
Date of Deviation:	**Duration of Deviation:**
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	

Form Completed by:_____

Title / Position: _____

Date:_____

Phone: _____

Mail to: Permit Administration and Support Section
Office of Air Quality
100 North Senate Avenue
MC 61-53 IGCN 1003
Indianapolis, Indiana 46204-2251

Magnetation LLC
64 East 100 North
Reynolds, Indiana 47980

Affidavit of Construction

I, _____, being duly sworn upon my oath, depose and say:
(Name of the Authorized Representative)

1. I live in _____ County, Indiana and being of sound mind and over twenty-one (21) years of age, I am competent to give this affidavit.

2. I hold the position of _____ for _____.
(Title) (Company Name)

3. By virtue of my position with _____, I have personal
(Company Name)
knowledge of the representations contained in this affidavit and am authorized to make these representations on behalf of _____.
(Company Name)

4. I hereby certify that Magnetation LLC 64 East 100 North, Reynolds, Indiana 47980, completed construction of the iron ore pelletizing plant on _____in conformity with the requirements and intent of the construction permit application received by the Office of Air Quality on ***Reviewer: Insert date application received at IDEM*** and as permitted pursuant to New Source Construction Permit and Part 70 Operating Permit No. T181-32081-00054, Plant ID No. 181-00054 issued on _____.

5. **Permittee, please cross out the following statement if it does not apply:** Additional (operations/facilities) were constructed/substituted as described in the attachment to this document and were not made in accordance with the construction permit.

Further Affiant said not.

I affirm under penalties of perjury that the representations contained in this affidavit are true, to the best of my information and belief.

Signature_____
Date_____

STATE OF INDIANA)
)SS

COUNTY OF _____)

Subscribed and sworn to me, a notary public in and for _____ County and State of Indiana

on this _____ day of _____, 20 _____. My Commission expires: _____.

Signature_____
Name_____ (typed or printed)

Attachment A
to Part 70 Operating Permit No. T181-32081-00054

Subpart OOO—Standards of Performance for Nonmetallic Mineral Processing Plants

Source: 74 FR 19309, Apr. 28, 2009, unless otherwise noted.

§ 60.670 Applicability and designation of affected facility.

(a)(1) Except as provided in paragraphs (a)(2), (b), (c), and (d) of this section, the provisions of this subpart are applicable to the following affected facilities in fixed or portable nonmetallic mineral processing plants: each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station. Also, crushers and grinding mills at hot mix asphalt facilities that reduce the size of nonmetallic minerals embedded in recycled asphalt pavement and subsequent affected facilities up to, but not including, the first storage silo or bin are subject to the provisions of this subpart.

(2) The provisions of this subpart do not apply to the following operations: All facilities located in underground mines; plants without crushers or grinding mills above ground; and wet material processing operations (as defined in § 60.671).

(b) An affected facility that is subject to the provisions of subparts F or I of this part or that follows in the plant process any facility subject to the provisions of subparts F or I of this part is not subject to the provisions of this subpart.

(c) Facilities at the following plants are not subject to the provisions of this subpart:

(1) Fixed sand and gravel plants and crushed stone plants with capacities, as defined in § 60.671, of 23 megagrams per hour (25 tons per hour) or less;

(2) Portable sand and gravel plants and crushed stone plants with capacities, as defined in § 60.671, of 136 megagrams per hour (150 tons per hour) or less; and

(3) Common clay plants and pumice plants with capacities, as defined in § 60.671, of 9 megagrams per hour (10 tons per hour) or less.

(d)(1) When an existing facility is replaced by a piece of equipment of equal or smaller size, as defined in § 60.671, having the same function as the existing facility, and there is no increase in the amount of emissions, the new facility is exempt from the provisions of §§ 60.672, 60.674, and 60.675 except as provided for in paragraph (d)(3) of this section.

(2) An owner or operator complying with paragraph (d)(1) of this section shall submit the information required in § 60.676(a).

(3) An owner or operator replacing all existing facilities in a production line with new facilities does not qualify for the exemption described in paragraph (d)(1) of this section and must comply with the provisions of §§ 60.672, 60.674 and 60.675.

(e) An affected facility under paragraph (a) of this section that commences construction, modification, or reconstruction after August 31, 1983, is subject to the requirements of this part.

(f) Table 1 of this subpart specifies the provisions of subpart A of this part 60 that do not apply to owners and operators of affected facilities subject to this subpart or that apply with certain exceptions.

§ 60.671 Definitions.

All terms used in this subpart, but not specifically defined in this section, shall have the meaning given them in the Act and in subpart A of this part.

Bagging operation means the mechanical process by which bags are filled with nonmetallic minerals.

Belt conveyor means a conveying device that transports material from one location to another by means of an endless belt that is carried on a series of idlers and routed around a pulley at each end.

Bucket elevator means a conveying device of nonmetallic minerals consisting of a head and foot assembly which supports and drives an endless single or double strand chain or belt to which buckets are attached.

Building means any frame structure with a roof.

Capacity means the cumulative rated capacity of all initial crushers that are part of the plant.

Capture system means the equipment (including enclosures, hoods, ducts, fans, dampers, etc.) used to capture and transport particulate matter generated by one or more affected facilities to a control device.

Control device means the air pollution control equipment used to reduce particulate matter emissions released to the atmosphere from one or more affected facilities at a nonmetallic mineral processing plant.

Conveying system means a device for transporting materials from one piece of equipment or location to another location within a plant. Conveying systems include but are not limited to the following: Feeders, belt conveyors, bucket elevators and pneumatic systems.

Crush or *Crushing* means to reduce the size of nonmetallic mineral material by means of physical impaction of the crusher or grinding mill upon the material.

Crusher means a machine used to crush any nonmetallic minerals, and includes, but is not limited to, the following types: Jaw, gyratory, cone, roll, rod mill, hammermill, and impactor.

Enclosed truck or railcar loading station means that portion of a nonmetallic mineral processing plant where nonmetallic minerals are loaded by an enclosed conveying system into enclosed trucks or railcars.

Fixed plant means any nonmetallic mineral processing plant at which the processing equipment specified in § 60.670(a) is attached by a cable, chain, turnbuckle, bolt or other means (except electrical connections) to any anchor, slab, or structure including bedrock.

Fugitive emission means particulate matter that is not collected by a capture system and is released to the atmosphere at the point of generation.

Grinding mill means a machine used for the wet or dry fine crushing of any nonmetallic mineral. Grinding mills include, but are not limited to, the following types: Hammer, roller, rod, pebble and ball, and fluid energy. The grinding mill includes the air conveying system, air separator, or air classifier, where such systems are used.

Initial crusher means any crusher into which nonmetallic minerals can be fed without prior crushing in the plant.

Nonmetallic mineral means any of the following minerals or any mixture of which the majority is any of the following minerals:

(1) Crushed and Broken Stone, including Limestone, Dolomite, Granite, Traprock, Sandstone, Quartz, Quartzite, Marl, Marble, Slate, Shale, Oil Shale, and Shell.

(2) Sand and Gravel.

(3) Clay including Kaolin, Fireclay, Bentonite, Fuller's Earth, Ball Clay, and Common Clay.

(4) Rock Salt.

(5) Gypsum (natural or synthetic).

(6) Sodium Compounds, including Sodium Carbonate, Sodium Chloride, and Sodium Sulfate.

(7) Pumice.

(8) Gilsonite.

(9) Talc and Pyrophyllite.

(10) Boron, including Borax, Kernite, and Colemanite.

(11) Barite.

(12) Fluorospar.

(13) Feldspar.

(14) Diatomite.

(15) Perlite.

(16) Vermiculite.

(17) Mica.

(18) Kyanite, including Andalusite, Sillimanite, Topaz, and Dumortierite.

Nonmetallic mineral processing plant means any combination of equipment that is used to crush or grind any nonmetallic mineral wherever located, including lime plants, power plants, steel mills, asphalt concrete plants, portland cement plants, or any other facility processing nonmetallic minerals except as provided in § 60.670 (b) and (c).

Portable plant means any nonmetallic mineral processing plant that is mounted on any chassis or skids and may be moved by the application of a lifting or pulling force. In addition, there shall be no cable,

chain, turnbuckle, bolt or other means (except electrical connections) by which any piece of equipment is attached or clamped to any anchor, slab, or structure, including bedrock that must be removed prior to the application of a lifting or pulling force for the purpose of transporting the unit.

Production line means all affected facilities (crushers, grinding mills, screening operations, bucket elevators, belt conveyors, bagging operations, storage bins, and enclosed truck and railcar loading stations) which are directly connected or are connected together by a conveying system.

Saturated material means, for purposes of this subpart, mineral material with sufficient surface moisture such that particulate matter emissions are not generated from processing of the material through screening operations, bucket elevators and belt conveyors. Material that is wetted solely by wet suppression systems is not considered to be “saturated” for purposes of this definition.

Screening operation means a device for separating material according to size by passing undersize material through one or more mesh surfaces (screens) in series, and retaining oversize material on the mesh surfaces (screens). Grizzly feeders associated with truck dumping and static (non-moving) grizzlies used anywhere in the nonmetallic mineral processing plant are not considered to be screening operations.

Seasonal shut down means shut down of an affected facility for a period of at least 45 consecutive days due to weather or seasonal market conditions.

Size means the rated capacity in tons per hour of a crusher, grinding mill, bucket elevator, bagging operation, or enclosed truck or railcar loading station; the total surface area of the top screen of a screening operation; the width of a conveyor belt; and the rated capacity in tons of a storage bin.

Stack emission means the particulate matter that is released to the atmosphere from a capture system.

Storage bin means a facility for storage (including surge bins) of nonmetallic minerals prior to further processing or loading.

Transfer point means a point in a conveying operation where the nonmetallic mineral is transferred to or from a belt conveyor except where the nonmetallic mineral is being transferred to a stockpile.

Truck dumping means the unloading of nonmetallic minerals from movable vehicles designed to transport nonmetallic minerals from one location to another. Movable vehicles include but are not limited to: Trucks, front end loaders, skip hoists, and railcars.

Vent means an opening through which there is mechanically induced air flow for the purpose of exhausting from a building air carrying particulate matter emissions from one or more affected facilities.

Wet material processing operation(s) means any of the following:

(1) Wet screening operations (as defined in this section) and subsequent screening operations, bucket elevators and belt conveyors in the production line that process saturated materials (as defined in this section) up to the first crusher, grinding mill or storage bin in the production line; or

(2) Screening operations, bucket elevators and belt conveyors in the production line downstream of wet mining operations (as defined in this section) that process saturated materials (as defined in this section) up to the first crusher, grinding mill or storage bin in the production line.

Wet mining operation means a mining or dredging operation designed and operated to extract any nonmetallic mineral regulated under this subpart from deposits existing at or below the water table, where the nonmetallic mineral is saturated with water.

Wet screening operation means a screening operation at a nonmetallic mineral processing plant which removes unwanted material or which separates marketable fines from the product by a washing process which is designed and operated at all times such that the product is saturated with water.

§ 60.672 Standard for particulate matter (PM).

(a) Affected facilities must meet the stack emission limits and compliance requirements in Table 2 of this subpart within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup as required under § 60.8. The requirements in Table 2 of this subpart apply for affected facilities with capture systems used to capture and transport particulate matter to a control device.

(b) Affected facilities must meet the fugitive emission limits and compliance requirements in Table 3 of this subpart within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup as required under § 60.11. The requirements in Table 3 of this subpart apply for fugitive emissions from affected facilities without capture systems and for fugitive emissions escaping capture systems.

(c) [Reserved]

(d) Truck dumping of nonmetallic minerals into any screening operation, feed hopper, or crusher is exempt from the requirements of this section.

(e) If any transfer point on a conveyor belt or any other affected facility is enclosed in a building, then each enclosed affected facility must comply with the emission limits in paragraphs (a) and (b) of this section, or the building enclosing the affected facility or facilities must comply with the following emission limits:

(1) Fugitive emissions from the building openings (except for vents as defined in § 60.671) must not exceed 7 percent opacity; and

(2) Vents (as defined in § 60.671) in the building must meet the applicable stack emission limits and compliance requirements in Table 2 of this subpart.

(f) Any baghouse that controls emissions from only an individual, enclosed storage bin is exempt from the applicable stack PM concentration limit (and associated performance testing) in Table 2 of this subpart but must meet the applicable stack opacity limit and compliance requirements in Table 2 of this subpart. This exemption from the stack PM concentration limit does not apply for multiple storage bins with combined stack emissions.

§ 60.673 Reconstruction.

(a) The cost of replacement of ore-contact surfaces on processing equipment shall not be considered in calculating either the “fixed capital cost of the new components” or the “fixed capital cost that would be required to construct a comparable new facility” under § 60.15. Ore-contact surfaces are crushing surfaces; screen meshes, bars, and plates; conveyor belts; and elevator buckets.

(b) Under § 60.15, the “fixed capital cost of the new components” includes the fixed capital cost of all depreciable components (except components specified in paragraph (a) of this section) which are or will be replaced pursuant to all continuous programs of component replacement commenced within any 2-year period following August 31, 1983.

§ 60.674 Monitoring of operations.

(a) The owner or operator of any affected facility subject to the provisions of this subpart which uses a wet scrubber to control emissions shall install, calibrate, maintain and operate the following monitoring devices:

(1) A device for the continuous measurement of the pressure loss of the gas stream through the scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±250 pascals ±1 inch water gauge pressure and must be calibrated on an annual basis in accordance with manufacturer's instructions.

(2) A device for the continuous measurement of the scrubbing liquid flow rate to the wet scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±5 percent of design scrubbing liquid flow rate and must be calibrated on an annual basis in accordance with manufacturer's instructions.

(b) The owner or operator of any affected facility for which construction, modification, or reconstruction commenced on or after April 22, 2008, that uses wet suppression to control emissions from the affected facility must perform monthly periodic inspections to check that water is flowing to discharge spray nozzles in the wet suppression system. The owner or operator must initiate corrective action within 24 hours and complete corrective action as expediently as practical if the owner or operator finds that water is not flowing properly during an inspection of the water spray nozzles. The owner or operator must record each inspection of the water spray nozzles, including the date of each inspection and any corrective actions taken, in the logbook required under § 60.676(b).

(1) If an affected facility relies on water carryover from upstream water sprays to control fugitive emissions, then that affected facility is exempt from the 5-year repeat testing requirement specified in Table 3 of this subpart provided that the affected facility meets the criteria in paragraphs (b)(1)(i) and (ii) of this section:

(i) The owner or operator of the affected facility conducts periodic inspections of the upstream water spray(s) that are responsible for controlling fugitive emissions from the affected facility. These inspections are conducted according to paragraph (b) of this section and § 60.676(b), and

(ii) The owner or operator of the affected facility designates which upstream water spray(s) will be periodically inspected at the time of the initial performance test required under § 60.11 of this part and § 60.675 of this subpart.

(2) If an affected facility that routinely uses wet suppression water sprays ceases operation of the water sprays or is using a control mechanism to reduce fugitive emissions other than water sprays during the monthly inspection (for example, water from recent rainfall), the logbook entry required under § 60.676(b) must specify the control mechanism being used instead of the water sprays.

(c) Except as specified in paragraph (d) or (e) of this section, the owner or operator of any affected facility for which construction, modification, or reconstruction commenced on or after April 22, 2008, that uses a baghouse to control emissions must conduct quarterly 30-minute visible emissions inspections using EPA Method 22 (40 CFR part 60, Appendix A-7). The Method 22 (40 CFR part 60, Appendix A-7) test shall be conducted while the baghouse is operating. The test is successful if no visible emissions are observed. If

any visible emissions are observed, the owner or operator of the affected facility must initiate corrective action within 24 hours to return the baghouse to normal operation. The owner or operator must record each Method 22 (40 CFR part 60, Appendix A-7) test, including the date and any corrective actions taken, in the logbook required under § 60.676(b). The owner or operator of the affected facility may establish a different baghouse-specific success level for the visible emissions test (other than no visible emissions) by conducting a PM performance test according to § 60.675(b) simultaneously with a Method 22 (40 CFR part 60, Appendix A-7) to determine what constitutes normal visible emissions from that affected facility's baghouse when it is in compliance with the applicable PM concentration limit in Table 2 of this subpart. The revised visible emissions success level must be incorporated into the permit for the affected facility.

(d) As an alternative to the periodic Method 22 (40 CFR part 60, Appendix A-7) visible emissions inspections specified in paragraph (c) of this section, the owner or operator of any affected facility for which construction, modification, or reconstruction commenced on or after April 22, 2008, that uses a baghouse to control emissions may use a bag leak detection system. The owner or operator must install, operate, and maintain the bag leak detection system according to paragraphs (d)(1) through (3) of this section.

(1) Each bag leak detection system must meet the specifications and requirements in paragraphs (d)(1)(i) through (viii) of this section.

(i) The bag leak detection system must be certified by the manufacturer to be capable of detecting PM emissions at concentrations of 1 milligram per dry standard cubic meter (0.00044 grains per actual cubic foot) or less.

(ii) The bag leak detection system sensor must provide output of relative PM loadings. The owner or operator shall continuously record the output from the bag leak detection system using electronic or other means (*e.g.* , using a strip chart recorder or a data logger).

(iii) The bag leak detection system must be equipped with an alarm system that will sound when the system detects an increase in relative particulate loading over the alarm set point established according to paragraph (d)(1)(iv) of this section, and the alarm must be located such that it can be heard by the appropriate plant personnel.

(iv) In the initial adjustment of the bag leak detection system, the owner or operator must establish, at a minimum, the baseline output by adjusting the sensitivity (range) and the averaging period of the device, the alarm set points, and the alarm delay time.

(v) Following initial adjustment, the owner or operator shall not adjust the averaging period, alarm set point, or alarm delay time without approval from the Administrator or delegated authority except as provided in paragraph (d)(1)(vi) of this section.

(vi) Once per quarter, the owner or operator may adjust the sensitivity of the bag leak detection system to account for seasonal effects, including temperature and humidity, according to the procedures identified in the site-specific monitoring plan required by paragraph (d)(2) of this section.

(vii) The owner or operator must install the bag leak detection sensor downstream of the fabric filter.

(viii) Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors.

(2) The owner or operator of the affected facility must develop and submit to the Administrator or delegated authority for approval of a site-specific monitoring plan for each bag leak detection system. The

owner or operator must operate and maintain the bag leak detection system according to the site-specific monitoring plan at all times. Each monitoring plan must describe the items in paragraphs (d)(2)(i) through (vi) of this section.

(i) Installation of the bag leak detection system;

(ii) Initial and periodic adjustment of the bag leak detection system, including how the alarm set-point will be established;

(iii) Operation of the bag leak detection system, including quality assurance procedures;

(iv) How the bag leak detection system will be maintained, including a routine maintenance schedule and spare parts inventory list;

(v) How the bag leak detection system output will be recorded and stored; and

(vi) Corrective action procedures as specified in paragraph (d)(3) of this section. In approving the site-specific monitoring plan, the Administrator or delegated authority may allow owners and operators more than 3 hours to alleviate a specific condition that causes an alarm if the owner or operator identifies in the monitoring plan this specific condition as one that could lead to an alarm, adequately explains why it is not feasible to alleviate this condition within 3 hours of the time the alarm occurs, and demonstrates that the requested time will ensure alleviation of this condition as expeditiously as practicable.

(3) For each bag leak detection system, the owner or operator must initiate procedures to determine the cause of every alarm within 1 hour of the alarm. Except as provided in paragraph (d)(2)(vi) of this section, the owner or operator must alleviate the cause of the alarm within 3 hours of the alarm by taking whatever corrective action(s) are necessary. Corrective actions may include, but are not limited to the following:

(i) Inspecting the fabric filter for air leaks, torn or broken bags or filter media, or any other condition that may cause an increase in PM emissions;

(ii) Sealing off defective bags or filter media;

(iii) Replacing defective bags or filter media or otherwise repairing the control device;

(iv) Sealing off a defective fabric filter compartment;

(v) Cleaning the bag leak detection system probe or otherwise repairing the bag leak detection system; or

(vi) Shutting down the process producing the PM emissions.

(e) As an alternative to the periodic Method 22 (40 CFR part 60, Appendix A-7) visible emissions inspections specified in paragraph (c) of this section, the owner or operator of any affected facility that is subject to the requirements for processed stone handling operations in the Lime Manufacturing NESHAP (40 CFR part 63, subpart AAAAA) may follow the continuous compliance requirements in row 1 items (i) through (iii) of Table 6 to Subpart AAAAA of 40 CFR part 63.

§ 60.675 Test methods and procedures.

(a) In conducting the performance tests required in § 60.8, the owner or operator shall use as reference methods and procedures the test methods in appendices A-1 through A-7 of this part or other methods

and procedures as specified in this section, except as provided in § 60.8(b). Acceptable alternative methods and procedures are given in paragraph (e) of this section.

(b) The owner or operator shall determine compliance with the PM standards in § 60.672(a) as follows:

(1) Except as specified in paragraphs (e)(3) and (4) of this section, Method 5 of Appendix A-3 of this part or Method 17 of Appendix A-6 of this part shall be used to determine the particulate matter concentration. The sample volume shall be at least 1.70 dscm (60 dscf). For Method 5 (40 CFR part 60, Appendix A-3), if the gas stream being sampled is at ambient temperature, the sampling probe and filter may be operated without heaters. If the gas stream is above ambient temperature, the sampling probe and filter may be operated at a temperature high enough, but no higher than 121 °C (250 °F), to prevent water condensation on the filter.

(2) Method 9 of Appendix A-4 of this part and the procedures in § 60.11 shall be used to determine opacity.

(c)(1) In determining compliance with the particulate matter standards in § 60.672(b) or § 60.672(e)(1), the owner or operator shall use Method 9 of Appendix A-4 of this part and the procedures in § 60.11, with the following additions:

(i) The minimum distance between the observer and the emission source shall be 4.57 meters (15 feet).

(ii) The observer shall, when possible, select a position that minimizes interference from other fugitive emission sources (*e.g.,* road dust). The required observer position relative to the sun (Method 9 of Appendix A-4 of this part, Section 2.1) must be followed.

(iii) For affected facilities using wet dust suppression for particulate matter control, a visible mist is sometimes generated by the spray. The water mist must not be confused with particulate matter emissions and is not to be considered a visible emission. When a water mist of this nature is present, the observation of emissions is to be made at a point in the plume where the mist is no longer visible.

(2)(i) In determining compliance with the opacity of stack emissions from any baghouse that controls emissions only from an individual enclosed storage bin under § 60.672(f) of this subpart, using Method 9 (40 CFR part 60, Appendix A-4), the duration of the Method 9 (40 CFR part 60, Appendix A-4) observations shall be 1 hour (ten 6-minute averages).

(ii) The duration of the Method 9 (40 CFR part 60, Appendix A-4) observations may be reduced to the duration the affected facility operates (but not less than 30 minutes) for baghouses that control storage bins or enclosed truck or railcar loading stations that operate for less than 1 hour at a time.

(3) When determining compliance with the fugitive emissions standard for any affected facility described under § 60.672(b) or § 60.672(e)(1) of this subpart, the duration of the Method 9 (40 CFR part 60, Appendix A-4) observations must be 30 minutes (five 6-minute averages). Compliance with the applicable fugitive emission limits in Table 3 of this subpart must be based on the average of the five 6-minute averages.

(d) To demonstrate compliance with the fugitive emission limits for buildings specified in § 60.672(e)(1), the owner or operator must complete the testing specified in paragraph (d)(1) and (2) of this section. Performance tests must be conducted while all affected facilities inside the building are operating.

(1) If the building encloses any affected facility that commences construction, modification, or reconstruction on or after April 22, 2008, the owner or operator of the affected facility must conduct an initial Method 9 (40 CFR part 60, Appendix A-4) performance test according to this section and § 60.11.

(2) If the building encloses only affected facilities that commenced construction, modification, or reconstruction before April 22, 2008, and the owner or operator has previously conducted an initial Method 22 (40 CFR part 60, Appendix A-7) performance test showing zero visible emissions, then the owner or operator has demonstrated compliance with the opacity limit in § 60.672(e)(1). If the owner or operator has not conducted an initial performance test for the building before April 22, 2008, then the owner or operator must conduct an initial Method 9 (40 CFR part 60, Appendix A-4) performance test according to this section and § 60.11 to show compliance with the opacity limit in § 60.672(e)(1).

(e) The owner or operator may use the following as alternatives to the reference methods and procedures specified in this section:

(1) For the method and procedure of paragraph (c) of this section, if emissions from two or more facilities continuously interfere so that the opacity of fugitive emissions from an individual affected facility cannot be read, either of the following procedures may be used:

(i) Use for the combined emission stream the highest fugitive opacity standard applicable to any of the individual affected facilities contributing to the emissions stream.

(ii) Separate the emissions so that the opacity of emissions from each affected facility can be read.

(2) A single visible emission observer may conduct visible emission observations for up to three fugitive, stack, or vent emission points within a 15-second interval if the following conditions are met:

(i) No more than three emission points may be read concurrently.

(ii) All three emission points must be within a 70 degree viewing sector or angle in front of the observer such that the proper sun position can be maintained for all three points.

(iii) If an opacity reading for any one of the three emission points equals or exceeds the applicable standard, then the observer must stop taking readings for the other two points and continue reading just that single point.

(3) Method 5I of Appendix A-3 of this part may be used to determine the PM concentration as an alternative to the methods specified in paragraph (b)(1) of this section. Method 5I (40 CFR part 60, Appendix A-3) may be useful for affected facilities that operate for less than 1 hour at a time such as (but not limited to) storage bins or enclosed truck or railcar loading stations.

(4) In some cases, velocities of exhaust gases from building vents may be too low to measure accurately with the type S pitot tube specified in EPA Method 2 of Appendix A-1 of this part [*i.e.,* velocity head <1.3 mm H_2O (0.05 in. H_2O)] and referred to in EPA Method 5 of Appendix A-3 of this part. For these conditions, the owner or operator may determine the average gas flow rate produced by the power fans (*e.g.,* from vendor-supplied fan curves) to the building vent. The owner or operator may calculate the average gas velocity at the building vent measurement site using Equation 1 of this section and use this average velocity in determining and maintaining isokinetic sampling rates.

$$v_e = \frac{Q_f}{A_e} \qquad \text{(Eq. 1)}$$

Where:

V_e = average building vent velocity (feet per minute);

Q_f = average fan flow rate (cubic feet per minute); and

A_e = area of building vent and measurement location (square feet).

(f) To comply with § 60.676(d), the owner or operator shall record the measurements as required in § 60.676(c) using the monitoring devices in § 60.674 (a)(1) and (2) during each particulate matter run and shall determine the averages.

(g) For performance tests involving only Method 9 (40 CFR part 60 Appendix A-4) testing, the owner or operator may reduce the 30-day advance notification of performance test in § 60.7(a)(6) and 60.8(d) to a 7-day advance notification.

(h) [Reserved]

(i) If the initial performance test date for an affected facility falls during a seasonal shut down (as defined in § 60.671 of this subpart) of the affected facility, then with approval from the permitting authority, the owner or operator may postpone the initial performance test until no later than 60 calendar days after resuming operation of the affected facility.

§ 60.676 Reporting and recordkeeping.

(a) Each owner or operator seeking to comply with § 60.670(d) shall submit to the Administrator the following information about the existing facility being replaced and the replacement piece of equipment.

(1) For a crusher, grinding mill, bucket elevator, bagging operation, or enclosed truck or railcar loading station:

(i) The rated capacity in megagrams or tons per hour of the existing facility being replaced and

(ii) The rated capacity in tons per hour of the replacement equipment.

(2) For a screening operation:

(i) The total surface area of the top screen of the existing screening operation being replaced and

(ii) The total surface area of the top screen of the replacement screening operation.

(3) For a conveyor belt:

(i) The width of the existing belt being replaced and

(ii) The width of the replacement conveyor belt.

(4) For a storage bin:

(i) The rated capacity in megagrams or tons of the existing storage bin being replaced and

(ii) The rated capacity in megagrams or tons of replacement storage bins.

(b)(1) Owners or operators of affected facilities (as defined in §§ 60.670 and 60.671) for which construction, modification, or reconstruction commenced on or after April 22, 2008, must record each periodic inspection required under § 60.674(b) or (c), including dates and any corrective actions taken, in a logbook (in written or electronic format). The owner or operator must keep the logbook onsite and make hard or electronic copies (whichever is requested) of the logbook available to the Administrator upon request.

(2) For each bag leak detection system installed and operated according to § 60.674(d), the owner or operator must keep the records specified in paragraphs (b)(2)(i) through (iii) of this section.

(i) Records of the bag leak detection system output;

(ii) Records of bag leak detection system adjustments, including the date and time of the adjustment, the initial bag leak detection system settings, and the final bag leak detection system settings; and

(iii) The date and time of all bag leak detection system alarms, the time that procedures to determine the cause of the alarm were initiated, the cause of the alarm, an explanation of the actions taken, the date and time the cause of the alarm was alleviated, and whether the cause of the alarm was alleviated within 3 hours of the alarm.

(3) The owner or operator of each affected facility demonstrating compliance according to § 60.674(e) by following the requirements for processed stone handling operations in the Lime Manufacturing NESHAP (40 CFR part 63, subpart AAAAA) must maintain records of visible emissions observations required by § 63.7132(a)(3) and (b) of 40 CFR part 63, subpart AAAAA.

(c) During the initial performance test of a wet scrubber, and daily thereafter, the owner or operator shall record the measurements of both the change in pressure of the gas stream across the scrubber and the scrubbing liquid flow rate.

(d) After the initial performance test of a wet scrubber, the owner or operator shall submit semiannual reports to the Administrator of occurrences when the measurements of the scrubber pressure loss and liquid flow rate decrease by more than 30 percent from the average determined during the most recent performance test.

(e) The reports required under paragraph (d) of this section shall be postmarked within 30 days following end of the second and fourth calendar quarters.

(f) The owner or operator of any affected facility shall submit written reports of the results of all performance tests conducted to demonstrate compliance with the standards set forth in § 60.672 of this subpart, including reports of opacity observations made using Method 9 (40 CFR part 60, Appendix A-4) to demonstrate compliance with § 60.672(b), (e) and (f).

(g) The owner or operator of any wet material processing operation that processes saturated and subsequently processes unsaturated materials, shall submit a report of this change within 30 days following such change. At the time of such change, this screening operation, bucket elevator, or belt conveyor becomes subject to the applicable opacity limit in § 60.672(b) and the emission test requirements of § 60.11.

(h) The subpart A requirement under § 60.7(a)(1) for notification of the date construction or reconstruction commenced is waived for affected facilities under this subpart.

(i) A notification of the actual date of initial startup of each affected facility shall be submitted to the Administrator.

(1) For a combination of affected facilities in a production line that begin actual initial startup on the same day, a single notification of startup may be submitted by the owner or operator to the Administrator. The notification shall be postmarked within 15 days after such date and shall include a description of each affected facility, equipment manufacturer, and serial number of the equipment, if available.

(2) For portable aggregate processing plants, the notification of the actual date of initial startup shall include both the home office and the current address or location of the portable plant.

(j) The requirements of this section remain in force until and unless the Agency, in delegating enforcement authority to a State under section 111(c) of the Act, approves reporting requirements or an alternative means of compliance surveillance adopted by such States. In that event, affected facilities within the State will be relieved of the obligation to comply with the reporting requirements of this section, provided that they comply with requirements established by the State.

(k) Notifications and reports required under this subpart and under subpart A of this part to demonstrate compliance with this subpart need only to be sent to the EPA Region or the State which has been delegated authority according to § 60.4(b).

Table 1 to Subpart OOO of Part 60—Exceptions to Applicability of Subpart A to Subpart OOO

Subpart A reference	Applies to subpart OOO	Explanation
60.4, Address	Yes	Except in § 60.4(a) and (b) submittals need not be submitted to both the EPA Region and delegated State authority (§ 60.676(k)).
60.7, Notification and recordkeeping	Yes	Except in (a)(1) notification of the date construction or reconstruction commenced (§ 60.676(h)).
		Also, except in (a)(6) performance tests involving only Method 9 (40 CFR part 60, Appendix A-4) require a 7-day advance notification instead of 30 days (§ 60.675(g)).
60.8, Performance tests	Yes	Except in (d) performance tests involving only Method 9 (40 CFR part 60, Appendix A-4) require a 7-day advance notification instead of 30 days (§ 60.675(g)).
60.11, Compliance with standards and maintenance requirements	Yes	Except in (b) under certain conditions (§§ 60.675(c)), Method 9 (40 CFR part 60, Appendix A-4) observation is reduced from 3 hours to 30 minutes for fugitive emissions.
60.18, General control device	No	Flares will not be used to comply with the emission limits.

Table 2 to Subpart OOO of Part 60—Stack Emission Limits for Affected Facilities With Capture Systems

For * * *	The owner or operator must meet a PM limit of * * *	And the owner or operator must meet an opacity limit of * * *	The owner or operator must demonstrate compliance with these limits by conducting * * *
Affected facilities (as defined in §§ 60.670 and 60.671) that commenced construction, modification, or reconstruction after August 31, 1983 but before April 22, 2008	0.05 g/dscm (0.022 gr/dscf) [a]	7 percent for dry control devices [b]	An initial performance test according to § 60.8 of this part and § 60.675 of this subpart; and Monitoring of wet scrubber parameters according to § 60.674(a) and § 60.676(c), (d), and (e).
Affected facilities (as defined in §§ 60.670 and 60.671) that commence construction, modification, or reconstruction on or after April 22, 2008	0.032 g/dscm (0.014 gr/dscf) [a]	Not applicable (except for individual enclosed storage bins) 7 percent for dry control devices on individual enclosed storage bins	An initial performance test according to § 60.8 of this part and § 60.675 of this subpart; and Monitoring of wet scrubber parameters according to § 60.674(a) and § 60.676(c), (d), and (e); and
			Monitoring of baghouses according to § 60.674(c), (d), or (e) and § 60.676(b).

[a] Exceptions to the PM limit apply for individual enclosed storage bins and other equipment. See § 60.672(d) through (f).

[b] The stack opacity limit and associated opacity testing requirements do not apply for affected facilities using wet scrubbers.

Table 3 to Subpart OOO of Part 60—Fugitive Emission Limits

For * * *	The owner or operator must meet the following fugitive emissions limit for grinding mills, screening operations, bucket elevators, transfer points on belt conveyors, bagging operations, storage bins, enclosed truck or railcar loading stations or from any other affected facility (as defined in §§ 60.670 and 60.671) * * *	The owner or operator must meet the following fugitive emissions limit for crushers at which a capture system is not used * * *	The owner or operator must demonstrate compliance with these limits by conducting * * *
Affected facilities (as defined in §§ 60.670 and 60.671) that commenced construction, modification, or reconstruction after August 31, 1983 but before April 22, 2008	10 percent opacity	15 percent opacity	An initial performance test according to § 60.11 of this part and § 60.675 of this subpart.
Affected facilities (as defined in §§ 60.670 and 60.671) that commence construction, modification, or reconstruction on or after April 22, 2008	7 percent opacity	12 percent opacity	An initial performance test according to § 60.11 of this part and § 60.675 of this subpart; and Periodic inspections of water sprays according to § 60.674(b) and § 60.676(b); and
			A repeat performance test according to § 60.11 of this part and § 60.675 of this subpart within 5 years from the previous performance test for fugitive emissions from affected facilities without water sprays. Affected facilities controlled by water carryover from upstream water sprays that are inspected according to the requirements in § 60.674(b) and § 60.676(b) are exempt from this 5-year repeat testing requirement.

Attachment B
to Part 70 Operating Permit No. T181-32081-00054

Subpart JJJJ—Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

Source: 73 FR 3591, Jan. 18, 2008, unless otherwise noted.

What This Subpart Covers

§ 60.4230 Am I subject to this subpart?

(a) The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (6) of this section. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator.

(1) Manufacturers of stationary SI ICE with a maximum engine power less than or equal to 19 kilowatt (KW) (25 horsepower (HP)) that are manufactured on or after July 1, 2008.

(2) Manufacturers of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) that are gasoline fueled or that are rich burn engines fueled by liquefied petroleum gas (LPG), where the date of manufacture is:

(i) On or after July 1, 2008; or

(ii) On or after January 1, 2009, for emergency engines.

(3) Manufacturers of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) that are not gasoline fueled and are not rich burn engines fueled by LPG, where the manufacturer participates in the voluntary manufacturer certification program described in this subpart and where the date of manufacture is:

(i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);

(ii) On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP;

(iii) On or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or

(iv) On or after January 1, 2009, for emergency engines.

(4) Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:

(i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);

(ii) on or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP;

(iii) on or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or

(iv) on or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP).

(5) Owners and operators of stationary SI ICE that are modified or reconstructed after June 12, 2006, and any person that modifies or reconstructs any stationary SI ICE after June 12, 2006.

(6) The provisions of § 60.4236 of this subpart are applicable to all owners and operators of stationary SI ICE that commence construction after June 12, 2006.

(b) The provisions of this subpart are not applicable to stationary SI ICE being tested at an engine test cell/stand.

(c) If you are an owner or operator of an area source subject to this subpart, you are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart as applicable.

(d) For the purposes of this subpart, stationary SI ICE using alcohol-based fuels are considered gasoline engines.

(e) Stationary SI ICE may be eligible for exemption from the requirements of this subpart as described in 40 CFR part 1068, subpart C (or the exemptions described in 40 CFR parts 90 and 1048, for engines that would need to be certified to standards in those parts), except that owners and operators, as well as manufacturers, may be eligible to request an exemption for national security.

(f) Owners and operators of facilities with internal combustion engines that are acting as temporary replacement units and that are located at a stationary source for less than 1 year and that have been properly certified as meeting the standards that would be applicable to such engine under the appropriate nonroad engine provisions, are not required to meet any other provisions under this subpart with regard to such engines.

[73 FR 3591, Jan. 18, 2008, as amended at 76 FR 37972, June 28, 2011]

Emission Standards for Manufacturers

§ 60.4231 What emission standards must I meet if I am a manufacturer of stationary SI internal combustion engines or equipment containing such engines?

(a) Stationary SI internal combustion engine manufacturers must certify their stationary SI ICE with a maximum engine power less than or equal to 19 KW (25 HP) manufactured on or after July 1, 2008 to the certification emission standards and other requirements for new nonroad SI engines in 40 CFR part 90 or 1054, as follows:

If engine displacement is * * *	and manufacturing dates are * * *	the engine must meet emission standards and related requirements for nonhandheld engines under * * *
(1) below 225 cc	July 1, 2008 to December 31, 2011	40 CFR part 90.
(2) below 225 cc	January 1, 2012 or later	40 CFR part 1054.
(3) at or above 225 cc	July 1, 2008 to December 31, 2010	40 CFR part 90.
(4) at or above 225 cc	January 1, 2011 or later	40 CFR part 1054.

(b) Stationary SI internal combustion engine manufacturers must certify their stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) (except emergency stationary ICE with a maximum engine power greater than 25 HP and less than 130 HP) that use gasoline and that are manufactured on or after the applicable date in § 60.4230(a)(2), or manufactured on or after the applicable date in § 60.4230(a)(4) for emergency stationary ICE with a maximum engine power greater than or equal to 130 HP, to the certification emission standards and other requirements for new nonroad SI engines in 40 CFR part 1048. Stationary SI internal combustion engine manufacturers must certify their emergency stationary SI ICE with a maximum engine power greater than 25 HP and less than 130 HP that are manufactured on or after the applicable date in § 60.4230(a)(4) to the Phase 1 emission standards in 40 CFR 90.103, applicable to class II engines, and other requirements for new nonroad SI engines in 40 CFR part 90. Stationary SI internal combustion engine manufacturers may certify their stationary SI ICE with a maximum engine power less than or equal to 30 KW (40 HP) with a total displacement less than or equal to 1,000 cubic centimeters (cc) to the certification emission standards and other requirements for new nonroad SI engines in 40 CFR part 90 or 1054, as appropriate.

(c) Stationary SI internal combustion engine manufacturers must certify their stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) (except emergency stationary ICE with a maximum engine power greater than 25 HP and less than 130 HP) that are rich burn engines that use LPG and that are manufactured on or after the applicable date in § 60.4230(a)(2), or manufactured on or after the applicable date in § 60.4230(a)(4) for emergency stationary ICE with a maximum engine power greater than or equal to 130 HP, to the certification emission standards and other requirements for new nonroad SI engines in 40 CFR part 1048. Stationary SI internal combustion engine manufacturers must certify their emergency stationary SI ICE with a maximum engine power greater than 25 HP and less than 130 HP that are manufactured on or after the applicable date in § 60.4230(a)(4) to the Phase 1 emission standards in 40 CFR 90.103, applicable to class II engines, and other requirements for new nonroad SI engines in 40 CFR part 90. Stationary SI internal combustion engine manufacturers may certify their stationary SI ICE with a maximum engine power less than or equal to 30 KW (40 HP) with a total displacement less than or equal to 1,000 cc to the certification emission standards and other requirements for new nonroad SI engines in 40 CFR part 90 or 1054, as appropriate.

(d) Stationary SI internal combustion engine manufacturers who choose to certify their stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) and less than 75 KW (100 HP) (except gasoline and rich burn engines that use LPG and emergency stationary ICE with a maximum engine power greater than 25 HP and less than 130 HP) under the voluntary manufacturer certification program described in this subpart must certify those engines to the certification emission standards for new nonroad SI engines in 40 CFR part 1048. Stationary SI internal combustion engine manufacturers who choose to certify their emergency stationary SI ICE greater than 25 HP and less than 130 HP, must certify those engines to the Phase 1 emission standards in 40 CFR 90.103, applicable to class II engines, for new nonroad SI engines in 40 CFR part 90. Stationary SI internal combustion engine manufacturers may certify their stationary SI ICE with a maximum engine power less than or equal to 30 KW (40 HP) with a total displacement less than or equal to 1,000 cc to the certification emission standards for new nonroad

SI engines in 40 CFR part 90 or 1054, as appropriate. For stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) and less than 75 KW (100 HP) (except gasoline and rich burn engines that use LPG and emergency stationary ICE with a maximum engine power greater than 25 HP and less than 130 HP) manufactured prior to January 1, 2011, manufacturers may choose to certify these engines to the standards in Table 1 to this subpart applicable to engines with a maximum engine power greater than or equal to 100 HP and less than 500 HP.

(e) Stationary SI internal combustion engine manufacturers who choose to certify their stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) under the voluntary manufacturer certification program described in this subpart must certify those engines to the emission standards in Table 1 to this subpart. Stationary SI internal combustion engine manufacturers may certify their stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) that are lean burn engines that use LPG to the certification emission standards for new nonroad SI engines in 40 CFR part 1048. For stationary SI ICE with a maximum engine power greater than or equal to 100 HP (75 KW) and less than 500 HP (373 KW) manufactured prior to January 1, 2011, and for stationary SI ICE with a maximum engine power greater than or equal to 500 HP (373 KW) manufactured prior to July 1, 2010, manufacturers may choose to certify these engines to the certification emission standards for new nonroad SI engines in 40 CFR part 1048 applicable to engines that are not severe duty engines.

(f) Manufacturers of equipment containing stationary SI internal combustion engines meeting the provisions of 40 CFR part 1054 must meet the provisions of 40 CFR part 1060, to the extent they apply to equipment manufacturers.

(g) Notwithstanding the requirements in paragraphs (a) through (c) of this section, stationary SI internal combustion engine manufacturers are not required to certify reconstructed engines; however manufacturers may elect to do so. The reconstructed engine must be certified to the emission standards specified in paragraphs (a) through (e) of this section that are applicable to the model year, maximum engine power and displacement of the reconstructed stationary SI ICE.

[73 FR 3591, Jan. 18, 2008, as amended by 73 FR 59175, Oct. 8, 2008; 76 FR 37973, June 28, 2011]

§ 60.4232 How long must my engines meet the emission standards if I am a manufacturer of stationary SI internal combustion engines?

Engines manufactured by stationary SI internal combustion engine manufacturers must meet the emission standards as required in § 60.4231 during the certified emissions life of the engines.

Emission Standards for Owners and Operators

§ 60.4233 What emission standards must I meet if I am an owner or operator of a stationary SI internal combustion engine?

(a) Owners and operators of stationary SI ICE with a maximum engine power less than or equal to 19 KW (25 HP) manufactured on or after July 1, 2008, must comply with the emission standards in § 60.4231(a) for their stationary SI ICE.

(b) Owners and operators of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) manufactured on or after the applicable date in § 60.4230(a)(4) that use gasoline must comply with the emission standards in § 60.4231(b) for their stationary SI ICE.

(c) Owners and operators of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) manufactured on or after the applicable date in § 60.4230(a)(4) that are rich burn engines that use LPG must comply with the emission standards in § 60.4231(c) for their stationary SI ICE.

(d) Owners and operators of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) and less than 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards for field testing in 40 CFR 1048.101(c) for their non-emergency stationary SI ICE and with the emission standards in Table 1 to this subpart for their emergency stationary SI ICE. Owners and operators of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) and less than 75 KW (100 HP) manufactured prior to January 1, 2011, that were certified to the standards in Table 1 to this subpart applicable to engines with a maximum engine power greater than or equal to 100 HP and less than 500 HP, may optionally choose to meet those standards.

(e) Owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards in Table 1 to this subpart for their stationary SI ICE. For owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 100 HP (except gasoline and rich burn engines that use LPG) manufactured prior to January 1, 2011 that were certified to the certification emission standards in 40 CFR part 1048 applicable to engines that are not severe duty engines, if such stationary SI ICE was certified to a carbon monoxide (CO) standard above the standard in Table 1 to this subpart, then the owners and operators may meet the CO certification (not field testing) standard for which the engine was certified.

(f) Owners and operators of any modified or reconstructed stationary SI ICE subject to this subpart must meet the requirements as specified in paragraphs (f)(1) through (5) of this section.

(1) Owners and operators of stationary SI ICE with a maximum engine power less than or equal to 19 KW (25 HP), that are modified or reconstructed after June 12, 2006, must comply with emission standards in § 60.4231(a) for their stationary SI ICE. Engines with a date of manufacture prior to July 1, 2008 must comply with the emission standards specified in § 60.4231(a) applicable to engines manufactured on July 1, 2008.

(2) Owners and operators of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) that are gasoline engines and are modified or reconstructed after June 12, 2006, must comply with the emission standards in § 60.4231(b) for their stationary SI ICE. Engines with a date of manufacture prior to July 1, 2008 (or January 1, 2009 for emergency engines) must comply with the emission standards specified in § 60.4231(b) applicable to engines manufactured on July 1, 2008 (or January 1, 2009 for emergency engines).

(3) Owners and operators of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) that are rich burn engines that use LPG, that are modified or reconstructed after June 12, 2006, must comply with the same emission standards as those specified in § 60.4231(c). Engines with a date of manufacture prior to July 1, 2008 (or January 1, 2009 for emergency engines) must comply with the emission standards specified in § 60.4231(c) applicable to engines manufactured on July 1, 2008 (or January 1, 2009 for emergency engines).

(4) Owners and operators of stationary SI natural gas and lean burn LPG engines with a maximum engine power greater than 19 KW (25 HP), that are modified or reconstructed after June 12, 2006, must comply with the same emission standards as those specified in paragraph (d) or (e) of this section, except that such owners and operators of non-emergency engines and emergency engines greater than or equal to 130 HP must meet a nitrogen oxides (NO_X) emission standard of 3.0 grams per HP-hour (g/HP-hr), a CO emission standard of 4.0 g/HP-hr (5.0 g/HP-hr for non-emergency engines less than 100 HP), and a volatile organic compounds (VOC) emission standard of 1.0 g/HP-hr, or a NO_X emission standard of 250

ppmvd at 15 percent oxygen (O_2), a CO emission standard 540 ppmvd at 15 percent O_2 (675 ppmvd at 15 percent O_2 for non-emergency engines less than 100 HP), and a VOC emission standard of 86 ppmvd at 15 percent O_2 , where the date of manufacture of the engine is:

(i) Prior to July 1, 2007, for non-emergency engines with a maximum engine power greater than or equal to 500 HP (except lean burn natural gas engines and LPG engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);

(ii) Prior to July 1, 2008, for non-emergency engines with a maximum engine power less than 500 HP;

(iii) Prior to January 1, 2009, for emergency engines;

(iv) Prior to January 1, 2008, for non-emergency lean burn natural gas engines and LPG engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP.

(5) Owners and operators of stationary SI landfill/digester gas ICE engines with a maximum engine power greater than 19 KW (25 HP), that are modified or reconstructed after June 12, 2006, must comply with the same emission standards as those specified in paragraph (e) of this section for stationary landfill/digester gas engines. Engines with maximum engine power less than 500 HP and a date of manufacture prior to July 1, 2008 must comply with the emission standards specified in paragraph (e) of this section for stationary landfill/digester gas ICE with a maximum engine power less than 500 HP manufactured on July 1, 2008. Engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines greater than or equal to 500 HP and less than 1,350 HP) and a date of manufacture prior to July 1, 2007 must comply with the emission standards specified in paragraph (e) of this section for stationary landfill/digester gas ICE with a maximum engine power greater than or equal to 500 HP (except lean burn engines greater than or equal to 500 HP and less than 1,350 HP) manufactured on July 1, 2007. Lean burn engines greater than or equal to 500 HP and less than 1,350 HP with a date of manufacture prior to January 1, 2008 must comply with the emission standards specified in paragraph (e) of this section for stationary landfill/digester gas ICE that are lean burn engines greater than or equal to 500 HP and less than 1,350 HP and manufactured on January 1, 2008.

(g) Owners and operators of stationary SI wellhead gas ICE engines may petition the Administrator for approval on a case-by-case basis to meet emission standards no less stringent than the emission standards that apply to stationary emergency SI engines greater than 25 HP and less than 130 HP due to the presence of high sulfur levels in the fuel, as specified in Table 1 to this subpart. The request must, at a minimum, demonstrate that the fuel has high sulfur levels that prevent the use of aftertreatment controls and also that the owner has reasonably made all attempts possible to obtain an engine that will meet the standards without the use of aftertreatment controls. The petition must request the most stringent standards reasonably applicable to the engine using the fuel.

(h) Owners and operators of stationary SI ICE that are required to meet standards that reference 40 CFR 1048.101 must, if testing their engines in use, meet the standards in that section applicable to field testing, except as indicated in paragraph (e) of this section.

[73 FR 3591, Jan. 18, 2008, as amended at 76 FR 37973, June 28, 2011]

§ 60.4234 How long must I meet the emission standards if I am an owner or operator of a stationary SI internal combustion engine?

Owners and operators of stationary SI ICE must operate and maintain stationary SI ICE that achieve the emission standards as required in § 60.4233 over the entire life of the engine.

Other Requirements for Owners and Operators

§ 60.4235 What fuel requirements must I meet if I am an owner or operator of a stationary SI gasoline fired internal combustion engine subject to this subpart?

Owners and operators of stationary SI ICE subject to this subpart that use gasoline must use gasoline that meets the per gallon sulfur limit in 40 CFR 80.195.

§ 60.4236 What is the deadline for importing or installing stationary SI ICE produced in previous model years?

(a) After July 1, 2010, owners and operators may not install stationary SI ICE with a maximum engine power of less than 500 HP that do not meet the applicable requirements in § 60.4233.

(b) After July 1, 2009, owners and operators may not install stationary SI ICE with a maximum engine power of greater than or equal to 500 HP that do not meet the applicable requirements in § 60.4233, except that lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP that do not meet the applicable requirements in § 60.4233 may not be installed after January 1, 2010.

(c) For emergency stationary SI ICE with a maximum engine power of greater than 19 KW (25 HP), owners and operators may not install engines that do not meet the applicable requirements in § 60.4233 after January 1, 2011.

(d) In addition to the requirements specified in §§ 60.4231 and 60.4233, it is prohibited to import stationary SI ICE less than or equal to 19 KW (25 HP), stationary rich burn LPG SI ICE, and stationary gasoline SI ICE that do not meet the applicable requirements specified in paragraphs (a), (b), and (c) of this section, after the date specified in paragraph (a), (b), and (c) of this section.

(e) The requirements of this section do not apply to owners and operators of stationary SI ICE that have been modified or reconstructed, and they do not apply to engines that were removed from one existing location and reinstalled at a new location.

§ 60.4237 What are the monitoring requirements if I am an owner or operator of an emergency stationary SI internal combustion engine?

(a) Starting on July 1, 2010, if the emergency stationary SI internal combustion engine that is greater than or equal to 500 HP that was built on or after July 1, 2010, does not meet the standards applicable to non-emergency engines, the owner or operator must install a non-resettable hour meter.

(b) Starting on January 1, 2011, if the emergency stationary SI internal combustion engine that is greater than or equal to 130 HP and less than 500 HP that was built on or after January 1, 2011, does not meet the standards applicable to non-emergency engines, the owner or operator must install a non-resettable hour meter.

(c) If you are an owner or operator of an emergency stationary SI internal combustion engine that is less than 130 HP, was built on or after July 1, 2008, and does not meet the standards applicable to non-emergency engines, you must install a non-resettable hour meter upon startup of your emergency engine.

Compliance Requirements for Manufacturers

§ 60.4238 What are my compliance requirements if I am a manufacturer of stationary SI internal combustion engines ≤19 KW (25 HP) or a manufacturer of equipment containing such engines?

Stationary SI internal combustion engine manufacturers who are subject to the emission standards specified in § 60.4231(a) must certify their stationary SI ICE using the certification procedures required in 40 CFR part 90, subpart B, or 40 CFR part 1054, subpart C, as applicable, and must test their engines as specified in those parts. Manufacturers of equipment containing stationary SI internal combustion engines meeting the provisions of 40 CFR part 1054 must meet the provisions of 40 CFR part 1060, subpart C, to the extent they apply to equipment manufacturers.

[73 FR 59176, Oct. 8, 2008]

§ 60.4239 What are my compliance requirements if I am a manufacturer of stationary SI internal combustion engines >19 KW (25 HP) that use gasoline or a manufacturer of equipment containing such engines?

Stationary SI internal combustion engine manufacturers who are subject to the emission standards specified in § 60.4231(b) must certify their stationary SI ICE using the certification procedures required in 40 CFR part 1048, subpart C, and must test their engines as specified in that part. Stationary SI internal combustion engine manufacturers who certify their stationary SI ICE with a maximum engine power less than or equal to 30 KW (40 HP) with a total displacement less than or equal to 1,000 cc to the certification emission standards and other requirements for new nonroad SI engines in 40 CFR part 90 or 40 CFR part 1054, and manufacturers of stationary SI emergency engines that are greater than 25 HP and less than 130 HP who meet the Phase 1 emission standards in 40 CFR 90.103, applicable to class II engines, must certify their stationary SI ICE using the certification procedures required in 40 CFR part 90, subpart B, or 40 CFR part 1054, subpart C, as applicable, and must test their engines as specified in those parts. Manufacturers of equipment containing stationary SI internal combustion engines meeting the provisions of 40 CFR part 1054 must meet the provisions of 40 CFR part 1060, subpart C, to the extent they apply to equipment manufacturers.

[73 FR 59176, Oct. 8, 2008]

§ 60.4240 What are my compliance requirements if I am a manufacturer of stationary SI internal combustion engines >19 KW (25 HP) that are rich burn engines that use LPG or a manufacturer of equipment containing such engines?

Stationary SI internal combustion engine manufacturers who are subject to the emission standards specified in § 60.4231(c) must certify their stationary SI ICE using the certification procedures required in 40 CFR part 1048, subpart C, and must test their engines as specified in that part. Stationary SI internal combustion engine manufacturers who certify their stationary SI ICE with a maximum engine power less than or equal to 30 KW (40 HP) with a total displacement less than or equal to 1,000 cc to the certification emission standards and other requirements for new nonroad SI engines in 40 CFR part 90 or 40 CFR part 1054, and manufacturers of stationary SI emergency engines that are greater than 25 HP and less than 130 HP who meet the Phase 1 emission standards in 40 CFR 90.103, applicable to class II engines, must certify their stationary SI ICE using the certification procedures required in 40 CFR part 90, subpart B, or 40 CFR part 1054, subpart C, as applicable, and must test their engines as specified in those parts. Manufacturers of equipment containing stationary SI internal combustion engines meeting the provisions of 40 CFR part 1054 must meet the provisions of 40 CFR part 1060, subpart C, to the extent they apply to equipment manufacturers.

[73 FR 59176, Oct. 8, 2008]

§ 60.4241 What are my compliance requirements if I am a manufacturer of stationary SI internal combustion engines participating in the voluntary certification program or a manufacturer of equipment containing such engines?

(a) Manufacturers of stationary SI internal combustion engines with a maximum engine power greater than 19 KW (25 HP) that do not use gasoline and are not rich burn engines that use LPG can choose to certify their engines to the emission standards in § 60.4231(d) or (e), as applicable, under the voluntary certification program described in this subpart. Manufacturers who certify their engines under the voluntary certification program must meet the requirements as specified in paragraphs (b) through (g) of this section. In addition, manufacturers of stationary SI internal combustion engines who choose to certify their engines under the voluntary certification program, must also meet the requirements as specified in § 60.4247.

(b) Manufacturers of engines other than those certified to standards in 40 CFR part 90 or 40 CFR part 1054 must certify their stationary SI ICE using the certification procedures required in 40 CFR part 1048, subpart C, and must follow the same test procedures that apply to large SI nonroad engines under 40 CFR part 1048, but must use the D-1 cycle of International Organization of Standardization 8178-4: 1996(E) (incorporated by reference, see 40 CFR 60.17) or the test cycle requirements specified in Table 3 to 40 CFR 1048.505, except that Table 3 of 40 CFR 1048.505 applies to high load engines only. Stationary SI internal combustion engine manufacturers who certify their stationary SI ICE with a maximum engine power less than or equal to 30 KW (40 HP) with a total displacement less than or equal to 1,000 cc to the certification emission standards and other requirements for new nonroad SI engines in 40 CFR part 90 or 40 CFR part 1054, and manufacturers of emergency engines that are greater than 25 HP and less than 130 HP who meet the Phase 1 standards in 40 CFR 90.103, applicable to class II engines, must certify their stationary SI ICE using the certification procedures required in 40 CFR part 90, subpart B, or 40 CFR part 1054, subpart C, as applicable, and must test their engines as specified in those parts. Manufacturers of equipment containing stationary SI internal combustion engines meeting the provisions of 40 CFR part 1054 must meet the provisions of 40 CFR part 1060, subpart C, to the extent they apply to equipment manufacturers.

(c) Certification of stationary SI ICE to the emission standards specified in § 60.4231(d) or (e), as applicable, is voluntary, but manufacturers who decide to certify are subject to all of the requirements indicated in this subpart with regard to the engines included in their certification. Manufacturers must clearly label their stationary SI engines as certified or non-certified engines.

(d) Manufacturers of natural gas fired stationary SI ICE who conduct voluntary certification of stationary SI ICE to the emission standards specified in § 60.4231(d) or (e), as applicable, must certify their engines for operation using fuel that meets the definition of pipeline-quality natural gas. The fuel used for certifying stationary SI natural gas engines must meet the definition of pipeline-quality natural gas as described in § 60.4248. In addition, the manufacturer must provide information to the owner and operator of the certified stationary SI engine including the specifications of the pipeline-quality natural gas to which the engine is certified and what adjustments the owner or operator must make to the engine when installed in the field to ensure compliance with the emission standards.

(e) Manufacturers of stationary SI ICE that are lean burn engines fueled by LPG who conduct voluntary certification of stationary SI ICE to the emission standards specified in § 60.4231(d) or (e), as applicable, must certify their engines for operation using fuel that meets the specifications in 40 CFR 1065.720.

(f) Manufacturers may certify their engines for operation using gaseous fuels in addition to pipeline-quality natural gas; however, the manufacturer must specify the properties of that fuel and provide testing information showing that the engine will meet the emission standards specified in § 60.4231(d) or (e), as applicable, when operating on that fuel. The manufacturer must also provide instructions for configuring the stationary engine to meet the emission standards on fuels that do not meet the pipeline-quality natural

gas definition. The manufacturer must also provide information to the owner and operator of the certified stationary SI engine regarding the configuration that is most conducive to reduced emissions where the engine will be operated on gaseous fuels with different quality than the fuel that it was certified to.

(g) A stationary SI engine manufacturer may certify an engine family solely to the standards applicable to landfill/digester gas engines as specified in § 60.4231(d) or (e), as applicable, but must certify their engines for operation using landfill/digester gas and must add a permanent label stating that the engine is for use only in landfill/digester gas applications. The label must be added according to the labeling requirements specified in 40 CFR 1048.135(b).

(h) For purposes of this subpart, when calculating emissions of volatile organic compounds, emissions of formaldehyde should not be included.

(i) For engines being certified to the voluntary certification standards in Table 1 of this subpart, the VOC measurement shall be made by following the procedures in 40 CFR 1065.260 and 1065.265 in order to determine the total NMHC emissions by using a flame-ionization detector and non-methane cutter. As an alternative to the nonmethane cutter, manufacturers may use a gas chromatograph as allowed under 40 CFR 1065.267 and may measure ethane, as well as methane, for excluding such levels from the total VOC measurement.

[73 FR 3591, Jan. 18, 2008, as amended by 73 FR 59176, Oct. 8, 2008; 76 FR 37974, June 28, 2011]

§ 60.4242 What other requirements must I meet if I am a manufacturer of stationary SI internal combustion engines or equipment containing stationary SI internal combustion engines or a manufacturer of equipment containing such engines?

(a) Stationary SI internal combustion engine manufacturers must meet the provisions of 40 CFR part 90, 40 CFR part 1048, or 40 CFR part 1054, as applicable, as well as 40 CFR part 1068 for engines that are certified to the emission standards in 40 CFR part 1048 or 1054, except that engines certified pursuant to the voluntary certification procedures in § 60.4241 are subject only to the provisions indicated in § 60.4247 and are permitted to provide instructions to owners and operators allowing for deviations from certified configurations, if such deviations are consistent with the provisions of paragraphs § 60.4241(c) through (f). Manufacturers of equipment containing stationary SI internal combustion engines meeting the provisions of 40 CFR part 1054 must meet the provisions of 40 CFR part 1060, as applicable. Labels on engines certified to 40 CFR part 1048 must refer to stationary engines, rather than or in addition to nonroad engines, as appropriate.

(b) An engine manufacturer certifying an engine family or families to standards under this subpart that are identical to standards applicable under 40 CFR part 90, 40 CFR part 1048, or 40 CFR part 1054 for that model year may certify any such family that contains both nonroad and stationary engines as a single engine family and/or may include any such family containing stationary engines in the averaging, banking and trading provisions applicable for such engines under those parts. This provision also applies to equipment or component manufacturers certifying to standards under 40 CFR part 1060.

(c) Manufacturers of engine families certified to 40 CFR part 1048 may meet the labeling requirements referred to in paragraph (a) of this section for stationary SI ICE by either adding a separate label containing the information required in paragraph (a) of this section or by adding the words “and stationary” after the word “nonroad” to the label.

(d) For all engines manufactured on or after January 1, 2011, and for all engines with a maximum engine power greater than 25 HP and less than 130 HP manufactured on or after July 1, 2008, a stationary SI engine manufacturer that certifies an engine family solely to the standards applicable to emergency

engines must add a permanent label stating that the engines in that family are for emergency use only. The label must be added according to the labeling requirements specified in 40 CFR 1048.135(b).

(e) All stationary SI engines subject to mandatory certification that do not meet the requirements of this subpart must be labeled according to 40 CFR 1068.230 and must be exported under the provisions of 40 CFR 1068.230. Stationary SI engines subject to standards in 40 CFR part 90 may use the provisions in 40 CFR 90.909. Manufacturers of stationary engines with a maximum engine power greater than 25 HP that are not certified to standards and other requirements under 40 CFR part 1048 are subject to the labeling provisions of 40 CFR 1048.20 pertaining to excluded stationary engines.

(f) For manufacturers of gaseous-fueled stationary engines required to meet the warranty provisions in 40 CFR 90.1103 or 1054.120, we may establish an hour-based warranty period equal to at least the certified emissions life of the engines (in engine operating hours) if we determine that these engines are likely to operate for a number of hours greater than the applicable useful life within 24 months. We will not approve an alternate warranty under this paragraph (f) for nonroad engines. An alternate warranty period approved under this paragraph (f) will be the specified number of engine operating hours or two years, whichever comes first. The engine manufacturer shall request this alternate warranty period in its application for certification or in an earlier submission. We may approve an alternate warranty period for an engine family subject to the following conditions:

(1) The engines must be equipped with non-resettable hour meters.

(2) The engines must be designed to operate for a number of hours substantially greater than the applicable certified emissions life.

(3) The emission-related warranty for the engines may not be shorter than any published warranty offered by the manufacturer without charge for the engines. Similarly, the emission-related warranty for any component shall not be shorter than any published warranty offered by the manufacturer without charge for that component.

[73 FR 3591, Jan. 18, 2008, as amended by 73 FR 59177, Oct. 8, 2008]

Compliance Requirements for Owners and Operators

§ 60.4243 What are my compliance requirements if I am an owner or operator of a stationary SI internal combustion engine?

(a) If you are an owner or operator of a stationary SI internal combustion engine that is manufactured after July 1, 2008, and must comply with the emission standards specified in § 60.4233(a) through (c), you must comply by purchasing an engine certified to the emission standards in § 60.4231(a) through (c), as applicable, for the same engine class and maximum engine power. In addition, you must meet one of the requirements specified in (a)(1) and (2) of this section.

(1) If you operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, you must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required if you are an owner or operator. You must also meet the requirements as specified in 40 CFR part 1068, subparts A through D, as they apply to you. If you adjust engine settings according to and consistent with the manufacturer's instructions, your stationary SI internal combustion engine will not be considered out of compliance.

(2) If you do not operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, your engine will be

considered a non-certified engine, and you must demonstrate compliance according to (a)(2)(i) through (iii) of this section, as appropriate.

(i) If you are an owner or operator of a stationary SI internal combustion engine less than 100 HP, you must keep a maintenance plan and records of conducted maintenance to demonstrate compliance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions, but no performance testing is required if you are an owner or operator.

(ii) If you are an owner or operator of a stationary SI internal combustion engine greater than or equal to 100 HP and less than or equal to 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test within 1 year of engine startup to demonstrate compliance.

(iii) If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test within 1 year of engine startup and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

(b) If you are an owner or operator of a stationary SI internal combustion engine and must comply with the emission standards specified in § 60.4233(d) or (e), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) and (2) of this section.

(1) Purchasing an engine certified according to procedures specified in this subpart, for the same model year and demonstrating compliance according to one of the methods specified in paragraph (a) of this section.

(2) Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in § 60.4233(d) or (e) and according to the requirements specified in § 60.4244, as applicable, and according to paragraphs (b)(2)(i) and (ii) of this section.

(i) If you are an owner or operator of a stationary SI internal combustion engine greater than 25 HP and less than or equal to 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test to demonstrate compliance.

(ii) If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

(c) If you are an owner or operator of a stationary SI internal combustion engine that must comply with the emission standards specified in § 60.4233(f), you must demonstrate compliance according paragraph (b)(2)(i) or (ii) of this section, except that if you comply according to paragraph (b)(2)(i) of this section, you demonstrate that your non-certified engine complies with the emission standards specified in § 60.4233(f).

(d) Emergency stationary ICE may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. Emergency stationary ICE may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity. For owners and operators of emergency engines, any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in this section, is prohibited.

(e) Owners and operators of stationary SI natural gas fired engines may operate their engines using propane for a maximum of 100 hours per year as an alternative fuel solely during emergency operations, but must keep records of such use. If propane is used for more than 100 hours per year in an engine that is not certified to the emission standards when using propane, the owners and operators are required to conduct a performance test to demonstrate compliance with the emission standards of § 60.4233.

(f) If you are an owner or operator of a stationary SI internal combustion engine that is less than or equal to 500 HP and you purchase a non-certified engine or you do not operate and maintain your certified stationary SI internal combustion engine and control device according to the manufacturer's written emission-related instructions, you are required to perform initial performance testing as indicated in this section, but you are not required to conduct subsequent performance testing unless the stationary engine is rebuilt or undergoes major repair or maintenance. A rebuilt stationary SI ICE means an engine that has been rebuilt as that term is defined in 40 CFR 94.11(a).

(g) It is expected that air-to-fuel ratio controllers will be used with the operation of three-way catalysts/non-selective catalytic reduction. The AFR controller must be maintained and operated appropriately in order to ensure proper operation of the engine and control device to minimize emissions at all times.

(h) If you are an owner/operator of an stationary SI internal combustion engine with maximum engine power greater than or equal to 500 HP that is manufactured after July 1, 2007 and before July 1, 2008, and must comply with the emission standards specified in sections 60.4233(b) or (c), you must comply by one of the methods specified in paragraphs (h)(1) through (h)(4) of this section.

(1) Purchasing an engine certified according to 40 CFR part 1048. The engine must be installed and configured according to the manufacturer's specifications.

(2) Keeping records of performance test results for each pollutant for a test conducted on a similar engine. The test must have been conducted using the same methods specified in this subpart and these methods must have been followed correctly.

(3) Keeping records of engine manufacturer data indicating compliance with the standards.

(4) Keeping records of control device vendor data indicating compliance with the standards.

(i) If you are an owner or operator of a modified or reconstructed stationary SI internal combustion engine and must comply with the emission standards specified in § 60.4233(f), you must demonstrate compliance according to one of the methods specified in paragraphs (i)(1) or (2) of this section.

(1) Purchasing, or otherwise owning or operating, an engine certified to the emission standards in § 60.4233(f), as applicable.

(2) Conducting a performance test to demonstrate initial compliance with the emission standards according to the requirements specified in § 60.4244. The test must be conducted within 60 days after the engine commences operation after the modification or reconstruction.

[73 FR 3591, Jan. 18, 2008, as amended at 76 FR 37974, June 28, 2011]

Testing Requirements for Owners and Operators

§ 60.4244 What test methods and other procedures must I use if I am an owner or operator of a stationary SI internal combustion engine?

Owners and operators of stationary SI ICE who conduct performance tests must follow the procedures in paragraphs (a) through (f) of this section.

(a) Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in § 60.8 and under the specific conditions that are specified by Table 2 to this subpart.

(b) You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in § 60.8(c). If your stationary SI internal combustion engine is non-operational, you do not need to startup the engine solely to conduct a performance test; however, you must conduct the performance test immediately upon startup of the engine.

(c) You must conduct three separate test runs for each performance test required in this section, as specified in § 60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour.

(d) To determine compliance with the NO_X mass per unit output emission limitation, convert the concentration of NO_X in the engine exhaust using Equation 1 of this section:

$$ER = \frac{C_d \times 1.912 \times 10^{-3} \times Q \times T}{HP - hr} \qquad \text{(Eq. 1)}$$

Where:

ER = Emission rate of NO_X in g/HP-hr.

C_d = Measured NO_X concentration in parts per million by volume (ppmv).

1.912×10^{-3} = Conversion constant for ppm NO_X to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, horsepower-hour (HP-hr).

(e) To determine compliance with the CO mass per unit output emission limitation, convert the concentration of CO in the engine exhaust using Equation 2 of this section:

$$ER = \frac{C_d \times 1.164 \times 10^{-3} \times Q \times T}{HP - hr} \qquad \text{(Eq. 2)}$$

Where:

ER = Emission rate of CO in g/HP-hr.

C_d = Measured CO concentration in ppmv.

1.164×10^{-3} = Conversion constant for ppm CO to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

(f) For purposes of this subpart, when calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation, convert the concentration of VOC in the engine exhaust using Equation 3 of this section:

$$ER = \frac{C_d \times 1.833 \times 10^{-3} \times Q \times T}{HP - hr} \qquad \text{(Eq. 3)}$$

Where:

ER = Emission rate of VOC in g/HP-hr.

C_d = VOC concentration measured as propane in ppmv.

1.833×10^{-3} = Conversion constant for ppm VOC measured as propane, to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

(g) If the owner/operator chooses to measure VOC emissions using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, appendix A, then it has the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using Equations 4 and 5 of this section. The corrected VOC concentration can then be placed on a propane basis using Equation 6 of this section.

$$RF_i = \frac{C_m}{C_{Ai}} \qquad \text{(Eq. 4)}$$

Where:

RF_i = Response factor of compound i when measured with EPA Method 25A.

$C_{M\ i}$ = Measured concentration of compound i in ppmv as carbon.

$C_{A\ i}$ = True concentration of compound i in ppmv as carbon.

$$C_{i\,corr} = RF_i \times C_{i\,meas} \qquad \text{(Eq. 5)}$$

Where:

$C_{i\ corr}$ = Concentration of compound i corrected to the value that would have been measured by EPA Method 25A, ppmv as carbon.

$C_{i\ meas}$ = Concentration of compound i measured by EPA Method 320, ppmv as carbon.

$$C_{Peq} = 0.6098 \times C_{i\,corr} \qquad \text{(Eq. 6)}$$

Where:

C_{Peq} = Concentration of compound i in mg of propane equivalent per DSCM.

Notification, Reports, and Records for Owners and Operators

§ 60.4245 What are my notification, reporting, and recordkeeping requirements if I am an owner or operator of a stationary SI internal combustion engine?

Owners or operators of stationary SI ICE must meet the following notification, reporting and recordkeeping requirements.

(a) Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section.

(1) All notifications submitted to comply with this subpart and all documentation supporting any notification.

(2) Maintenance conducted on the engine.

(3) If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90, 1048, 1054, and 1060, as applicable.

(4) If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to § 60.4243(a)(2), documentation that the engine meets the emission standards.

(b) For all stationary SI emergency ICE greater than or equal to 500 HP manufactured on or after July 1, 2010, that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. For all stationary SI emergency ICE greater than or equal to 130 HP and less than 500 HP manufactured on or after July 1, 2011 that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. For all stationary SI emergency ICE greater than 25 HP

and less than 130 HP manufactured on or after July 1, 2008, that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. The owner or operator must document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation.

(c) Owners and operators of stationary SI ICE greater than or equal to 500 HP that have not been certified by an engine manufacturer to meet the emission standards in § 60.4231 must submit an initial notification as required in § 60.7(a)(1). The notification must include the information in paragraphs (c)(1) through (5) of this section.

(1) Name and address of the owner or operator;

(2) The address of the affected source;

(3) Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;

(4) Emission control equipment; and

(5) Fuel used.

(d) Owners and operators of stationary SI ICE that are subject to performance testing must submit a copy of each performance test as conducted in § 60.4244 within 60 days after the test has been completed.

[73 FR 3591, Jan. 18, 2008, as amended by 73 FR 59177, Oct. 8, 2008]

General Provisions

§ 60.4246 What parts of the General Provisions apply to me?

Table 3 to this subpart shows which parts of the General Provisions in §§ 60.1 through 60.19 apply to you.

Mobile Source Provisions

§ 60.4247 What parts of the mobile source provisions apply to me if I am a manufacturer of stationary SI internal combustion engines or a manufacturer of equipment containing such engines?

(a) Manufacturers certifying to emission standards in 40 CFR part 90, including manufacturers certifying emergency engines below 130 HP, must meet the provisions of 40 CFR part 90. Manufacturers certifying to emission standards in 40 CFR part 1054 must meet the provisions of 40 CFR part 1054. Manufacturers of equipment containing stationary SI internal combustion engines meeting the provisions of 40 CFR part 1054 must meet the provisions of 40 CFR part 1060 to the extent they apply to equipment manufacturers.

(b) Manufacturers required to certify to emission standards in 40 CFR part 1048 must meet the provisions of 40 CFR part 1048. Manufacturers certifying to emission standards in 40 CFR part 1048 pursuant to the voluntary certification program must meet the requirements in Table 4 to this subpart as well as the standards in 40 CFR 1048.101.

(c) For manufacturers of stationary SI internal combustion engines participating in the voluntary certification program and certifying engines to Table 1 to this subpart, Table 4 to this subpart shows which parts of the mobile source provisions in 40 CFR parts 1048, 1065, and 1068 apply to you. Compliance with the deterioration factor provisions under 40 CFR 1048.205(n) and 1048.240 will be required for engines built new on and after January 1, 2010. Prior to January 1, 2010, manufacturers of stationary internal combustion engines participating in the voluntary certification program have the option to develop their own deterioration factors based on an engineering analysis.

[73 FR 3591, Jan. 18, 2008, as amended by 73 FR 59177, Oct. 8, 2008]

Definitions

§ 60.4248 What definitions apply to this subpart?

As used in this subpart, all terms not defined herein shall have the meaning given them in the CAA and in subpart A of this part.

Certified emissions life means the period during which the engine is designed to properly function in terms of reliability and fuel consumption, without being remanufactured, specified as a number of hours of operation or calendar years, whichever comes first. The values for certified emissions life for stationary SI ICE with a maximum engine power less than or equal to 19 KW (25 HP) are given in 40 CFR 90.105, 40 CFR 1054.107, and 40 CFR 1060.101, as appropriate. The values for certified emissions life for stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) certified to 40 CFR part 1048 are given in 40 CFR 1048.101(g). The certified emissions life for stationary SI ICE with a maximum engine power greater than 75 KW (100 HP) certified under the voluntary manufacturer certification program of this subpart is 5,000 hours or 7 years, whichever comes first. You may request in your application for certification that we approve a shorter certified emissions life for an engine family. We may approve a shorter certified emissions life, in hours of engine operation but not in years, if we determine that these engines will rarely operate longer than the shorter certified emissions life. If engines identical to those in the engine family have already been produced and are in use, your demonstration must include documentation from such in-use engines. In other cases, your demonstration must include an engineering analysis of information equivalent to such in-use data, such as data from research engines or similar engine models that are already in production. Your demonstration must also include any overhaul interval that you recommend, any mechanical warranty that you offer for the engine or its components, and any relevant customer design specifications. Your demonstration may include any other relevant information. The certified emissions life value may not be shorter than any of the following:

(i) 1,000 hours of operation.

(ii) Your recommended overhaul interval.

(iii) Your mechanical warranty for the engine.

Certified stationary internal combustion engine means an engine that belongs to an engine family that has a certificate of conformity that complies with the emission standards and requirements in this part, or of 40 CFR part 90, 40 CFR part 1048, or 40 CFR part 1054, as appropriate.

Combustion turbine means all equipment, including but not limited to the turbine, the fuel, air, lubrication and exhaust gas systems, control systems (except emissions control equipment), and any ancillary components and sub-components comprising any simple cycle combustion turbine, any regenerative/recuperative cycle combustion turbine, the combustion turbine portion of any cogeneration cycle combustion system, or the combustion turbine portion of any combined cycle steam/electric generating system.

Compression ignition means relating to a type of stationary internal combustion engine that is not a spark ignition engine.

Date of manufacture means one of the following things:

(1) For freshly manufactured engines and modified engines, date of manufacture means the date the engine is originally produced.

(2) For reconstructed engines, date of manufacture means the date the engine was originally produced, except as specified in paragraph (3) of this definition.

(3) Reconstructed engines are assigned a new date of manufacture if the fixed capital cost of the new and refurbished components exceeds 75 percent of the fixed capital cost of a comparable entirely new facility. An engine that is produced from a previously used engine block does not retain the date of manufacture of the engine in which the engine block was previously used if the engine is produced using all new components except for the engine block. In these cases, the date of manufacture is the date of reconstruction or the date the new engine is produced.

Diesel fuel means any liquid obtained from the distillation of petroleum with a boiling point of approximately 150 to 360 degrees Celsius. One commonly used form is number 2 distillate oil.

Digester gas means any gaseous by-product of wastewater treatment typically formed through the anaerobic decomposition of organic waste materials and composed principally of methane and carbon dioxide (CO_2).

Emergency stationary internal combustion engine means any stationary internal combustion engine whose operation is limited to emergency situations and required testing and maintenance. Examples include stationary ICE used to produce power for critical networks or equipment (including power supplied to portions of a facility) when electric power from the local utility (or the normal power source, if the facility runs on its own power production) is interrupted, or stationary ICE used to pump water in the case of fire or flood, etc. Stationary SI ICE used for peak shaving are not considered emergency stationary ICE. Stationary ICE used to supply power to an electric grid or that supply power as part of a financial arrangement with another entity are not considered to be emergency engines.

Engine manufacturer means the manufacturer of the engine. See the definition of “manufacturer” in this section.

Four-stroke engine means any type of engine which completes the power cycle in two crankshaft revolutions, with intake and compression strokes in the first revolution and power and exhaust strokes in the second revolution.

Freshly manufactured engine means an engine that has not been placed into service. An engine becomes freshly manufactured when it is originally produced.

Gasoline means any fuel sold in any State for use in motor vehicles and motor vehicle engines, or nonroad or stationary engines, and commonly or commercially known or sold as gasoline.

Installed means the engine is placed and secured at the location where it is intended to be operated.

Landfill gas means a gaseous by-product of the land application of municipal refuse typically formed through the anaerobic decomposition of waste materials and composed principally of methane and CO_2 .

Lean burn engine means any two-stroke or four-stroke spark ignited engine that does not meet the definition of a rich burn engine.

Liquefied petroleum gas means any liquefied hydrocarbon gas obtained as a by-product in petroleum refining or natural gas production.

Manufacturer has the meaning given in section 216(1) of the Clean Air Act. In general, this term includes any person who manufactures a stationary engine for sale in the United States or otherwise introduces a new stationary engine into commerce in the United States. This includes importers who import stationary engines for resale.

Maximum engine power means maximum engine power as defined in 40 CFR 1048.801.

Model year means the calendar year in which an engine is manufactured (see “date of manufacture”), except as follows:

(1) Model year means the annual new model production period of the engine manufacturer in which an engine is manufactured (see “date of manufacture”), if the annual new model production period is different than the calendar year and includes January 1 of the calendar year for which the model year is named. It may not begin before January 2 of the previous calendar year and it must end by December 31 of the named calendar year.

(2) For an engine that is converted to a stationary engine after being placed into service as a nonroad or other non-stationary engine, model year means the calendar year or new model production period in which the engine was manufactured (see “date of manufacture”).

Natural gas means a naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in geologic formations beneath the Earth's surface, of which the principal constituent is methane. Natural gas may be field or pipeline quality.

Other internal combustion engine means any internal combustion engine, except combustion turbines, which is not a reciprocating internal combustion engine or rotary internal combustion engine.

Pipeline-quality natural gas means a naturally occurring fluid mixture of hydrocarbons (e.g., methane, ethane, or propane) produced in geological formations beneath the Earth's surface that maintains a gaseous state at standard atmospheric temperature and pressure under ordinary conditions, and which is provided by a supplier through a pipeline. Pipeline-quality natural gas must either be composed of at least 70 percent methane by volume or have a gross calorific value between 950 and 1,100 British thermal units per standard cubic foot.

Rich burn engine means any four-stroke spark ignited engine where the manufacturer's recommended operating air/fuel ratio divided by the stoichiometric air/fuel ratio at full load conditions is less than or equal to 1.1. Engines originally manufactured as rich burn engines, but modified prior to June 12, 2006, with passive emission control technology for NO_X (such as pre-combustion chambers) will be considered lean burn engines. Also, existing engines where there are no manufacturer's recommendations regarding air/fuel ratio will be considered a rich burn engine if the excess oxygen content of the exhaust at full load conditions is less than or equal to 2 percent.

Rotary internal combustion engine means any internal combustion engine which uses rotary motion to convert heat energy into mechanical work.

Spark ignition means relating to either: a gasoline-fueled engine; or any other type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark ignition engines usually use a throttle to regulate intake air flow to control power during normal operation. Dual-fuel engines in which a liquid fuel (typically diesel fuel) is used for compression ignition and gaseous fuel (typically natural gas) is used as the primary fuel at an annual average ratio of less than 2 parts diesel fuel to 100 parts total fuel on an energy equivalent basis are spark ignition engines.

Stationary internal combustion engine means any internal combustion engine, except combustion turbines, that converts heat energy into mechanical work and is not mobile. Stationary ICE differ from mobile ICE in that a stationary internal combustion engine is not a nonroad engine as defined at 40 CFR 1068.30 (excluding paragraph (2)(ii) of that definition), and is not used to propel a motor vehicle, aircraft, or a vehicle used solely for competition. Stationary ICE include reciprocating ICE, rotary ICE, and other ICE, except combustion turbines.

Stationary internal combustion engine test cell/stand means an engine test cell/stand, as defined in 40 CFR part 63, subpart PPPPP, that tests stationary ICE.

Stoichiometric means the theoretical air-to-fuel ratio required for complete combustion.

Subpart means 40 CFR part 60, subpart JJJJ.

Two-stroke engine means a type of engine which completes the power cycle in single crankshaft revolution by combining the intake and compression operations into one stroke and the power and exhaust operations into a second stroke. This system requires auxiliary scavenging and inherently runs lean of stoichiometric.

Volatile organic compounds means volatile organic compounds as defined in 40 CFR 51.100(s).

Voluntary certification program means an optional engine certification program that manufacturers of stationary SI internal combustion engines with a maximum engine power greater than 19 KW (25 HP) that do not use gasoline and are not rich burn engines that use LPG can choose to participate in to certify their engines to the emission standards in § 60.4231(d) or (e), as applicable.

[73 FR 3591, Jan. 18, 2008, as amended by 73 FR 59177, Oct. 8, 2008; 76 FR 37974, June 28, 2011]

Table 1 to Subpart JJJJ of Part 60—NO_X , CO, and VOC Emission Standards for Stationary Non-Emergency SI Engines ≥100 HP (Except Gasoline and Rich Burn LPG), Stationary SI Landfill/Digester Gas Engines, and Stationary Emergency Engines >25 HP

Engine type and fuel	Maximum engine power	Manufacture date	Emission standards [a]					
			g/HP-hr			ppmvd at 15% O_2		
			NO_X	CO	VOC [d]	NO_X	CO	VOC [d]
Non-Emergency SI Natural Gas [b] and Non-Emergency SI Lean Burn LPG [b]	100≤HP<500	7/1/2008	2.0	4.0	1.0	160	540	86
		1/1/2011	1.0	2.0	0.7	82	270	60
Non-Emergency SI Lean Burn Natural Gas and LPG	500≤HP<1,350	1/1/2008	2.0	4.0	1.0	160	540	86
		7/1/2010	1.0	2.0	0.7	82	270	60
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500≤HP<1,350)	HP≥500	7/1/2007	2.0	4.0	1.0	160	540	86
	HP≥500	7/1/2010	1.0	2.0	0.7	82	270	60
Landfill/Digester Gas (except lean burn 500≤HP<1,350)	HP<500	7/1/2008	3.0	5.0	1.0	220	610	80
		1/1/2011	2.0	5.0	1.0	150	610	80
	HP≥500	7/1/2007	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80
Landfill/Digester Gas Lean Burn	500≤HP<1,350	1/1/2008	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80
Emergency	25<HP<130	1/1/2009	[c] 10	387	N/A	N/A	N/A	N/A
	HP≥130		2.0	4.0	1.0	160	540	86

[a] Owners and operators of stationary non-certified SI engines may choose to comply with the emission standards in units of either g/HP-hr or ppmvd at 15 percent O_2.

[b] Owners and operators of new or reconstructed non-emergency lean burn SI stationary engines with a site rating of greater than or equal to 250 brake HP located at a major source that are meeting the requirements of 40 CFR part 63, subpart ZZZZ, Table 2a do not have to comply with the CO emission standards of Table 1 of this subpart.

[c] The emission standards applicable to emergency engines between 25 HP and 130 HP are in terms of NO_X+ HC.

[d] For purposes of this subpart, when calculating emissions of volatile organic compounds, emissions of formaldehyde should not be included.

[76 FR 37975, June 28, 2011]

Table 2 to Subpart JJJJ of Part 60—Requirements for Performance Tests

As stated in § 60.4244, you must comply with the following requirements for performance tests within 10 percent of 100 percent peak (or the highest achievable) load:

For each	Complying with the requirement to	You must	Using	According to the following requirements
1. Stationary SI internal combustion engine demonstrating compliance according to § 60.4244	a. limit the concentration of NO_X in the stationary SI internal combustion engine exhaust	i. Select the sampling port location and the number of traverse points;	(1) Method 1 or 1A of 40 CFR part 60, Appendix A or ASTM Method D6522-00(2005)[a]	(a) If using a control device, the sampling site must be located at the outlet of the control device.
		ii. Determine the O_2 concentration of the stationary internal combustion engine exhaust at the sampling port location;	(2) Method 3, 3A, or 3B[b] of 40 CFR part 60, appendix A or ASTM Method D6522-00(2005)[a]	(b) Measurements to determine O_2 concentration must be made at the same time as the measurements for NO_X concentration.
		iii. If necessary, determine the exhaust flowrate of the stationary internal combustion engine exhaust;	(3) Method 2 or 19 of 40 CFR part 60	
		iv. If necessary, measure moisture content of the stationary internal combustion engine exhaust at the sampling port location; and	(4) Method 4 of 40 CFR part 60, appendix A, Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03 (incorporated by reference, see § 60.17)	(c) Measurements to determine moisture must be made at the same time as the measurement for NO_X concentration.
		v. Measure NO_X at the exhaust of the stationary internal combustion engine	(5) Method 7E of 40 CFR part 60, appendix A, Method D6522-00(2005)[a], Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03 (incorporated by reference, see § 60.17)	(d) Results of this test consist of the average of the three 1-hour or longer runs.

For each	Complying with the requirement to	You must	Using	According to the following requirements
	b. limit the concentration of CO in the stationary SI internal combustion engine exhaust	i. Select the sampling port location and the number of traverse points;	(1) Method 1 or 1A of 40 CFR part 60, Appendix A or ASTM Method D6522-00(2005)[a]	(a) If using a control device, the sampling site must be located at the outlet of the control device.
		ii. Determine the O_2concentration of the stationary internal combustion engine exhaust at the sampling port location;	(2) Method 3, 3A, or 3B[b]of 40 CFR part 60, appendix A or ASTM Method D6522-00(2005)[a]	(b) Measurements to determine O_2concentration must be made at the same time as the measurements for CO concentration.
		iii. If necessary, determine the exhaust flowrate of the stationary internal combustion engine exhaust;	(3) Method 2 or 19 of 40 CFR part 60	
		iv. If necessary, measure moisture content of the stationary internal combustion engine exhaust at the sampling port location; and	(4) Method 4 of 40 CFR part 60, appendix A, Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03 (incorporated by reference, see § 60.17)	(c) Measurements to determine moisture must be made at the same time as the measurement for CO concentration.
		v. Measure CO at the exhaust of the stationary internal combustion engine	(5) Method 10 of 40 CFR part 60, appendix A, ASTM Method D6522-00(2005)[a], Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03 (incorporated by reference, see § 60.17)	(d) Results of this test consist of the average of the three 1-hour or longer runs.
	c. limit the concentration of VOC in the stationary SI internal combustion engine exhaust	i. Select the sampling port location and the number of traverse points;	(1) Method 1 or 1A of 40 CFR part 60, Appendix A	(a) If using a control device, the sampling site must be located at the outlet of the control device.

For each	Complying with the requirement to	You must	Using	According to the following requirements
		ii. Determine the O_2concentration of the stationary internal combustion engine exhaust at the sampling port location;	(2) Method 3, 3A, or 3B[b]of 40 CFR part 60, appendix A or ASTM Method D6522-00(2005)[a]	(b) Measurements to determine O_2concentration must be made at the same time as the measurements for VOC concentration.
		iii. If necessary, determine the exhaust flowrate of the stationary internal combustion engine exhaust;	(3) Method 2 or 19 of 40 CFR part 60	
		iv. If necessary, measure moisture content of the stationary internal combustion engine exhaust at the sampling port location; and	(4) Method 4 of 40 CFR part 60, appendix A, Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03 (incorporated by reference, see § 60.17)	(c) Measurements to determine moisture must be made at the same time as the measurement for VOC concentration.
		v. Measure VOC at the exhaust of the stationary internal combustion engine	(5) Methods 25A and 18 of 40 CFR part 60, appendix A, Method 25A with the use of a methane cutter as described in 40 CFR 1065.265, Method 18 or 40 CFR part 60, appendix A[c,d], Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03 (incorporated by reference, see § 60.17)	(d) Results of this test consist of the average of the three 1-hour or longer runs.

[76 FR 37975, June 28, 2011]

Table 3 to Subpart JJJJ of Part 60—Applicability of General Provisions to Subpart JJJJ

[As stated in § 60.4246, you must comply with the following applicable General Provisions]

General provisions citation	Subject of citation	Applies to subpart	Explanation
§ 60.1	General applicability of the General Provisions	Yes	
§ 60.2	Definitions	Yes	Additional terms defined in § 60.4248.
§ 60.3	Units and abbreviations	Yes	
§ 60.4	Address	Yes	
§ 60.5	Determination of construction or modification	Yes	
§ 60.6	Review of plans	Yes	
§ 60.7	Notification and Recordkeeping	Yes	Except that § 60.7 only applies as specified in § 60.4245.
§ 60.8	Performance tests	Yes	Except that § 60.8 only applies to owners and operators who are subject to performance testing in subpart JJJJ.
§ 60.9	Availability of information	Yes	
§ 60.10	State Authority	Yes	
§ 60.11	Compliance with standards and maintenance requirements	Yes	Requirements are specified in subpart JJJJ.
§ 60.12	Circumvention	Yes	
§ 60.13	Monitoring requirements	No	
§ 60.14	Modification	Yes	
§ 60.15	Reconstruction	Yes	
§ 60.16	Priority list	Yes	
§ 60.17	Incorporations by reference	Yes	
§ 60.18	General control device requirements	No	
§ 60.19	General notification and reporting requirements	Yes	

Table 4 to Subpart JJJJ of Part 60—Applicability of Mobile Source Provisions for Manufacturers Participating in the Voluntary Certification Program and Certifying Stationary SI ICE to Emission Standards in Table 1 of Subpart JJJJ

[As stated in § 60.4247, you must comply with the following applicable mobile source provisions if you are a manufacturer participating in the voluntary certification program and certifying stationary SI ICE to emission standards in Table 1 of subpart JJJJ]

Mobile source provisions citation	Subject of citation	Applies to subpart	Explanation
1048 subpart A	Overview and Applicability	Yes	
1048 subpart B	Emission Standards and Related Requirements	Yes	Except for the specific sections below.
1048.101	Exhaust Emission Standards	No	
1048.105	Evaporative Emission Standards	No	
1048.110	Diagnosing Malfunctions	No	
1048.140	Certifying Blue Sky Series Engines	No	
1048.145	Interim Provisions	No	
1048 subpart C	Certifying Engine Families	Yes	Except for the specific sections below.
1048.205(b)	AECD reporting	Yes	
1048.205(c)	OBD Requirements	No	
1048.205(n)	Deterioration Factors	Yes	Except as indicated in 60.4247(c).
1048.205(p)(1)	Deterioration Factor Discussion	Yes	
1048.205(p)(2)	Liquid Fuels as they require	No	
1048.240(b)(c)(d)	Deterioration Factors	Yes	
1048 subpart D	Testing Production-Line Engines	Yes	
1048 subpart E	Testing In-Use Engines	No	
1048 subpart F	Test Procedures	Yes	
1065.5(a)(4)	Raw sampling (refers reader back to the specific emissions regulation for guidance)	Yes	
1048 subpart G	Compliance Provisions	Yes	
1048 subpart H	Reserved		
1048 subpart I	Definitions and Other Reference Information	Yes	
1048 appendix I and II	Yes		

Mobile source provisions citation	Subject of citation	Applies to subpart	Explanation
1065 (all subparts)	Engine Testing Procedures	Yes	Except for the specific section below.
1065.715	Test Fuel Specifications for Natural Gas	No	
1068 (all subparts)	General Compliance Provisions for Nonroad Programs	Yes	Except for the specific sections below.
1068.245	Hardship Provisions for Unusual Circumstances	No	
1068.250	Hardship Provisions for Small-Volume Manufacturers	No	
1068.255	Hardship Provisions for Equipment Manufacturers and Secondary Engine Manufacturers	No	

Attachment C
To Part 70 Operating Permit No.: T181-32081-00069

What This Subpart Covers

§ 63.6580 What is the purpose of subpart ZZZZ?

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

[73 FR 3603, Jan. 18, 2008]

§ 63.6585 Am I subject to this subpart?

You are subject to this subpart if you own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand.

(a) A stationary RICE is any internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. Stationary RICE differ from mobile RICE in that a stationary RICE is not a non-road engine as defined at 40 CFR 1068.30, and is not used to propel a motor vehicle or a vehicle used solely for competition.

(b) A major source of HAP emissions is a plant site that emits or has the potential to emit any single HAP at a rate of 10 tons (9.07 megagrams) or more per year or any combination of HAP at a rate of 25 tons (22.68 megagrams) or more per year, except that for oil and gas production facilities, a major source of HAP emissions is determined for each surface site.

(c) An area source of HAP emissions is a source that is not a major source.

(d) If you are an owner or operator of an area source subject to this subpart, your status as an entity subject to a standard or other requirements under this subpart does not subject you to the obligation to obtain a permit under 40 CFR part 70 or 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart as applicable.

(e) If you are an owner or operator of a stationary RICE used for national security purposes, you may be eligible to request an exemption from the requirements of this subpart as described in 40 CFR part 1068, subpart C.

(f) The emergency stationary RICE listed in paragraphs (f)(1) through (3) of this section are not subject to this subpart. The stationary RICE must meet the definition of an emergency stationary RICE in Sec. 63.6675, which includes operating according to the provisions specified in Sec. 63.6640(f).

(1) Existing residential emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in Sec. 63.6640(f)(4)(ii).

(2) Existing commercial emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for

the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in Sec. 63.6640(f)(4)(ii).

(3) Existing institutional emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in Sec. 63.6640(f)(4)(ii).

[69 FR 33506, June 15, 2004, as amended at 73 FR 3603, Jan. 18, 2008]

§ 63.6590 What parts of my plant does this subpart cover?

This subpart applies to each affected source.

(a) *Affected source.* An affected source is any existing, new, or reconstructed stationary RICE located at a major or area source of HAP emissions, excluding stationary RICE being tested at a stationary RICE test cell/stand.

(1) *Existing stationary RICE.*

(i) For stationary RICE with a site rating of more than 500 brake horsepower (HP) located at a major source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before December 19, 2002.

(ii) For stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before June 12, 2006.

(iii) For stationary RICE located at an area source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before June 12, 2006.

(iv) A change in ownership of an existing stationary RICE does not make that stationary RICE a new or reconstructed stationary RICE.

(2) *New stationary RICE.* (i) A stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions is new if you commenced construction of the stationary RICE on or after December 19, 2002.

(ii) A stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions is new if you commenced construction of the stationary RICE on or after June 12, 2006.

(iii) A stationary RICE located at an area source of HAP emissions is new if you commenced construction of the stationary RICE on or after June 12, 2006.

(3) *Reconstructed stationary RICE.* (i) A stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions is reconstructed if you meet the definition of reconstruction in § 63.2 and reconstruction is commenced on or after December 19, 2002.

(ii) A stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions is reconstructed if you meet the definition of reconstruction in § 63.2 and reconstruction is commenced on or after June 12, 2006.

(iii) A stationary RICE located at an area source of HAP emissions is reconstructed if you meet the definition of reconstruction in § 63.2 and reconstruction is commenced on or after June 12, 2006.

(b) *Stationary RICE subject to limited requirements.* (1) An affected source which meets either of the criteria in paragraphs (b)(1)(i) through (ii) of this section does not have to meet the requirements of this subpart and of subpart A of this part except for the initial notification requirements of § 63.6645(f).

(i) The stationary RICE is a new or reconstructed emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions that does not operate or is not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii).

(ii) The stationary RICE is a new or reconstructed limited use stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions.

(2) A new or reconstructed stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions which combusts landfill or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis must meet the initial notification requirements of § 63.6645(f) and the requirements of §§ 63.6625(c), 63.6650(g), and 63.6655(c). These stationary RICE do not have to meet the emission limitations and operating limitations of this subpart.

(3) The following stationary RICE do not have to meet the requirements of this subpart and of subpart A of this part, including initial notification requirements:

(i) Existing spark ignition 2 stroke lean burn (2SLB) stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions;

(ii) Existing spark ignition 4 stroke lean burn (4SLB) stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions;

(iii) Existing emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions that does not operate or is not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii).

(c) *Stationary RICE subject to Regulations under 40 CFR Part 60.* An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part.

(1) A new or reconstructed stationary RICE located at an area source;

(2) A new or reconstructed 2SLB stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions;

(3) A new or reconstructed 4SLB stationary RICE with a site rating of less than 250 brake HP located at a major source of HAP emissions;

(4) A new or reconstructed spark ignition 4 stroke rich burn (4SRB) stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions;

(5) A new or reconstructed stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions which combusts landfill or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis;

(6) A new or reconstructed emergency or limited use stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions;

(7) A new or reconstructed compression ignition (CI) stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions.

[69 FR 33506, June 15, 2004, as amended at 73 FR 3604, Jan. 18, 2008; 75 FR 9674, Mar. 3, 2010; 75 FR 37733, June 30, 2010; 75 FR 51588, Aug. 20, 2010]

§ 63.6595 When do I have to comply with this subpart?

(a) *Affected sources.* (1) If you have an existing stationary RICE, excluding existing non-emergency CI stationary RICE, with a site rating of more than 500 brake HP located at a major source of HAP emissions, you must comply with the applicable emission limitations, operating limitations and other requirements no later than June 15, 2007. If you have an existing non-emergency CI stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, an existing stationary CI RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions, or an existing stationary CI RICE located at an area source of HAP emissions, you must comply with the applicable emission limitations, operating limitations, and other requirements no later than May 3, 2013. If you have an existing stationary SI RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions, or an existing stationary SI RICE located at an area source of HAP emissions, you must comply with the applicable emission limitations, operating limitations, and other requirements no later than October 19, 2013.

(2) If you start up your new or reconstructed stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions before August 16, 2004, you must comply with the applicable emission limitations and operating limitations in this subpart no later than August 16, 2004.

(3) If you start up your new or reconstructed stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions after August 16, 2004, you must comply with the applicable emission limitations and operating limitations in this subpart upon startup of your affected source.

(4) If you start up your new or reconstructed stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions before January 18, 2008, you must comply with the applicable emission limitations and operating limitations in this subpart no later than January 18, 2008.

(5) If you start up your new or reconstructed stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions after January 18, 2008, you must comply with the applicable emission limitations and operating limitations in this subpart upon startup of your affected source.

(6) If you start up your new or reconstructed stationary RICE located at an area source of HAP emissions before January 18, 2008, you must comply with the applicable emission limitations and operating limitations in this subpart no later than January 18, 2008.

(7) If you start up your new or reconstructed stationary RICE located at an area source of HAP emissions after January 18, 2008, you must comply with the applicable emission limitations and operating limitations in this subpart upon startup of your affected source.

(b) *Area sources that become major sources.* If you have an area source that increases its emissions or its potential to emit such that it becomes a major source of HAP, the compliance dates in paragraphs (b)(1) and (2) of this section apply to you.

(1) Any stationary RICE for which construction or reconstruction is commenced after the date when your area source becomes a major source of HAP must be in compliance with this subpart upon startup of your affected source.

(2) Any stationary RICE for which construction or reconstruction is commenced before your area source becomes a major source of HAP must be in compliance with the provisions of this subpart that are applicable to RICE located at major sources within 3 years after your area source becomes a major source of HAP.

(c) If you own or operate an affected source, you must meet the applicable notification requirements in § 63.6645 and in 40 CFR part 63, subpart A.

[69 FR 33506, June 15, 2004, as amended at 73 FR 3604, Jan. 18, 2008; 75 FR 9675, Mar. 3, 2010; 75 FR 51589, Aug. 20, 2010]

Emission and Operating Limitations

§ 63.6600 What emission limitations and operating limitations must I meet if I own or operate a stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions?

Compliance with the numerical emission limitations established in this subpart is based on the results of testing the average of three 1-hour runs using the testing requirements and procedures in § 63.6620 and Table 4 to this subpart.

(a) If you own or operate an existing, new, or reconstructed spark ignition 4SRB stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you must comply with the emission limitations in Table 1a to this subpart and the operating limitations in Table 1b to this subpart which apply to you.

(b) If you own or operate a new or reconstructed 2SLB stationary RICE with a site rating of more than 500 brake HP located at major source of HAP emissions, a new or reconstructed 4SLB stationary RICE with a site rating of more than 500 brake HP located at major source of HAP emissions, or a new or reconstructed CI stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you must comply with the emission limitations in Table 2a to this subpart and the operating limitations in Table 2b to this subpart which apply to you.

(c) If you own or operate any of the following stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you do not need to comply with the emission limitations in Tables 1a, 2a, 2c, and 2d to this subpart or operating limitations in Tables 1b and 2b to this subpart: an existing 2SLB stationary RICE; an existing 4SLB stationary RICE; a stationary RICE that combusts landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis; an emergency stationary RICE; or a limited use stationary RICE.

(d) If you own or operate an existing non-emergency stationary CI RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you must comply with the emission limitations in Table 2c to this subpart and the operating limitations in Table 2b to this subpart which apply to you.

[73 FR 3605, Jan. 18, 2008, as amended at 75 FR 9675, Mar. 3, 2010]

§ 63.6601 What emission limitations must I meet if I own or operate a new or reconstructed 4SLB stationary RICE with a site rating of greater than or equal to 250 brake HP and less than or equal to 500 brake HP located at a major source of HAP emissions?

Compliance with the numerical emission limitations established in this subpart is based on the results of testing the average of three 1-hour runs using the testing requirements and procedures in § 63.6620 and Table 4 to this subpart. If you own or operate a new or reconstructed 4SLB stationary RICE with a site rating of greater than or equal to 250 and less than or equal to 500 brake HP located at major source of HAP emissions manufactured on or after January 1, 2008, you must comply with the emission limitations in Table 2a to this subpart and the operating limitations in Table 2b to this subpart which apply to you.

[73 FR 3605, Jan. 18, 2008, as amended at 75 FR 9675, Mar. 3, 2010; 75 FR 51589, Aug. 20, 2010]

§ 63.6602 What emission limitations and other requirements must I meet if I own or operate an existing stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions?

If you own or operate an existing stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions, you must comply with the emission limitations and other requirements in Table 2c to this subpart which apply to you. Compliance with the numerical emission limitations established in this subpart is based on the results of testing the average of three 1-hour runs using the testing requirements and procedures in Sec. 63.6620 and Table 4 to this subpart.

[75 FR 51589, Aug. 20, 2010]

§ 63.6603 What emission limitations, operating limitations, and other requirements must I meet if I own or operate an existing stationary RICE located at an area source of HAP emissions?

Compliance with the numerical emission limitations established in this subpart is based on the results of testing the average of three 1-hour runs using the testing requirements and procedures in § 63.6620 and Table 4 to this subpart.

(a) If you own or operate an existing stationary RICE located at an area source of HAP emissions, you must comply with the requirements in Table 2d to this subpart and the operating limitations in Table 2b to this subpart that apply to you.

(b) If you own or operate an existing stationary non-emergency CI RICE with a site rating of more than 300 HP located at an area source of HAP that meets either paragraph (b)(1) or (2) of this section, you do not have to meet the numerical CO emission limitations specified in Table 2d of this subpart. Existing stationary non-emergency CI RICE with a site rating of more than 300 HP located at an area source of HAP that meet either paragraph (b)(1) or (2) of this section must meet the management practices that are shown for stationary non-emergency CI RICE with a site rating of less than or equal to 300 HP in Table 2d of this subpart.

(1) The area source is located in an area of Alaska that is not accessible by the Federal Aid Highway System (FAHS).

(2) The stationary RICE is located at an area source that meets paragraphs (b)(2)(i), (ii), and (iii) of this section.

(i) The only connection to the FAHS is through the Alaska Marine Highway System (AMHS), or the stationary RICE operation is within an isolated grid in Alaska that is not connected to the statewide electrical grid referred to as the Alaska Railbelt Grid.

(ii) At least 10 percent of the power generated by the stationary RICE on an annual basis is used for residential purposes.

(iii) The generating capacity of the area source is less than 12 megawatts, or the stationary RICE is used exclusively for backup power for renewable energy.

(c) If you own or operate an existing stationary non-emergency CI RICE with a site rating of more than 300 HP located on an offshore vessel that is an area source of HAP and is a nonroad vehicle that is an Outer Continental Shelf (OCS) source as defined in 40 CFR 55.2, you do not have to meet the numerical CO emission limitations specified in Table 2d of this subpart. You must meet all of the following management practices:

(1) Change oil every 1,000 hours of operation or annually, whichever comes first. Sources have the option to utilize an oil analysis program as described in Sec. 63.6625(i) in order to extend the specified oil change requirement.

(2) Inspect and clean air filters every 750 hours of operation or annually, whichever comes first, and replace as necessary.

(3) Inspect fuel filters and belts, if installed, every 750 hours of operation or annually, whichever comes first, and replace as necessary.

(4) Inspect all flexible hoses every 1,000 hours of operation or annually, whichever comes first, and replace as necessary.

(d) If you own or operate an existing non-emergency CI RICE with a site rating of more than 300 HP located at an area source of HAP emissions that is certified to the Tier 1 or Tier 2 emission standards in Table 1 of 40 CFR 89.112 and that is subject to an enforceable state or local standard that requires the engine to be replaced no later than June 1, 2018, you may until January 1, 2015, or 12 years after the installation date of the engine (whichever is later), but not later than June 1, 2018, choose to comply with the management practices that are shown for stationary non-emergency CI RICE with a site rating of less than or equal to 300 HP in Table 2d of this subpart instead of the applicable emission limitations in Table 2d, operating limitations in Table 2b, and crankcase ventilation system requirements in Sec. 63.6625(g). You must comply with the emission limitations in Table 2d and operating limitations in Table 2b that apply for non-emergency CI RICE with a site rating of more than 300 HP located at an area source of HAP emissions by January 1, 2015, or 12 years after the installation date of the engine (whichever is later), but not later than June 1, 2018. You must also comply with the crankcase ventilation system requirements in Sec. 63.6625(g) by January 1, 2015, or 12 years after the installation date of the engine (whichever is later), but not later than June 1, 2018.

(e) If you own or operate an existing non-emergency CI RICE with a site rating of more than 300 HP located at an area source of HAP emissions that is certified to the Tier 3 (Tier 2 for engines above 560 kilowatt (kW)) emission standards in Table 1 of 40 CFR 89.112, you may comply with the requirements under this part by meeting the requirements for Tier 3 engines (Tier 2 for engines above 560 kW) in 40 CFR part 60 subpart IIII instead of the emission limitations and other requirements that would otherwise apply under this part for existing non-emergency CI RICE with a site rating of more than 300 HP located at an area source of HAP emissions.

(f) An existing non-emergency SI 4SLB and 4SRB stationary RICE with a site rating of more than 500 HP located at area sources of HAP must meet the definition of remote stationary RICE in Sec. 63.6675 on the initial compliance date for the engine, October 19, 2013, in order to be considered a remote stationary RICE under this subpart. Owners and operators of existing non-emergency SI 4SLB and 4SRB stationary RICE with a site rating of more than 500 HP located at area sources of HAP that meet the definition of remote stationary RICE in Sec. 63.6675 of this subpart as of October 19, 2013 must evaluate the status of their stationary RICE every 12 months. Owners and operators must keep records of the initial and annual evaluation of the status of the engine. If the evaluation indicates that the stationary RICE no

longer meets the definition of remote stationary RICE in Sec. 63.6675 of this subpart, the owner or operator must comply with all of the requirements for existing non-emergency SI 4SLB and 4SRB stationary RICE with a site rating of more than 500 HP located at area sources of HAP that are not remote stationary RICE within 1 year of the evaluation.

[75 FR 9675, Mar. 3, 2010, as amended at 75 FR 51589, Aug. 20, 2010; 76 FR 12866, Mar. 9, 2011]

§ 63.6604 What fuel requirements must I meet if I own or operate a stationary CI RICE?

(a) If you own or operate an existing non-emergency, non-black start CI stationary RICE with a site rating of more than 300 brake HP with a displacement of less than 30 liters per cylinder that uses diesel fuel, you must use diesel fuel that meets the requirements in 40 CFR 80.510(b) for nonroad diesel fuel.

(b) Beginning January 1, 2015, if you own or operate an existing emergency CI stationary RICE with a site rating of more than 100 brake HP and a displacement of less than 30 liters per cylinder that uses diesel fuel and operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii) or that operates for the purpose specified in Sec. 63.6640(f)(4)(ii), you must use diesel fuel that meets the requirements in 40 CFR 80.510(b) for nonroad diesel fuel, except that any existing diesel fuel purchased (or otherwise obtained) prior to January 1, 2015, may be used until depleted.

(c) Beginning January 1, 2015, if you own or operate a new emergency CI stationary RICE with a site rating of more than 500 brake HP and a displacement of less than 30 liters per cylinder located at a major source of HAP that uses diesel fuel and operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii), you must use diesel fuel that meets the requirements in 40 CFR 80.510(b) for nonroad diesel fuel, except that any existing diesel fuel purchased (or otherwise obtained) prior to January 1, 2015, may be used until depleted.

(d) Existing CI stationary RICE located in Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, at area sources in areas of Alaska that meet either Sec. 63.6603(b)(1) or Sec. 63.6603(b)(2), or are on offshore vessels that meet Sec. 63.6603(c) are exempt from the requirements of this section.

[75 FR 51589, Aug. 20, 2010]

General Compliance Requirements

§ 63.6605 What are my general requirements for complying with this subpart?

(a) You must be in compliance with the emission limitations, operating limitations, and other requirements in this subpart that apply to you at all times.

(b) At all times you must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require you to make any further efforts to reduce emissions if levels required by this standard have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source.

[75 FR 9675, Mar. 3, 2010]

Testing and Initial Compliance Requirements

§ 63.6610 By what date must I conduct the initial performance tests or other initial compliance demonstrations if I own or operate a stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions?

If you own or operate a stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions you are subject to the requirements of this section.

(a) You must conduct the initial performance test or other initial compliance demonstrations in Table 4 to this subpart that apply to you within 180 days after the compliance date that is specified for your stationary RICE in § 63.6595 and according to the provisions in § 63.7(a)(2).

(b) If you commenced construction or reconstruction between December 19, 2002 and June 15, 2004 and own or operate stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you must demonstrate initial compliance with either the proposed emission limitations or the promulgated emission limitations no later than February 10, 2005 or no later than 180 days after startup of the source, whichever is later, according to § 63.7(a)(2)(ix).

(c) If you commenced construction or reconstruction between December 19, 2002 and June 15, 2004 and own or operate stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, and you chose to comply with the proposed emission limitations when demonstrating initial compliance, you must conduct a second performance test to demonstrate compliance with the promulgated emission limitations by December 13, 2007 or after startup of the source, whichever is later, according to § 63.7(a)(2)(ix).

(d) An owner or operator is not required to conduct an initial performance test on units for which a performance test has been previously conducted, but the test must meet all of the conditions described in paragraphs (d)(1) through (5) of this section.

(1) The test must have been conducted using the same methods specified in this subpart, and these methods must have been followed correctly.

(2) The test must not be older than 2 years.

(3) The test must be reviewed and accepted by the Administrator.

(4) Either no process or equipment changes must have been made since the test was performed, or the owner or operator must be able to demonstrate that the results of the performance test, with or without adjustments, reliably demonstrate compliance despite process or equipment changes.

(5) The test must be conducted at any load condition within plus or minus 10 percent of 100 percent load.

[69 FR 33506, June 15, 2004, as amended at 73 FR 3605, Jan. 18, 2008]

§ 63.6611 By what date must I conduct the initial performance tests or other initial compliance demonstrations if I own or operate a new or reconstructed 4SLB SI stationary RICE with a site rating of greater than or equal to 250 and less than or equal to 500 brake HP located at a major source of HAP emissions?

If you own or operate a new or reconstructed 4SLB stationary RICE with a site rating of greater than or equal to 250 and less than or equal to 500 brake HP located at a major source of HAP emissions, you must conduct an initial performance test within 240 days after the compliance date that is specified for

your stationary RICE in § 63.6595 and according to the provisions specified in Table 4 to this subpart, as appropriate.

[73 FR 3605, Jan. 18, 2008, as amended at 75 FR 51589, Aug. 20, 2010]

§ 63.6612 By what date must I conduct the initial performance tests or other initial compliance demonstrations if I own or operate an existing stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions or an existing stationary RICE located at an area source of HAP emissions?

If you own or operate an existing stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions or an existing stationary RICE located at an area source of HAP emissions you are subject to the requirements of this section.

(a) You must conduct any initial performance test or other initial compliance demonstration according to Tables 4 and 5 to this subpart that apply to you within 180 days after the compliance date that is specified for your stationary RICE in § 63.6595 and according to the provisions in § 63.7(a)(2).

(b) An owner or operator is not required to conduct an initial performance test on a unit for which a performance test has been previously conducted, but the test must meet all of the conditions described in paragraphs (b)(1) through (4) of this section.

(1) The test must have been conducted using the same methods specified in this subpart, and these methods must have been followed correctly.

(2) The test must not be older than 2 years.

(3) The test must be reviewed and accepted by the Administrator.

(4) Either no process or equipment changes must have been made since the test was performed, or the owner or operator must be able to demonstrate that the results of the performance test, with or without adjustments, reliably demonstrate compliance despite process or equipment changes.

[75 FR 9676, Mar. 3, 2010, as amended at 75 FR 51589, Aug. 20, 2010]

§ 63.6615 When must I conduct subsequent performance tests?

If you must comply with the emission limitations and operating limitations, you must conduct subsequent performance tests as specified in Table 3 of this subpart.

§ 63.6620 What performance tests and other procedures must I use?

(a) You must conduct each performance test in Tables 3 and 4 of this subpart that applies to you.

(b) Each performance test must be conducted according to the requirements that this subpart specifies in Table 4 to this subpart. If you own or operate a non-operational stationary RICE that is subject to performance testing, you do not need to start up the engine solely to conduct the performance test. Owners and operators of a non-operational engine can conduct the performance test when the engine is started up again. The test must be conducted at any load condition within plus or minus 10 percent of 100 percent load for the stationary RICE listed in paragraphs (b)(1) through (4) of this section.

(1) Non-emergency 4SRB stationary RICE with a site rating of greater than 500 brake HP located at a major source of HAP emissions.

(2) New non-emergency 4SLB stationary RICE with a site rating of greater than or equal to 250 brake HP located at a major source of HAP emissions.

(3) New non-emergency 2SLB stationary RICE with a site rating of greater than 500 brake HP located at a major source of HAP emissions.

(4) New non-emergency CI stationary RICE with a site rating of greater than 500 brake HP located at a major source of HAP emissions.

(c) [Reserved]

(d) You must conduct three separate test runs for each performance test required in this section, as specified in Sec. 63.7(e)(3). Each test run must last at least 1 hour, unless otherwise specified in this subpart.

(e)(1) You must use Equation 1 of this section to determine compliance with the percent reduction requirement:

$$\frac{C_i - C_o}{C_i} \times 100 = R \qquad \text{(Eq. 1)}$$

Where:

C_i = concentration of carbon monoxide (CO), total hydrocarbons (THC), or formaldehyde at the control device inlet,

C_o = concentration of CO, THC, or formaldehyde at the control device outlet, and

R = percent reduction of CO, THC, or formaldehyde emissions.

(2) You must normalize the CO, THC, or formaldehyde concentrations at the inlet and outlet of the control device to a dry basis and to 15 percent oxygen, or an equivalent percent carbon dioxide (CO2). If pollutant concentrations are to be corrected to 15 percent oxygen and CO2 concentration is measured in lieu of oxygen concentration measurement, a CO2 correction factor is needed. Calculate the CO2 correction factor as described in paragraphs (e)(2)(i) through (iii) of this section.

(i) Calculate the fuel-specific Fo value for the fuel burned during the test using values obtained from Method 19, Section 5.2, and the following equation:

$$F_o = \frac{0.209\, F_d}{F_c} \qquad \text{(Eq. 2)}$$

Where:

F_o = Fuel factor based on the ratio of oxygen volume to the ultimate CO_2 volume produced by the fuel at zero percent excess air.

0.209 = Fraction of air that is oxygen, percent/100.

F_d = Ratio of the volume of dry effluent gas to the gross calorific value of the fuel from Method 19, dsm^3 /J (dscf/10^6 Btu).

F_c = Ratio of the volume of CO_2 produced to the gross calorific value of the fuel from Method 19, dsm^3 /J (dscf/10^6 Btu).

(ii) Calculate the CO_2 correction factor for correcting measurement data to 15 percent oxygen, as follows:

$$X_{co_2} = \frac{5.9}{F_o} \qquad \text{(Eq. 3)}$$

Where:

X_{co2} = CO_2 correction factor, percent.

5.9 = 20.9 percent O_2 −15 percent O_2 , the defined O_2 correction value, percent.

(iii) Calculate the CO, THC, and formaldehyde gas concentrations adjusted to 15 percent O2 using CO2 as follows:

$$C_{adj} = C_d \frac{X_{CO2}}{\%CO_2} \qquad (Eq.4)$$

Where:

Cadj = Calculated concentration of CO, THC, or formaldehyde adjusted to 15 percent O2.
Cd = Measured concentration of CO, THC, or formaldehyde, uncorrected.
XCO2 = CO2 correction factor, percent.
%CO2 = Measured CO2 concentration measured, dry basis, percent.

(f) If you comply with the emission limitation to reduce CO and you are not using an oxidation catalyst, if you comply with the emission limitation to reduce formaldehyde and you are not using NSCR, or if you comply with the emission limitation to limit the concentration of formaldehyde in the stationary RICE exhaust and you are not using an oxidation catalyst or NSCR, you must petition the Administrator for operating limitations to be established during the initial performance test and continuously monitored thereafter; or for approval of no operating limitations. You must not conduct the initial performance test until after the petition has been approved by the Administrator.

(g) If you petition the Administrator for approval of operating limitations, your petition must include the information described in paragraphs (g)(1) through (5) of this section.

(1) Identification of the specific parameters you propose to use as operating limitations;

(2) A discussion of the relationship between these parameters and HAP emissions, identifying how HAP emissions change with changes in these parameters, and how limitations on these parameters will serve to limit HAP emissions;

(3) A discussion of how you will establish the upper and/or lower values for these parameters which will establish the limits on these parameters in the operating limitations;

(4) A discussion identifying the methods you will use to measure and the instruments you will use to monitor these parameters, as well as the relative accuracy and precision of these methods and instruments; and

(5) A discussion identifying the frequency and methods for recalibrating the instruments you will use for monitoring these parameters.

(h) If you petition the Administrator for approval of no operating limitations, your petition must include the information described in paragraphs (h)(1) through (7) of this section.

(1) Identification of the parameters associated with operation of the stationary RICE and any emission control device which could change intentionally (*e.g.,* operator adjustment, automatic controller adjustment, etc.) or unintentionally (*e.g.,* wear and tear, error, etc.) on a routine basis or over time;

(2) A discussion of the relationship, if any, between changes in the parameters and changes in HAP emissions;

(3) For the parameters which could change in such a way as to increase HAP emissions, a discussion of whether establishing limitations on the parameters would serve to limit HAP emissions;

(4) For the parameters which could change in such a way as to increase HAP emissions, a discussion of how you could establish upper and/or lower values for the parameters which would establish limits on the parameters in operating limitations;

(5) For the parameters, a discussion identifying the methods you could use to measure them and the instruments you could use to monitor them, as well as the relative accuracy and precision of the methods and instruments;

(6) For the parameters, a discussion identifying the frequency and methods for recalibrating the instruments you could use to monitor them; and

(7) A discussion of why, from your point of view, it is infeasible or unreasonable to adopt the parameters as operating limitations.

(i) The engine percent load during a performance test must be determined by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. A written report of the average percent load determination must be included in the notification of compliance status. The following information must be included in the written report: the engine model number, the engine manufacturer, the year of purchase, the manufacturer's site-rated brake horsepower, the ambient temperature, pressure, and humidity during the performance test, and all assumptions that were made to estimate or calculate percent load during the performance test must be clearly explained. If measurement devices such as flow meters, kilowatt meters, beta analyzers, stain gauges, etc. are used, the model number of the measurement device, and an estimate of its accurate in percentage of true value must be provided.

[69 FR 33506, June 15, 2004, as amended at 75 FR 9676, Mar. 3, 2010]

§ 63.6625 What are my monitoring, installation, collection, operation, and maintenance requirements?

(a) If you elect to install a CEMS as specified in Table 5 of this subpart, you must install, operate, and maintain a CEMS to monitor CO and either O2 or CO2 according to the requirements in paragraphs (a)(1) through (4) of this section. If you are meeting a requirement to reduce CO emissions, the CEMS must be installed at both the inlet and outlet of the control device. If you are meeting a requirement to limit the concentration of CO, the CEMS must be installed at the outlet of the control device.

(1) Each CEMS must be installed, operated, and maintained according to the applicable performance specifications of 40 CFR part 60, appendix B.

(2) You must conduct an initial performance evaluation and an annual relative accuracy test audit (RATA) of each CEMS according to the requirements in § 63.8 and according to the applicable performance specifications of 40 CFR part 60, appendix B as well as daily and periodic data quality checks in accordance with 40 CFR part 60, appendix F, procedure 1.

(3) As specified in § 63.8(c)(4)(ii), each CEMS must complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period. You must have at least two data points, with each representing a different 15-minute period, to have a valid hour of data.

(4) The CEMS data must be reduced as specified in § 63.8(g)(2) and recorded in parts per million or parts per billion (as appropriate for the applicable limitation) at 15 percent oxygen or the equivalent CO_2 concentration.

(b) If you are required to install a continuous parameter monitoring system (CPMS) as specified in Table 5 of this subpart, you must install, operate, and maintain each CPMS according to the requirements in paragraphs (b)(1) through (6) of this section.

(1) You must prepare a site-specific monitoring plan that addresses the monitoring system design, data collection, and the quality assurance and quality control elements outlined in paragraphs (b)(1)(i) through (v) of this section and in § 63.8(d). As specified in § 63.8(f)(4), you may request approval of monitoring system quality assurance and quality control procedures alternative to those specified in paragraphs (b)(1) through (5) of this section in your site-specific monitoring plan.

(i) The performance criteria and design specifications for the monitoring system equipment, including the sample interface, detector signal analyzer, and data acquisition and calculations;

(ii) Sampling interface (*e.g.,* thermocouple) location such that the monitoring system will provide representative measurements;

(iii) Equipment performance evaluations, system accuracy audits, or other audit procedures;

(iv) Ongoing operation and maintenance procedures in accordance with provisions in Sec. 63.8(c)(1)(ii) and (c)(3); and

(v) Ongoing reporting and recordkeeping procedures in accordance with provisions in § 63.10(c), (e)(1), and (e)(2)(i).

(2) You must install, operate, and maintain each CPMS in continuous operation according to the procedures in your site-specific monitoring plan.

(3) The CPMS must collect data at least once every 15 minutes (see also § 63.6635).

(4) For a CPMS for measuring temperature range, the temperature sensor must have a minimum tolerance of 2.8 degrees Celsius (5 degrees Fahrenheit) or 1 percent of the measurement range, whichever is larger.

(5) You must conduct the CPMS equipment performance evaluation, system accuracy audits, or other audit procedures specified in your site-specific monitoring plan at least annually.

(6) You must conduct a performance evaluation of each CPMS in accordance with your site-specific monitoring plan.

(c) If you are operating a new or reconstructed stationary RICE which fires landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis, you must monitor and record your fuel usage daily with separate fuel meters to measure the volumetric flow rate of each fuel. In addition, you must operate your stationary RICE in a manner which reasonably minimizes HAP emissions.

(d) If you are operating a new or reconstructed emergency 4SLB stationary RICE with a site rating of greater than or equal to 250 and less than or equal to 500 brake HP located at a major source of HAP emissions, you must install a non-resettable hour meter prior to the startup of the engine.

(e) If you own or operate any of the following stationary RICE, you must operate and maintain the stationary RICE and after-treatment control device (if any) according to the manufacturer's emission-related written instructions or develop your own maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions:

(1) An existing stationary RICE with a site rating of less than 100 HP located at a major source of HAP emissions;

(2) An existing emergency or black start stationary RICE with a site rating of less than or equal to 500 HP located at a major source of HAP emissions;

(3) An existing emergency or black start stationary RICE located at an area source of HAP emissions;

(4) An existing non-emergency, non-black start stationary CI RICE with a site rating less than or equal to 300 HP located at an area source of HAP emissions;

(5) An existing non-emergency, non-black start 2SLB stationary RICE located at an area source of HAP emissions;

(6) An existing non-emergency, non-black start stationary RICE located at an area source of HAP emissions which combusts landfill or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis.

(7) An existing non-emergency, non-black start 4SLB stationary RICE with a site rating less than or equal to 500 HP located at an area source of HAP emissions;

(8) An existing non-emergency, non-black start 4SRB stationary RICE with a site rating less than or equal to 500 HP located at an area source of HAP emissions;

(9) An existing, non-emergency, non-black start 4SLB stationary RICE with a site rating greater than 500 HP located at an area source of HAP emissions that is operated 24 hours or less per calendar year; and

(10) An existing, non-emergency, non-black start 4SRB stationary RICE with a site rating greater than 500 HP located at an area source of HAP emissions that is operated 24 hours or less per calendar year.

(f) If you own or operate an existing emergency stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions or an existing emergency stationary RICE located at an area source of HAP emissions, you must install a non-resettable hour meter if one is not already installed.

(g) If you own or operate an existing non-emergency, non-black start CI engine greater than or equal to 300 HP that is not equipped with a closed crankcase ventilation system, you must comply with either

paragraph (g)(1) or paragraph (2) of this section. Owners and operators must follow the manufacturer's specified maintenance requirements for operating and maintaining the open or closed crankcase ventilation systems and replacing the crankcase filters, or can request the Administrator to approve different maintenance requirements that are as protective as manufacturer requirements. Existing CI engines located at area sources in areas of Alaska that meet either Sec. 63.6603(b)(1) or Sec. 63.6603(b)(2) do not have to meet the requirements of this paragraph (g). Existing CI engines located on offshore vessels that meet Sec. 63.6603(c) do not have to meet the requirements of this paragraph (g).

(1) Install a closed crankcase ventilation system that prevents crankcase emissions from being emitted to the atmosphere, or

(2) Install an open crankcase filtration emission control system that reduces emissions from the crankcase by filtering the exhaust stream to remove oil mist, particulates and metals.

(h) If you operate a new, reconstructed, or existing stationary engine, you must minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the emission standards applicable to all times other than startup in Tables 1a, 2a, 2c, and 2d to this subpart apply.

(i) If you own or operate a stationary CI engine that is subject to the work, operation or management practices in items 1 or 2 of Table 2c to this subpart or in items 1 or 4 of Table 2d to this subpart, you have the option of utilizing an oil analysis program in order to extend the specified oil change requirement in Tables 2c and 2d to this subpart. The oil analysis must be performed at the same frequency specified for changing the oil in Table 2c or 2d to this subpart. The analysis program must at a minimum analyze the following three parameters: Total Base Number, viscosity, and percent water content. The condemning limits for these parameters are as follows: Total Base Number is less than 30 percent of the Total Base Number of the oil when new; viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new; or percent water content (by volume) is greater than 0.5. If all of these condemning limits are not exceeded, the engine owner or operator is not required to change the oil. If any of the limits are exceeded, the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later. The owner or operator must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine.

(j) If you own or operate a stationary SI engine that is subject to the work, operation or management practices in items 6, 7, or 8 of Table 2c to this subpart or in items 5, 6, 7, 9, or 11 of Table 2d to this subpart, you have the option of utilizing an oil analysis program in order to extend the specified oil change requirement in Tables 2c and 2d to this subpart. The oil analysis must be performed at the same frequency specified for changing the oil in Table 2c or 2d to this subpart. The analysis program must at a minimum analyze the following three parameters: Total Acid Number, viscosity, and percent water content. The condemning limits for these parameters are as follows: Total Acid Number increases by more than 3.0 milligrams of potassium hydroxide (KOH) per gram from Total Acid Number of the oil when new; viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new; or percent water content (by volume) is greater than 0.5. If all of these condemning limits are not exceeded, the engine owner or operator is not required to change the oil. If any of the limits are exceeded, the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later. The owner or operator must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine.

[69 FR 33506, June 15, 2004, as amended at 73 FR 3606, Jan. 18, 2008; 75 FR 9676, Mar. 3, 2010; 75 FR 51589, Aug. 20, 2010; 76 FR 12866, Mar. 9, 2011]

§ 63.6630 How do I demonstrate initial compliance with the emission limitations, operating limitations, and other requirements?

(a) You must demonstrate initial compliance with each emission limitation, operating limitation, and other requirement that applies to you according to Table 5 of this subpart.

(b) During the initial performance test, you must establish each operating limitation in Tables 1b and 2b of this subpart that applies to you.

(c) You must submit the Notification of Compliance Status containing the results of the initial compliance demonstration according to the requirements in § 63.6645.

(d) Non-emergency 4SRB stationary RICE complying with the requirement to reduce formaldehyde emissions by 76 percent or more can demonstrate initial compliance with the formaldehyde emission limit by testing for THC instead of formaldehyde. The testing must be conducted according to the requirements in Table 4 of this subpart. The average reduction of emissions of THC determined from the performance test must be equal to or greater than 30 percent.

(e) The initial compliance demonstration required for existing non-emergency 4SLB and 4SRB stationary RICE with a site rating of more than 500 HP located at an area source of HAP that are not remote stationary RICE and that are operated more than 24 hours per calendar year must be conducted according to the following requirements:

(1) The compliance demonstration must consist of at least three test runs.

(2) Each test run must be of at least 15 minute duration, except that each test conducted using the method in appendix A to this subpart must consist of at least one measurement cycle and include at least 2 minutes of test data phase measurement.

(3) If you are demonstrating compliance with the CO concentration or CO percent reduction requirement, you must measure CO emissions using one of the CO measurement methods specified in Table 4 of this subpart, or using appendix A to this subpart.

(4) If you are demonstrating compliance with the THC percent reduction requirement, you must measure THC emissions using Method 25A, reported as propane, of 40 CFR part 60, appendix A.

(5) You must measure O2 using one of the O2 measurement methods specified in Table 4 of this subpart. Measurements to determine O2 concentration must be made at the same time as the measurements for CO or THC concentration.

(6) If you are demonstrating compliance with the CO or THC percent reduction requirement, you must measure CO or THC emissions and O2 emissions simultaneously at the inlet and outlet of the control device.

Continuous Compliance Requirements

§ 63.6635 How do I monitor and collect data to demonstrate continuous compliance?

(a) If you must comply with emission and operating limitations, you must monitor and collect data according to this section.

(b) Except for monitor malfunctions, associated repairs, required performance evaluations, and required quality assurance or control activities, you must monitor continuously at all times that the stationary RICE is operating. A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the

monitoring to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions.

(c) You may not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels. You must, however, use all the valid data collected during all other periods.

[69 FR 33506, June 15, 2004, as amended at 76 FR 12867, Mar. 9, 2011]

§ 63.6640 How do I demonstrate continuous compliance with the emission limitations, operating limitations, and other requirements?

(a) You must demonstrate continuous compliance with each emission limitation, operating limitation, and other requirements in Tables 1a and 1b, Tables 2a and 2b, Table 2c, and Table 2d to this subpart that apply to you according to methods specified in Table 6 to this subpart.

(b) You must report each instance in which you did not meet each emission limitation or operating limitation in Tables 1a and 1b, Tables 2a and 2b, Table 2c, and Table 2d to this subpart that apply to you. These instances are deviations from the emission and operating limitations in this subpart. These deviations must be reported according to the requirements in § 63.6650. If you change your catalyst, you must reestablish the values of the operating parameters measured during the initial performance test. When you reestablish the values of your operating parameters, you must also conduct a performance test to demonstrate that you are meeting the required emission limitation applicable to your stationary RICE.

(c) The annual compliance demonstration required for existing non-emergency 4SLB and 4SRB stationary RICE with a site rating of more than 500 HP located at an area source of HAP that are not remote stationary RICE and that are operated more than 24 hours per calendar year must be conducted according to the following requirements:

(1) The compliance demonstration must consist of at least one test run.

(2) Each test run must be of at least 15 minute duration, except that each test conducted using the method in appendix A to this subpart must consist of at least one measurement cycle and include at least 2 minutes of test data phase measurement.

(3) If you are demonstrating compliance with the CO concentration or CO percent reduction requirement, you must measure CO emissions using one of the CO measurement methods specified in Table 4 of this subpart, or using appendix A to this subpart.

(4) If you are demonstrating compliance with the THC percent reduction requirement, you must measure THC emissions using Method 25A, reported as propane, of 40 CFR part 60, appendix A.

(5) You must measure O2 using one of the O2 measurement methods specified in Table 4 of this subpart. Measurements to determine O2 concentration must be made at the same time as the measurements for CO or THC concentration.

(6) If you are demonstrating compliance with the CO or THC percent reduction requirement, you must measure CO or THC emissions and O2 emissions simultaneously at the inlet and outlet of the control device.

(7) If the results of the annual compliance demonstration show that the emissions exceed the levels specified in Table 6 of this subpart, the stationary RICE must be shut down as soon as safely possible, and appropriate corrective action must be taken (e.g., repairs, catalyst cleaning, catalyst replacement). The stationary RICE must be retested within 7 days of being restarted and the emissions must meet the levels specified in Table 6 of this subpart. If the retest shows that the emissions continue to exceed the

specified levels, the stationary RICE must again be shut down as soon as safely possible, and the stationary RICE may not operate, except for purposes of startup and testing, until the owner/operator demonstrates through testing that the emissions do not exceed the levels specified in Table 6 of this subpart.

(d) For new, reconstructed, and rebuilt stationary RICE, deviations from the emission or operating limitations that occur during the first 200 hours of operation from engine startup (engine burn-in period) are not violations. Rebuilt stationary RICE means a stationary RICE that has been rebuilt as that term is defined in 40 CFR 94.11(a).

(e) You must also report each instance in which you did not meet the requirements in Table 8 to this subpart that apply to you. If you own or operate a new or reconstructed stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions (except new or reconstructed 4SLB engines greater than or equal to 250 and less than or equal to 500 brake HP), a new or reconstructed stationary RICE located at an area source of HAP emissions, or any of the following RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you do not need to comply with the requirements in Table 8 to this subpart: An existing 2SLB stationary RICE, an existing 4SLB stationary RICE, an existing emergency stationary RICE, an existing limited use stationary RICE, or an existing stationary RICE which fires landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis. If you own or operate any of the following RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you do not need to comply with the requirements in Table 8 to this subpart, except for the initial notification requirements: a new or reconstructed stationary RICE that combusts landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis, a new or reconstructed emergency stationary RICE, or a new or reconstructed limited use stationary RICE.

(f) If you own or operate an emergency stationary RICE, you must operate the emergency stationary RICE according to the requirements in paragraphs (f)(1) through (4) of this section. In order for the engine to be considered an emergency stationary RICE under this subpart, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year, as described in paragraphs (f)(1) through (4) of this section, is prohibited. If you do not operate the engine according to the requirements in paragraphs (f)(1) through (4) of this section, the engine will not be considered an emergency engine under this subpart and must meet all requirements for non-emergency engines.

(1) There is no time limit on the use of emergency stationary RICE in emergency situations.

(2) You may operate your emergency stationary RICE for any combination of the purposes specified in paragraphs (f)(2)(i) through (iii) of this section for a maximum of 100 hours per calendar year. Any operation for non-emergency situations as allowed by paragraphs (f)(3) and (4) of this section counts as part of the 100 hours per calendar year allowed by this paragraph (f)(2).

(i) Emergency stationary RICE may be operated for maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency RICE beyond 100 hours per calendar year.

(ii) Emergency stationary RICE may be operated for emergency demand response for periods in which the Reliability Coordinator under the North American Electric Reliability Corporation (NERC) Reliability Standard EOP-002-3, Capacity and Energy Emergencies (incorporated by reference, see Sec. 63.14), or other authorized entity as determined by the Reliability Coordinator, has declared an Energy Emergency Alert Level 2 as defined in the NERC Reliability Standard EOP-002-3.

(iii) Emergency stationary RICE may be operated for periods where there is a deviation of voltage or frequency of 5 percent or greater below standard voltage or frequency.

(3) Emergency stationary RICE located at major sources of HAP may be operated for up to 50 hours per calendar year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing and emergency demand response provided in paragraph (f)(2) of this section. The 50 hours per year for non-emergency situations cannot be used for peak shaving or non-emergency demand response, or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

(4) Emergency stationary RICE located at area sources of HAP may be operated for up to 50 hours per calendar year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing and emergency demand response provided in paragraph (f)(2) of this section. Except as provided in paragraphs (f)(4)(i) and (ii) of this section, the 50 hours per year for non-emergency situations cannot be used for peak shaving or non-emergency demand response, or to generate income for a facility to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

(i) Prior to May 3, 2014, the 50 hours per year for non-emergency situations can be used for peak shaving or non-emergency demand response to generate income for a facility, or to otherwise supply power as part of a financial arrangement with another entity if the engine is operated as part of a peak shaving load management program) with the local distribution system operator and the power is provided only to the facility itself or to support the local distribution system.

(ii) The 50 hours per year for non-emergency situations can be used to supply power as part of a financial arrangement with another entity if all of the following conditions are met:

(A) The engine is dispatched by the local balancing authority or local transmission and distribution system operator.

(B) The dispatch is intended to mitigate local transmission and/or distribution limitations so as to avert potential voltage collapse or line overloads that could lead to the interruption of power supply in a local area or region.

(C) The dispatch follows reliability, emergency operation or similar protocols that follow specific NERC, regional, state, public utility commission or local standards or guidelines.

(D) The power is provided only to the facility itself or to support the local transmission and distribution system.

(E) The owner or operator identifies and records the entity that dispatches the engine and the specific NERC, regional, state, public utility commission or local standards or guidelines that are being followed for dispatching the engine. The local balancing authority or local transmission and distribution system operator may keep these records on behalf of the engine owner or operator.

[69 FR 33506, June 15, 2004, as amended at 71 FR 20467, Apr. 20, 2006; 73 FR 3606, Jan. 18, 2008; 75 FR 9676, Mar. 3, 2010; 75 FR 51591, Aug. 20, 2010]

Notifications, Reports, and Records

§ 63.6645 What notifications must I submit and when?

(a) You must submit all of the notifications in §§ 63.7(b) and (c), 63.8(e), (f)(4) and (f)(6), 63.9(b) through (e), and (g) and (h) that apply to you by the dates specified if you own or operate any of the following;

(1) An existing stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions.

(2) An existing stationary RICE located at an area source of HAP emissions.

(3) A stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions.

(4) A new or reconstructed 4SLB stationary RICE with a site rating of greater than or equal to 250 HP located at a major source of HAP emissions.

(5) This requirement does not apply if you own or operate an existing stationary RICE less than 100 HP, an existing stationary emergency RICE, or an existing stationary RICE that is not subject to any numerical emission standards.

(b) As specified in § 63.9(b)(2), if you start up your stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions before the effective date of this subpart, you must submit an Initial Notification not later than December 13, 2004.

(c) If you start up your new or reconstructed stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions on or after August 16, 2004, you must submit an Initial Notification not later than 120 days after you become subject to this subpart.

(d) As specified in § 63.9(b)(2), if you start up your stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions before the effective date of this subpart and you are required to submit an initial notification, you must submit an Initial Notification not later than July 16, 2008.

(e) If you start up your new or reconstructed stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions on or after March 18, 2008 and you are required to submit an initial notification, you must submit an Initial Notification not later than 120 days after you become subject to this subpart.

(f) If you are required to submit an Initial Notification but are otherwise not affected by the requirements of this subpart, in accordance with § 63.6590(b), your notification should include the information in § 63.9(b)(2)(i) through (v), and a statement that your stationary RICE has no additional requirements and explain the basis of the exclusion (for example, that it operates exclusively as an emergency stationary RICE if it has a site rating of more than 500 brake HP located at a major source of HAP emissions).

(g) If you are required to conduct a performance test, you must submit a Notification of Intent to conduct a performance test at least 60 days before the performance test is scheduled to begin as required in § 63.7(b)(1).

(h) If you are required to conduct a performance test or other initial compliance demonstration as specified in Tables 4 and 5 to this subpart, you must submit a Notification of Compliance Status according to § 63.9(h)(2)(ii).

(1) For each initial compliance demonstration required in Table 5 to this subpart that does not include a performance test, you must submit the Notification of Compliance Status before the close of business on the 30th day following the completion of the initial compliance demonstration.

(2) For each initial compliance demonstration required in Table 5 to this subpart that includes a performance test conducted according to the requirements in Table 3 to this subpart, you must submit the

Notification of Compliance Status, including the performance test results, before the close of business on the 60th day following the completion of the performance test according to § 63.10(d)(2).

(i) If you own or operate an existing non-emergency CI RICE with a site rating of more than 300 HP located at an area source of HAP emissions that is certified to the Tier 1 or Tier 2 emission standards in Table 1 of 40 CFR 89.112 and subject to an enforceable state or local standard requiring engine replacement and you intend to meet management practices rather than emission limits, as specified in Sec. 63.6603(d), you must submit a notification by March 3, 2013, stating that you intend to use the provision in Sec. 63.6603(d) and identifying the state or local regulation that the engine is subject to.

[73 FR 3606, Jan. 18, 2008, as amended at 75 FR 9677, Mar. 3, 2010; 75 FR 51591, Aug. 20, 2010]

§ 63.6650 What reports must I submit and when?

(a) You must submit each report in Table 7 of this subpart that applies to you.

(b) Unless the Administrator has approved a different schedule for submission of reports under § 63.10(a), you must submit each report by the date in Table 7 of this subpart and according to the requirements in paragraphs (b)(1) through (b)(9) of this section.

(1) For semiannual Compliance reports, the first Compliance report must cover the period beginning on the compliance date that is specified for your affected source in § 63.6595 and ending on June 30 or December 31, whichever date is the first date following the end of the first calendar half after the compliance date that is specified for your source in § 63.6595.

(2) For semiannual Compliance reports, the first Compliance report must be postmarked or delivered no later than July 31 or January 31, whichever date follows the end of the first calendar half after the compliance date that is specified for your affected source in § 63.6595.

(3) For semiannual Compliance reports, each subsequent Compliance report must cover the semiannual reporting period from January 1 through June 30 or the semiannual reporting period from July 1 through December 31.

(4) For semiannual Compliance reports, each subsequent Compliance report must be postmarked or delivered no later than July 31 or January 31, whichever date is the first date following the end of the semiannual reporting period.

(5) For each stationary RICE that is subject to permitting regulations pursuant to 40 CFR part 70 or 71, and if the permitting authority has established dates for submitting semiannual reports pursuant to 40 CFR 70.6(a)(3)(iii)(A) or 40 CFR 71.6 (a)(3)(iii)(A), you may submit the first and subsequent Compliance reports according to the dates the permitting authority has established instead of according to the dates in paragraphs (b)(1) through (b)(4) of this section.

(6) For annual Compliance reports, the first Compliance report must cover the period beginning on the compliance date that is specified for your affected source in § 63.6595 and ending on December 31.

(7) For annual Compliance reports, the first Compliance report must be postmarked or delivered no later than January 31 following the end of the first calendar year after the compliance date that is specified for your affected source in § 63.6595.

(8) For annual Compliance reports, each subsequent Compliance report must cover the annual reporting period from January 1 through December 31.

(9) For annual Compliance reports, each subsequent Compliance report must be postmarked or delivered no later than January 31.

(c) The Compliance report must contain the information in paragraphs (c)(1) through (6) of this section.

(1) Company name and address.

(2) Statement by a responsible official, with that official's name, title, and signature, certifying the accuracy of the content of the report.

(3) Date of report and beginning and ending dates of the reporting period.

(4) If you had a malfunction during the reporting period, the compliance report must include the number, duration, and a brief description for each type of malfunction which occurred during the reporting period and which caused or may have caused any applicable emission limitation to be exceeded. The report must also include a description of actions taken by an owner or operator during a malfunction of an affected source to minimize emissions in accordance with § 63.6605(b), including actions taken to correct a malfunction.

(5) If there are no deviations from any emission or operating limitations that apply to you, a statement that there were no deviations from the emission or operating limitations during the reporting period.

(6) If there were no periods during which the continuous monitoring system (CMS), including CEMS and CPMS, was out-of-control, as specified in § 63.8(c)(7), a statement that there were no periods during which the CMS was out-of-control during the reporting period.

(d) For each deviation from an emission or operating limitation that occurs for a stationary RICE where you are not using a CMS to comply with the emission or operating limitations in this subpart, the Compliance report must contain the information in paragraphs (c)(1) through (4) of this section and the information in paragraphs (d)(1) and (2) of this section.

(1) The total operating time of the stationary RICE at which the deviation occurred during the reporting period.

(2) Information on the number, duration, and cause of deviations (including unknown cause, if applicable), as applicable, and the corrective action taken.

(e) For each deviation from an emission or operating limitation occurring for a stationary RICE where you are using a CMS to comply with the emission and operating limitations in this subpart, you must include information in paragraphs (c)(1) through (4) and (e)(1) through (12) of this section.

(1) The date and time that each malfunction started and stopped.

(2) The date, time, and duration that each CMS was inoperative, except for zero (low-level) and high-level checks.

(3) The date, time, and duration that each CMS was out-of-control, including the information in § 63.8(c)(8).

(4) The date and time that each deviation started and stopped, and whether each deviation occurred during a period of malfunction or during another period.

(5) A summary of the total duration of the deviation during the reporting period, and the total duration as a percent of the total source operating time during that reporting period.

(6) A breakdown of the total duration of the deviations during the reporting period into those that are due to control equipment problems, process problems, other known causes, and other unknown causes.

(7) A summary of the total duration of CMS downtime during the reporting period, and the total duration of CMS downtime as a percent of the total operating time of the stationary RICE at which the CMS downtime occurred during that reporting period.

(8) An identification of each parameter and pollutant (CO or formaldehyde) that was monitored at the stationary RICE.

(9) A brief description of the stationary RICE.

(10) A brief description of the CMS.

(11) The date of the latest CMS certification or audit.

(12) A description of any changes in CMS, processes, or controls since the last reporting period.

(f) Each affected source that has obtained a title V operating permit pursuant to 40 CFR part 70 or 71 must report all deviations as defined in this subpart in the semiannual monitoring report required by 40 CFR 70.6 (a)(3)(iii)(A) or 40 CFR 71.6(a)(3)(iii)(A). If an affected source submits a Compliance report pursuant to Table 7 of this subpart along with, or as part of, the semiannual monitoring report required by 40 CFR 70.6(a)(3)(iii)(A) or 40 CFR 71.6(a)(3)(iii)(A), and the Compliance report includes all required information concerning deviations from any emission or operating limitation in this subpart, submission of the Compliance report shall be deemed to satisfy any obligation to report the same deviations in the semiannual monitoring report. However, submission of a Compliance report shall not otherwise affect any obligation the affected source may have to report deviations from permit requirements to the permit authority.

(g) If you are operating as a new or reconstructed stationary RICE which fires landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis, you must submit an annual report according to Table 7 of this subpart by the date specified unless the Administrator has approved a different schedule, according to the information described in paragraphs (b)(1) through (b)(5) of this section. You must report the data specified in (g)(1) through (g)(3) of this section.

(1) Fuel flow rate of each fuel and the heating values that were used in your calculations. You must also demonstrate that the percentage of heat input provided by landfill gas or digester gas is equivalent to 10 percent or more of the total fuel consumption on an annual basis.

(2) The operating limits provided in your federally enforceable permit, and any deviations from these limits.

(3) Any problems or errors suspected with the meters.

(h) If you own or operate an emergency stationary RICE with a site rating of more than 100 brake HP that operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii) or that operates for the purpose specified in Sec. 63.6640(f)(4)(ii), you must submit an annual report according to the requirements in paragraphs (h)(1) through (3) of this section.

(1) The report must contain the following information:

(i) Company name and address where the engine is located.

(ii) Date of the report and beginning and ending dates of the reporting period.

(iii) Engine site rating and model year.

(iv) Latitude and longitude of the engine in decimal degrees reported to the fifth decimal place.

(v) Hours operated for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii), including the date, start time, and end time for engine operation for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii).

(vi) Number of hours the engine is contractually obligated to be available for the purposes specified in Sec. 63.6640(f)(2)(ii) and (iii).

(vii) Hours spent for operation for the purpose specified in Sec. 63.6640(f)(4)(ii), including the date, start time, and end time for engine operation for the purposes specified in Sec. 63.6640(f)(4)(ii). The report must also identify the entity that dispatched the engine and the situation that necessitated the dispatch of the engine.

(viii) If there were no deviations from the fuel requirements in Sec. 63.6604 that apply to the engine (if any), a statement that there were no deviations from the fuel requirements during the reporting period.

(ix) If there were deviations from the fuel requirements in Sec. 63.6604 that apply to the engine (if any), information on the number, duration, and cause of deviations, and the corrective action taken.

(2) The first annual report must cover the calendar year 2015 and must be submitted no later than March 31, 2016. Subsequent annual reports for each calendar year must be submitted no later than March 31 of the following calendar year.

(3) The annual report must be submitted electronically using the subpart specific reporting form in the Compliance and Emissions Data Reporting Interface (CEDRI) that is accessed through EPA's Central Data Exchange (CDX) (www.epa.gov/cdx). However, if the reporting form specific to this subpart is not available in CEDRI at the time that the report is due, the written report must be submitted to the Administrator at the appropriate address listed in Sec. 63.13.

[69 FR 33506, June 15, 2004, as amended at 75 FR 9677, Mar. 3, 2010]

§ 63.6655 What records must I keep?

(a) If you must comply with the emission and operating limitations, you must keep the records described in paragraphs (a)(1) through (a)(5), (b)(1) through (b)(3) and (c) of this section.

(1) A copy of each notification and report that you submitted to comply with this subpart, including all documentation supporting any Initial Notification or Notification of Compliance Status that you submitted, according to the requirement in § 63.10(b)(2)(xiv).

(2) Records of the occurrence and duration of each malfunction of operation (*i.e.,* process equipment) or the air pollution control and monitoring equipment.

(3) Records of performance tests and performance evaluations as required in § 63.10(b)(2)(viii).

(4) Records of all required maintenance performed on the air pollution control and monitoring equipment.

(5) Records of actions taken during periods of malfunction to minimize emissions in accordance with § 63.6605(b), including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation.

(b) For each CEMS or CPMS, you must keep the records listed in paragraphs (b)(1) through (3) of this section.

(1) Records described in § 63.10(b)(2)(vi) through (xi).

(2) Previous (*i.e.,* superseded) versions of the performance evaluation plan as required in § 63.8(d)(3).

(3) Requests for alternatives to the relative accuracy test for CEMS or CPMS as required in § 63.8(f)(6)(i), if applicable.

(c) If you are operating a new or reconstructed stationary RICE which fires landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis, you must keep the records of your daily fuel usage monitors.

(d) You must keep the records required in Table 6 of this subpart to show continuous compliance with each emission or operating limitation that applies to you.

(e) You must keep records of the maintenance conducted on the stationary RICE in order to demonstrate that you operated and maintained the stationary RICE and after-treatment control device (if any) according to your own maintenance plan if you own or operate any of the following stationary RICE;

(1) An existing stationary RICE with a site rating of less than 100 brake HP located at a major source of HAP emissions.

(2) An existing stationary emergency RICE.

(3) An existing stationary RICE located at an area source of HAP emissions subject to management practices as shown in Table 2d to this subpart.

(f) If you own or operate any of the stationary RICE in paragraphs (f)(1) through (2) of this section, you must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. The owner or operator must document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. If the engine is used for the purposes specified in Sec. 63.6640(f)(2)(ii) or (iii) or Sec. 63.6640(f)(4)(ii), the owner or operator must keep records of the notification of the emergency situation, and the date, start time, and end time of engine operation for these purposes.

(1) An existing emergency stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions that does not meet the standards applicable to non-emergency engines.

(2) An existing emergency stationary RICE located at an area source of HAP emissions that does not meet the standards applicable to non-emergency engines.

[69 FR 33506, June 15, 2004, as amended at 75 FR 9678, Mar. 3, 2010; 75 FR 51592, Aug. 20, 2010]

§ 63.6660 In what form and how long must I keep my records?

(a) Your records must be in a form suitable and readily available for expeditious review according to § 63.10(b)(1).

(b) As specified in § 63.10(b)(1), you must keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record.

(c) You must keep each record readily accessible in hard copy or electronic form for at least 5 years after the date of each occurrence, measurement, maintenance, corrective action, report, or record, according to § 63.10(b)(1).

[69 FR 33506, June 15, 2004, as amended at 75 FR 9678, Mar. 3, 2010]

Other Requirements and Information

§ 63.6665 What parts of the General Provisions apply to me?

Table 8 to this subpart shows which parts of the General Provisions in §§ 63.1 through 63.15 apply to you. If you own or operate a new or reconstructed stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions (except new or reconstructed 4SLB engines greater than or equal to 250 and less than or equal to 500 brake HP), a new or reconstructed stationary RICE located at an area source of HAP emissions, or any of the following RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you do not need to comply with any of the requirements of the General Provisions specified in Table 8: An existing 2SLB stationary RICE, an existing 4SLB stationary RICE, an existing stationary RICE that combusts landfill or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis, an existing emergency stationary RICE, or an existing limited use stationary RICE. If you own or operate any of the following RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, you do not need to comply with the requirements in the General Provisions specified in Table 8 except for the initial notification requirements: A new stationary RICE that combusts landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis, a new emergency stationary RICE, or a new limited use stationary RICE.

[75 FR 9678, Mar. 3, 2010]

§ 63.6670 Who implements and enforces this subpart?

(a) This subpart is implemented and enforced by the U.S. EPA, or a delegated authority such as your State, local, or tribal agency. If the U.S. EPA Administrator has delegated authority to your State, local, or tribal agency, then that agency (as well as the U.S. EPA) has the authority to implement and enforce this subpart. You should contact your U.S. EPA Regional Office to find out whether this subpart is delegated to your State, local, or tribal agency.

(b) In delegating implementation and enforcement authority of this subpart to a State, local, or tribal agency under 40 CFR part 63, subpart E, the authorities contained in paragraph (c) of this section are retained by the Administrator of the U.S. EPA and are not transferred to the State, local, or tribal agency.

(c) The authorities that will not be delegated to State, local, or tribal agencies are:

(1) Approval of alternatives to the non-opacity emission limitations and operating limitations in § 63.6600 under § 63.6(g).

(2) Approval of major alternatives to test methods under § 63.7(e)(2)(ii) and (f) and as defined in § 63.90.

(3) Approval of major alternatives to monitoring under § 63.8(f) and as defined in § 63.90.

(4) Approval of major alternatives to recordkeeping and reporting under § 63.10(f) and as defined in § 63.90.

(5) Approval of a performance test which was conducted prior to the effective date of the rule, as specified in § 63.6610(b).

§ 63.6675 What definitions apply to this subpart?

Terms used in this subpart are defined in the Clean Air Act (CAA); in 40 CFR 63.2, the General Provisions of this part; and in this section as follows:

Alaska Railbelt Grid means the service areas of the six regulated public utilities that extend from Fairbanks to Anchorage and the Kenai Peninsula. These utilities are Golden Valley Electric Association; Chugach Electric Association; Matanuska Electric Association; Homer Electric Association; Anchorage Municipal Light & Power; and the City of Seward Electric System.

Area source means any stationary source of HAP that is not a major source as defined in part 63.

Associated equipment as used in this subpart and as referred to in section 112(n)(4) of the CAA, means equipment associated with an oil or natural gas exploration or production well, and includes all equipment from the well bore to the point of custody transfer, except glycol dehydration units, storage vessels with potential for flash emissions, combustion turbines, and stationary RICE.

Backup power for renewable energy means an engine that provides backup power to a facility that generates electricity from renewable energy resources, as that term is defined in Alaska Statute 42.45.045(l)(5) (incorporated by reference, see Sec. 63.14).

Black start engine means an engine whose only purpose is to start up a combustion turbine.

CAA means the Clean Air Act (42 U.S.C. 7401 *et seq.,* as amended by Public Law 101-549, 104 Stat. 2399).

Commercial emergency stationary RICE means an emergency stationary RICE used in commercial establishments such as office buildings, hotels, stores, telecommunications facilities, restaurants, financial institutions such as banks, doctor's offices, and sports and performing arts facilities.

Compression ignition means relating to a type of stationary internal combustion engine that is not a spark ignition engine.

Custody transfer means the transfer of hydrocarbon liquids or natural gas: After processing and/or treatment in the producing operations, or from storage vessels or automatic transfer facilities or other such equipment, including product loading racks, to pipelines or any other forms of transportation. For the purposes of this subpart, the point at which such liquids or natural gas enters a natural gas processing plant is a point of custody transfer.

Deviation means any instance in which an affected source subject to this subpart, or an owner or operator of such a source:

(1) Fails to meet any requirement or obligation established by this subpart, including but not limited to any emission limitation or operating limitation;

(2) Fails to meet any term or condition that is adopted to implement an applicable requirement in this subpart and that is included in the operating permit for any affected source required to obtain such a permit; or

(3) Fails to meet any emission limitation or operating limitation in this subpart during malfunction, regardless or whether or not such failure is permitted by this subpart.

(4) Fails to satisfy the general duty to minimize emissions established by § 63.6(e)(1)(i).

Diesel engine means any stationary RICE in which a high boiling point liquid fuel injected into the combustion chamber ignites when the air charge has been compressed to a temperature sufficiently high for auto-ignition. This process is also known as compression ignition.

Diesel fuel means any liquid obtained from the distillation of petroleum with a boiling point of approximately 150 to 360 degrees Celsius. One commonly used form is fuel oil number 2. Diesel fuel also includes any non-distillate fuel with comparable physical and chemical properties (*e.g.* biodiesel) that is suitable for use in compression ignition engines.

Digester gas means any gaseous by-product of wastewater treatment typically formed through the anaerobic decomposition of organic waste materials and composed principally of methane and CO_2 .

Dual-fuel engine means any stationary RICE in which a liquid fuel (typically diesel fuel) is used for compression ignition and gaseous fuel (typically natural gas) is used as the primary fuel.

Emergency stationary RICE means any stationary reciprocating internal combustion engine that meets all of the criteria in paragraphs (1) through (3) of this definition. All emergency stationary RICE must comply with the requirements specified in Sec. 63.6640(f) in order to be considered emergency stationary RICE. If the engine does not comply with the requirements specified in Sec. 63.6640(f), then it is not considered to be an emergency stationary RICE under this subpart.

(1) The stationary RICE is operated to provide electrical power or mechanical work during an emergency situation. Examples include stationary RICE used to produce power for critical networks or equipment (including power supplied to portions of a facility) when electric power from the local utility (or the normal power source, if the facility runs on its own power production) is interrupted, or stationary RICE used to pump water in the case of fire or flood, etc.

(2) The stationary RICE is operated under limited circumstances for situations not included in paragraph (1) of this definition, as specified in Sec. 63.6640(f).

(3) The stationary RICE operates as part of a financial arrangement with another entity in situations not included in paragraph (1) of this definition only as allowed in Sec. 63.6640(f)(2)(ii) or (iii) and Sec. 63.6640(f)(4)(i) or (ii).

Engine startup means the time from initial start until applied load and engine and associated equipment reaches steady state or normal operation. For stationary engine with catalytic controls, engine startup means the time from initial start until applied load and engine and associated equipment, including the catalyst, reaches steady state or normal operation.

Four-stroke engine means any type of engine which completes the power cycle in two crankshaft revolutions, with intake and compression strokes in the first revolution and power and exhaust strokes in the second revolution.

Gaseous fuel means a material used for combustion which is in the gaseous state at standard atmospheric temperature and pressure conditions.

Gasoline means any fuel sold in any State for use in motor vehicles and motor vehicle engines, or nonroad or stationary engines, and commonly or commercially known or sold as gasoline.

Glycol dehydration unit means a device in which a liquid glycol (including, but not limited to, ethylene glycol, diethylene glycol, or triethylene glycol) absorbent directly contacts a natural gas stream and absorbs water in a contact tower or absorption column (absorber). The glycol contacts and absorbs water vapor and other gas stream constituents from the natural gas and becomes “rich” glycol. This glycol is then regenerated in the glycol dehydration unit reboiler. The “lean” glycol is then recycled.

Hazardous air pollutants (HAP) means any air pollutants listed in or pursuant to section 112(b) of the CAA.

Institutional emergency stationary RICE means an emergency stationary RICE used in institutional establishments such as medical centers, nursing homes, research centers, institutions of higher education, correctional facilities, elementary and secondary schools, libraries, religious establishments, police stations, and fire stations.

ISO standard day conditions means 288 degrees Kelvin (15 degrees Celsius), 60 percent relative humidity and 101.3 kilopascals pressure.

Landfill gas means a gaseous by-product of the land application of municipal refuse typically formed through the anaerobic decomposition of waste materials and composed principally of methane and CO_2 .

Lean burn engine means any two-stroke or four-stroke spark ignited engine that does not meet the definition of a rich burn engine.

Limited use stationary RICE means any stationary RICE that operates less than 100 hours per year.

Liquefied petroleum gas means any liquefied hydrocarbon gas obtained as a by-product in petroleum refining of natural gas production.

Liquid fuel means any fuel in liquid form at standard temperature and pressure, including but not limited to diesel, residual/crude oil, kerosene/naphtha (jet fuel), and gasoline.

Major Source, as used in this subpart, shall have the same meaning as in § 63.2, except that:

(1) Emissions from any oil or gas exploration or production well (with its associated equipment (as defined in this section)) and emissions from any pipeline compressor station or pump station shall not be aggregated with emissions from other similar units, to determine whether such emission points or stations are major sources, even when emission points are in a contiguous area or under common control;

(2) For oil and gas production facilities, emissions from processes, operations, or equipment that are not part of the same oil and gas production facility, as defined in § 63.1271 of subpart HHH of this part, shall not be aggregated;

(3) For production field facilities, only HAP emissions from glycol dehydration units, storage vessel with the potential for flash emissions, combustion turbines and reciprocating internal combustion engines shall be aggregated for a major source determination; and

(4) Emissions from processes, operations, and equipment that are not part of the same natural gas transmission and storage facility, as defined in § 63.1271 of subpart HHH of this part, shall not be aggregated.

Malfunction means any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

Natural gas means a naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in geologic formations beneath the Earth's surface, of which the principal constituent is methane. Natural gas may be field or pipeline quality.

Non-selective catalytic reduction (NSCR) means an add-on catalytic nitrogen oxides (NO_X) control device for rich burn engines that, in a two-step reaction, promotes the conversion of excess oxygen, NO_X , CO, and volatile organic compounds (VOC) into CO_2 , nitrogen, and water.

Oil and gas production facility as used in this subpart means any grouping of equipment where hydrocarbon liquids are processed, upgraded (*i.e.,* remove impurities or other constituents to meet contract specifications), or stored prior to the point of custody transfer; or where natural gas is processed, upgraded, or stored prior to entering the natural gas transmission and storage source category. For purposes of a major source determination, facility (including a building, structure, or installation) means oil and natural gas production and processing equipment that is located within the boundaries of an individual surface site as defined in this section. Equipment that is part of a facility will typically be located within close proximity to other equipment located at the same facility. Pieces of production equipment or groupings of equipment located on different oil and gas leases, mineral fee tracts, lease tracts, subsurface or surface unit areas, surface fee tracts, surface lease tracts, or separate surface sites, whether or not connected by a road, waterway, power line or pipeline, shall not be considered part of the same facility. Examples of facilities in the oil and natural gas production source category include, but are not limited to, well sites, satellite tank batteries, central tank batteries, a compressor station that transports natural gas to a natural gas processing plant, and natural gas processing plants.

Oxidation catalyst means an add-on catalytic control device that controls CO and VOC by oxidation.

Peaking unit or engine means any standby engine intended for use during periods of high demand that are not emergencies.

Percent load means the fractional power of an engine compared to its maximum manufacturer's design capacity at engine site conditions. Percent load may range between 0 percent to above 100 percent.

Potential to emit means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the stationary source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable. For oil and natural gas production facilities subject to subpart HH of this part, the potential to emit provisions in § 63.760(a) may be used. For natural gas transmission and storage facilities subject to subpart HHH of this part, the maximum annual facility gas throughput for storage facilities may be determined according to § 63.1270(a)(1) and the maximum annual throughput for transmission facilities may be determined according to § 63.1270(a)(2).

Production field facility means those oil and gas production facilities located prior to the point of custody transfer.

Production well means any hole drilled in the earth from which crude oil, condensate, or field natural gas is extracted.

Propane means a colorless gas derived from petroleum and natural gas, with the molecular structure C_3H_8 .

Remote stationary RICE means stationary RICE meeting any of the following criteria:

(1) Stationary RICE located in an offshore area that is beyond the line of ordinary low water along that portion of the coast of the United States that is in direct contact with the open seas and beyond the line marking the seaward limit of inland waters.

(2) Stationary RICE located on a pipeline segment that meets both of the criteria in paragraphs (2)(i) and (ii) of this definition.

(i) A pipeline segment with 10 or fewer buildings intended for human occupancy and no buildings with four or more stories within 220 yards (200 meters) on either side of the centerline of any continuous 1-mile (1.6 kilometers) length of pipeline. Each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy.

(ii) The pipeline segment does not lie within 100 yards (91 meters) of either a building or a small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period. The days and weeks need not be consecutive. The building or area is considered occupied for a full day if it is occupied for any portion of the day.

(iii) For purposes of this paragraph (2), the term pipeline segment means all parts of those physical facilities through which gas moves in transportation, including but not limited to pipe, valves, and other appurtenance attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies. Stationary RICE located within 50 yards (46 meters) of the pipeline segment providing power for equipment on a pipeline segment are part of the pipeline segment. Transportation of gas means the gathering, transmission, or distribution of gas by pipeline, or the storage of gas. A building is intended for human occupancy if its primary use is for a purpose involving the presence of humans.

(3) Stationary RICE that are not located on gas pipelines and that have 5 or fewer buildings intended for human occupancy and no buildings with four or more stories within a 0.25 mile radius around the engine. A building is intended for human occupancy if its primary use is for a purpose involving the presence of humans.

Residential emergency stationary RICE means an emergency stationary RICE used in residential establishments such as homes or apartment buildings.

Responsible official means responsible official as defined in 40 CFR 70.2.

Rich burn engine means any four-stroke spark ignited engine where the manufacturer's recommended operating air/fuel ratio divided by the stoichiometric air/fuel ratio at full load conditions is less than or equal to 1.1. Engines originally manufactured as rich burn engines, but modified prior to December 19, 2002 with passive emission control technology for NO_X (such as pre-combustion chambers) will be considered lean burn engines. Also, existing engines where there are no manufacturer's recommendations regarding air/fuel ratio will be considered a rich burn engine if the excess oxygen content of the exhaust at full load conditions is less than or equal to 2 percent.

Site-rated HP means the maximum manufacturer's design capacity at engine site conditions.

Spark ignition means relating to either: A gasoline-fueled engine; or any other type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark ignition engines usually use a throttle to regulate intake air flow to control power during normal operation. Dual-fuel engines in which a liquid fuel (typically diesel fuel) is used for CI and gaseous fuel (typically natural gas) is used as the primary fuel at an annual average ratio of less than 2 parts diesel fuel to 100 parts total fuel on an energy equivalent basis are spark ignition engines.

Stationary reciprocating internal combustion engine (RICE) means any reciprocating internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. Stationary RICE differ from mobile RICE in that a stationary RICE is not a non-road engine as defined at 40 CFR 1068.30, and is not used to propel a motor vehicle or a vehicle used solely for competition.

Stationary RICE test cell/stand means an engine test cell/stand, as defined in subpart PPPPP of this part, that tests stationary RICE.

Stoichiometric means the theoretical air-to-fuel ratio required for complete combustion.

Storage vessel with the potential for flash emissions means any storage vessel that contains a hydrocarbon liquid with a stock tank gas-to-oil ratio equal to or greater than 0.31 cubic meters per liter and an American Petroleum Institute gravity equal to or greater than 40 degrees and an actual annual average hydrocarbon liquid throughput equal to or greater than 79,500 liters per day. Flash emissions occur when dissolved hydrocarbons in the fluid evolve from solution when the fluid pressure is reduced.

Subpart means 40 CFR part 63, subpart ZZZZ.

Surface site means any combination of one or more graded pad sites, gravel pad sites, foundations, platforms, or the immediate physical location upon which equipment is physically affixed.

Two-stroke engine means a type of engine which completes the power cycle in single crankshaft revolution by combining the intake and compression operations into one stroke and the power and exhaust operations into a second stroke. This system requires auxiliary scavenging and inherently runs lean of stoichiometric.

[69 FR 33506, June 15, 2004, as amended at 71 FR 20467, Apr. 20, 2006; 73 FR 3607, Jan. 18, 2008; 75 FR 9679, Mar. 3, 2010; 75 FR 51592, Aug. 20, 2010; 76 FR 12867, Mar. 9, 2011]

Table 1a to Subpart ZZZZ of Part 63—Emission Limitations for Existing, New, and Reconstructed Spark Ignition, 4SRB Stationary RICE > 500 HP Located at a Major Source of HAP Emissions

As stated in §§ 63.6600 and 63.6640, you must comply with the following emission limitations at 100 percent load plus or minus 10 percent for existing, new and reconstructed 4SRB stationary RICE >500 HP located at a major source of HAP emissions:

For each . . .	You must meet the following emission limitation, except during periods of startup . . .	During periods of startup you must . . .
1. 4SRB stationary RICE	a. Reduce formaldehyde emissions by 76 percent or more. If you commenced construction or reconstruction between December 19, 2002 and June 15, 2004, you may reduce formaldehyde emissions by 75 percent or more until June 15, 2007 or	Minimize the engine's time spent at idle and minimize the engine's startup time at startup to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the non-startup emission limitations apply.[1]
	b. Limit the concentration of formaldehyde in the stationary RICE exhaust to 350 ppbvd or less at 15 percent O_2	

[1]Sources can petition the Administrator pursuant to the requirements of 40 CFR 63.6(g) for alternative work practices.

[75 FR 9679, Mar. 3, 2010, as amended at 75 FR 51592, Aug. 20, 2010]

Table 1b to Subpart ZZZZ of Part 63—Operating Limitations for Existing, New, and Reconstructed SI 4SRB Stationary RICE >500 HP Located at a Major Source of HAP Emissions

As stated in §§ 63.6600, 63.6603, 63.6630 and 63.6640, you must comply with the following operating limitations for existing, new and reconstructed 4SRB stationary RICE >500 HP located at a major source of HAP emissions:

For each . . .	You must meet the following operating limitation, except during periods of startup . . .
1. existing, new and reconstructed 4SRB stationary RICE >500 HP located at a major source of HAP emissions complying with the requirement to reduce formaldehyde emissions by 76 percent or more (or by 75 percent or more, if applicable) and using NSCR; or existing, new and reconstructed 4SRB stationary RICE >500 HP located at a major source of HAP emissions complying with the requirement to limit the concentration of formaldehyde in the stationary RICE exhaust to 350 ppbvd or less at 15 percent O2 and using NSCR;.	a. Maintain your catalyst so that the pressure drop across the catalyst does not change by more than 2 inches of water at 100 percent load plus or minus 10 percent from the pressure drop across the catalyst measured during the initial performance test; and b. Maintain the temperature of your stationary RICE exhaust so that the catalyst inlet temperature is greater than or equal to 750 °F and less than or equal to 1250 °F.
2. existing, new and reconstructed 4SRB stationary RICE >500 HP located at a major source of HAP emissions complying with the requirement to reduce formaldehyde emissions by 76 percent or more (or by 75 percent or more, if applicable) and not using NSCR; or existing, new and reconstructed 4SRB stationary RICE >500 HP located at a major source of HAP emissions complying with the requirement to limit the concentration of formaldehyde in the stationary RICE exhaust to 350 ppbvd or less at 15 percent O2 and not using NSCR.	Comply with any operating limitations approved by the Administrator.

\1\ Sources can petition the Administrator pursuant to the requirements of 40 CFR 63.8(f) for a different temperature range.

[76 FR 12867, Mar. 9, 2011]

Table 2a to Subpart ZZZZ of Part 63—Emission Limitations for New and Reconstructed 2SLB and Compression Ignition Stationary RICE >500 HP and New and Reconstructed 4SLB Stationary RICE ≥250 HP Located at a Major Source of HAP Emissions

As stated in §§ 63.6600 and 63.6640, you must comply with the following emission limitations for new and reconstructed lean burn and new and reconstructed compression ignition stationary RICE at 100 percent load plus or minus 10 percent:

For each . . .	You must meet the following emission limitation, except during periods of startup . . .	During periods of startup you must . . .
1. 2SLB stationary RICE	a. Reduce CO emissions by 58 percent or more; or b. Limit concentration of formaldehyde in the stationary RICE exhaust to 12 ppmvd or less at 15 percent O_2. If you commenced construction or reconstruction between December 19, 2002 and June 15, 2004, you may limit concentration of formaldehyde to 17 ppmvd or less at 15 percent O_2until June 15, 2007	Minimize the engine's time spent at idle and minimize the engine's startup time at startup to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the non-startup emission limitations apply.[1]
2. 4SLB stationary RICE	a. Reduce CO emissions by 93 percent or more; or	
	b. Limit concentration of formaldehyde in the stationary RICE exhaust to 14 ppmvd or less at 15 percent O_2	
3. CI stationary RICE	a. Reduce CO emissions by 70 percent or more; or	
	b. Limit concentration of formaldehyde in the stationary RICE exhaust to 580 ppbvd or less at 15 percent O_2	

[1] Sources can petition the Administrator pursuant to the requirements of 40 CFR 63.6(g) for alternative work practices.

[75 FR 9680, Mar. 3, 2010]

Table 2b to Subpart ZZZZ of Part 63— Operating Limitations for New and Reconstructed 2SLB and CI Stationary RICE >500 HP Located at a Major Source of HAP Emissions, New and Reconstructed 4SLB Stationary RICE ≥250 HP Located at a Major Source of HAP Emissions, Existing CI Stationary RICE >500 HP

As stated in §§ 63.6600, 63.6601, 63.6603, 63.6630, and 63.6640, you must comply with the following operating limitations for new and reconstructed 2SLB and CI stationary RICE >500 HP located at a major source of HAP emissions; new and reconstructed 4SLB stationary RICE ≥250 HP located at a major source of HAP emissions; existing CI stationary RICE >500 HP:

For each . . .	You must meet the following operating limitation, except during periods of startup . . .
1. New and reconstructed 2SLB and CI stationary RICE >500 HP located at a major source of HAP emissions and 4SLB stationary RICE ≥250 HP located at a major source of HAP emissions complying with the requirement to reduce CO emissions and using an oxidation catalyst; and New and reconstructed 2SLB and CI stationary RICE >500HP located at a major source of HAP emissions and new and reconstructed 4SLB stationary RICE ≥250 HP located at a major source of HAP emissions complying with the requirement to limit the concentration of formaldehyde in the stationary RICE exhaust and using an oxidation catalyst	a. maintain your catalyst so that the pressure drop across the catalyst does not change by more than 2 inches of water at 100 percent load plus or minus 10 percent from the pressure drop across the catalyst that was measured during the initial performance test; and b. maintain the temperature of your stationary RICE exhaust so that the catalyst inlet temperature is greater than or equal to 450 °F and less than or equal to 1350 °F.[1]
2. Existing CI stationary RICE >500 HP complying with the requirement to limit or reduce the concentration of CO in the stationary RICE exhaust and using an oxidation catalyst	a. maintain your catalyst so that the pressure drop across the catalyst does not change by more than 2 inches of water from the pressure drop across the catalyst that was measured during the initial performance test; and b. maintain the temperature of your stationary RICE exhaust so that the catalyst inlet temperature is greater than or equal to 450 [deg]F and less than or equal to 1350°F.\1\
3. New and reconstructed 2SLB and CI stationary RICE >500 HP located at a major source of HAP emissions and new and reconstructed 4SLB stationary RICE >=250 HP located at a major source of HAP emissions complying with the requirement to reduce CO emissions and not using an oxidation catalyst; and New and reconstructed 2SLB and CI stationary RICE >500 HP located at a major source of HAP emissions and new and reconstructed 4SLB stationary RICE >=250 HP located at a major source of HAP emissions complying with the requirement to limit the concentration of formaldehyde in the stationary RICE exhaust and not using an oxidation catalyst; and existing CI stationary RICE >500 HP complying with the requirement to limit or reduce the concentration of CO in the stationary RICE exhaust and not using an oxidation catalyst.	Comply with any operating limitations approved by the Administrator.

[1] Sources can petition the Administrator pursuant to the requirements of 40 CFR 63.8(f) for a different temperature range.

[75 FR 51593, Aug. 20, 2010, as amended at 76 FR 12867, Mar. 9, 2011]

Table 2c to Subpart ZZZZ of Part 63—Requirements for Existing Compression Ignition Stationary RICE Located at a Major Source of HAP Emissions and Existing Spark Ignition Stationary RICE ≤ 500 HP Located at a Major Source of HAP Emissions

As stated in §§ 63.6600, 63.6602, and 63.6640, you must comply with the following requirements for existing compression ignition stationary RICE located at a major source of HAP emissions and existing spark ignition stationary RICE ≤ 500 HP located at a major source of HAP emissions:

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of except startup you must . . .
1. Emergency stationary CI RICE and black start stationary CI RICE \1\.	a. Change oil and filter every 500 hours of operation or annually, whichever comes first.\2\ b. Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary;. c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.\3\.	Minimize the engine's time spent at idle and minimize the engine's startup time at startup to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the non-startup emission limitations apply.\3\
2. Non-Emergency, non-black start stationary CI RICE <100 HP.	a. Change oil and filter every 1,000 hours of operation or annually, whichever comes first.\2\ b. Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary;. c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.\3\.	

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of startup you must . . . except
3. Non-Emergency, non-black start CI stationary RICE 100<=HP<=300 HP.	Limit concentration of CO in the stationary RICE exhaust to 230 ppmvd or less at 15 percent O2.	
4. Non-Emergency, non-black start CI stationary RICE 300>HP<=500.	a. Limit concentration of CO in the stationary RICE exhaust to 49 ppmvd or less at 15 percent O2; or b. Reduce CO emissions by 70 percent or more..	
5. Non-Emergency, non-black start stationary CI RICE >500 HP.	a. Limit concentration of CO in the stationary RICE exhaust to 23 ppmvd or less at 15 percent O2; or b. Reduce CO emissions by 70 percent or more..	
6. Emergency stationary SI RICE and black start stationary SI RICE.\1\	a. Change oil and filter every 500 hours of operation or annually, whichever comes first;\2\ b. Inspect spark plugs every 1,000 hours of operation or annually, whichever comes first, and replace as necessary;. c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.\3\.	

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of except startup you must . . .
7. Non-Emergency, non-black start stationary SI RICE <100 HP that are not 2SLB stationary RICE.	a. Change oil and filter every 1,440 hours of operation or annually, whichever comes first;\2\ b. Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first, and replace as necessary;. c. Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.\3\	
8. Non-Emergency, non-black start 2SLB stationary SI RICE <100 HP.	a. Change oil and filter every 4,320 hours of operation or annually, whichever comes first;\2\ b. Inspect spark plugs every 4,320 hours of operation or annually, whichever comes first, and replace as necessary;. c. Inspect all hoses and belts every 4,320 hours of operation or annually, whichever comes first, and replace as necessary.\3\	
9. Non-emergency, non-black start 2SLB stationary RICE 100<=HP<=500.	Limit concentration of CO in the stationary RICE exhaust to 225 ppmvd or less at 15 percent O2.	

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of except startup you must . . .
10. Non-emergency, non-black start 4SLB stationary RICE 100<=HP<=500.	Limit concentration of CO in the stationary RICE exhaust to 47 ppmvd or less at 15 percent O2.	
11. Non-emergency, non-black start 4SRB stationary RICE 100<=HP<=500.	Limit concentration of formaldehyde in the stationary RICE exhaust to 10.3 ppmvd or less at 15 percent O2.	
12. Non-emergency, non-black start stationary RICE 100<=HP<=500 which combusts landfill or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis.	Limit concentration of CO in the stationary RICE exhaust to 177 ppmvd or less at 15 percent O2.	

\1\ If an emergency engine is operating during an emergency and it is not possible to shut down the engine in order to perform the work practice requirements on the schedule required in Table 2c of this subpart, or if performing the work practice on the required schedule would otherwise pose an unacceptable risk under federal, state, or local law, the work practice can be delayed until the emergency is over or the unacceptable risk under federal, state, or local law has abated. The work practice should be performed as soon as practicable after the emergency has ended or the unacceptable risk under federal state, or local law has abated. Sources must report any failure to perform the work practice on the schedule required and the federal, state or local law under which the risk was deemed unacceptable.
\2\ Sources have the option to utilize an oil analysis program as described in Sec. 63.6625(i) or (j) in order to extend the specified oil change requirement in Table 2c of this subpart.
\3\ Sources can petition the Administrator pursuant to the requirements of 40 CFR 63.6(g) for alternative work practices.

[75 FR 51593, Aug. 20, 2010]

Table 2d to Subpart ZZZZ of Part 63—Requirements for Existing Stationary RICE Located at Area Sources of HAP Emissions

As stated in §§ 63.6603 and 63.6640, you must comply with the following requirements for existing stationary RICE located at area sources of HAP emissions:

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of except startup you must . . .
1. Non-Emergency, non-black start CI stationary RICE <=300 HP.	a. Change oil and filter every 1,000 hours of operation or annually, whichever comes first;\1\ b. Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary;. c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary..	Minimize the engine's time spent at idle and minimize the engine's startup time at startup to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the non-startup emission limitations apply.
2. Non-Emergency, non-black start CI stationary RICE 300<HP<=500.	a. Limit concentration of CO in the stationary RICE exhaust to 49 ppmvd at 15 percent O2; or b. Reduce CO emissions by 70 percent or more.	
3. Non-Emergency, non-black start CI stationary RICE >500 HP.	a. Limit concentration of CO in the stationary RICE exhaust to 23 ppmvd at 15 percent O2; or b. Reduce CO emissions by 70 percent or more.	
4. Emergency stationary CI RICE and black start stationary CI RICE.\2\	a. Change oil and filter every 500 hours of operation or annually, whichever comes first;\1\	

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of startup you must . . . except
	b. Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary; and c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.	
5. Emergency stationary SI RICE; black start stationary SI RICE; non-emergency, non-black start 4SLB stationary RICE >500 HP that operate 24 hours or less per calendar year; non-emergency, non-black start 4SRB stationary RICE >500 HP that operate 24 hours or less per calendar year.\2\	a. Change oil and filter every 500 hours of operation or annually, whichever comes first;\1\; b. Inspect spark plugs every 1,000 hours of operation or annually, whichever comes first, and replace as necessary; and. c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary..	
6. Non-emergency, non-black start 2SLB stationary RICE.	a. Change oil and filter every 4,320 hours of operation or annually, whichever comes first;\1\ b. Inspect spark plugs every 4,320 hours of operation or annually, whichever comes first, and replace as necessary; and	

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of startup you must . . . except
	c. Inspect all hoses and belts every 4,320 hours of operation or annually, whichever comes first, and replace as necessary.	
7. Non-emergency, non-black start 4SLB stationary RICE <=500 HP.	a. Change oil and filter every 1,440 hours of operation or annually, whichever comes first;\1\ b. Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first, and replace as necessary; and c. Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.	
8. Non-emergency, non-black start 4SLB remote stationary RICE >500 HP.	a. Change oil and ilter every 2,160 hours of operation or annually, whichever comes first;\1\ b. Inspect spark plugs every 2,160 hours of operation or annually, whichever comes first, and replace as necessary; and	

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of startup you must . . . except
	c. Inspect all hoses and belts every 2,160 hours of operation or annually, whichever comes first, and replace as necessary.	
9. Non-emergency, non-black start 4SLB stationary RICE >500 HP that are not remote stationary RICE and that operate more than 24 hours per calendar year.	Install an oxidation catalyst to reduce HAP emissions from the stationary RICE.	
10. Non-emergency, non-black start 4SRB stationary RICE <=500 HP.	a. Change oil and filter every 1,440 hours of operation or annually, whichever comes first;\1\ b. Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first, and replace as necessary; and c. Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.	
11. Non-emergency, non-black start 4SRB remote stationary RICE >500 HP.	a. Change oil and filter every 2,160 hours of operation or annually, whichever comes first;\1\	

For each . . .	You must meet the following requirement, during periods of startup . . .	During periods of except startup you must . . .
	b. Inspect spark plugs every 2,160 hours of operation or annually, whichever comes first, and replace as necessary; and c. Inspect all hoses and belts every 2,160 hours of operation or annually, whichever comes first, and replace as necessary.	
12. Non-emergency, non-black start 4SRB stationary RICE >500 HP that are not remote stationary RICE and that operate more than 24 hours per calendar year.	Install NSCR to reduce HAP emissions from the stationary RICE.	
13. Non-emergency, non-black start stationary RICE which combusts landfill or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis.	a. Change oil and filter every 1,440 hours of operation or annually, whichever comes first;\1\ b. Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first, and replace as necessary; and. c. Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.	

\1\ Sources have the option to utilize an oil analysis program as described in Sec. 63.6625(i) or (j) in order to extend the specified oil change requirement in Table 2d of this subpart.
\2\ If an emergency engine is operating during an emergency and it is not possible to shut down the engine in order to perform the management practice requirements on the schedule required in Table 2d of this subpart, or if performing the management practice on the required schedule would otherwise pose

an unacceptable risk under federal, state, or local law, the management practice can be delayed until the emergency is over or the unacceptable risk under federal, state, or local law has abated. The management practice should be performed as soon as practicable after the emergency has ended or the unacceptable risk under federal, state, or local law has abated. Sources must report any failure to perform the management practice on the schedule required and the federal, state or local law under which the risk was deemed unacceptable.

[75 FR 51595, Aug. 20, 2010]

Table 3 to Subpart ZZZZ of Part 63—Subsequent Performance Tests

As stated in §§ 63.6615 and 63.6620, you must comply with the following subsequent performance test requirements:

For each . . .	Complying with the requirement to . . .	You must . . .
1. New or reconstructed 2SLB stationary RICE >500 HP located at major sources; new or reconstructed 4SLB stationary RICE ≥250 HP located at major sources; and new or reconstructed CI stationary RICE >500 HP located at major sources.	Reduce CO emissions and not using a CEMS	Conduct subsequent performance tests semiannually.[1]
2. 4SRB stationary RICE ≥ 5,000 HP located at major sources	Reduce formaldehyde emissions	Conduct subsequent performance tests semiannually.[1]
3. Stationary RICE > 500 HP located at major sources and new or reconstructed 4SLB stationary RICE with a brake horsepower 250 ≤ HP ≤ 500 located at major sources	Limit the concentration of formaldehyde in the stationary RICE exhaust	Conduct subsequent performance tests semiannually.[1]
4. Existing non-emergency, non-black start CI stationary RICE > 500 HP that are not limited use stationary RICE	Limit or reduce CO emissions and not using a CEMS	Conduct subsequent performance tests every 8,760 hrs. or 3 years, whichever comes first.
5. Existing non-emergency, non-black start CI stationary RICE > 500 HP that are limited use stationary RICE	Limit or reduce CO emissions and no using a CEMS	Conduct subsequent performance tests every 8,760 hrs. or 5 years, whichever comes first.

1 After you have demonstrated compliance for two consecutive tests, you may reduce the frequency of subsequent performance tests to annually. If the results of any subsequent annual performance test indicate the stationary RICE is not in compliance with the CO or formaldehyde emission limitation, or you deviate from any of your operating limitations, you must resume semiannual performance tests.

[75 FR 51596, Aug. 20, 2010]

Table 4 to Subpart ZZZZ of Part 63—Requirements for Performance Tests

As stated in §§ 63.6610, 63.6611, 63.6612, 63.6620, and 63.6640, you must comply with the following requirements for performance tests for stationary RICE:

For each . . .	Complying with the requirement to . . .	You must . . .	Using . . .	According to the following requirements . . .
1. 2SLB, 4SLB, and CI stationary RICE	a. Reduce CO emissions	i. Measure the O_2at the inlet and outlet of the control device; and	(1) Method 3 or 3A or 3B of 40 CFR part 60, appendix A, or ASTM Method D6522–00 (Reapproved 2005).a c	(a) Measurements to determine O2 must be made at the same time as the measurements for CO concentration.
		ii. Measure the CO at the inlet and the outlet of the control device	(1) ASTM D6522–00 (Reapproved 2005) a b c or Method 10 of 40 CFR part 60, appendix A.	(a) The CO concentration must be at 15 percent O_2, dry basis.
2. 4SRB stationary RICE	a. Reduce formaldehyde emissions	i. Select the sampling port location and the number of traverse points; and	(1) Method 1 or 1A of 40 CFR part 60, appendix A § 63.7(d)(1)(i).	(a) Sampling sites must be located at the inlet and outlet of the control device.
		ii. Measure O_2at the inlet and outlet of the control device; and	(1) Method 3 or 3A or 3B of 40 CFR part 60, appendix A, or ASTM Method D6522-00 (Reapproved 2005).[a]	(a) Measurements to determine O_2concentration must be made at the same time as the measurements for formaldehyde or THC concentration.
		iii. Measure moisture content at the inlet and outlet of the control device; and	(1) Method 4 of 40 CFR part 60, appendix A, or Test Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03	(a) Measurements to determine moisture content must be made at the same time and location as the measurements for formaldehyde or THC concentration.
		iv. If demonstrating compliance with the formaldehyde percent reduction requirement, measure formaldehyde at the inlet and the outlet of the control device	(1) Method 320 or 323 of 40 CFR part 63, appendix A; or ASTM D6348-03,[a]provided in ASTM D6348-03 Annex A5 (Analyte Spiking Technique), the percent R must be greater than or equal to 70 and less than or equal to 130	(a) Formaldehyde concentration must be at 15 percent O_2, dry basis. Results of this test consist of the average of the three 1-hour or longer runs.
		v. If demonstrating compliance with the THC percent reduction requirement, measure THC at the inlet and the outlet of the control device.	(1) Method 25A, reported as propane, of 40 CFR part 60, appendix A.	(a) THC concentration must be at 15 percent O2, dry basis. Results of this test consist of the average of the three 1-hour or longer runs.

For each . . .	Complying with the requirement to . . .	You must . . .	Using . . .	According to the following requirements . . .
3. Stationary RICE	a. Limit the concentration of formaldehyde or CO in the stationary RICE exhaust	i. Select the sampling port location and the number of traverse points; and	(1) Method 1 or 1A of 40 CFR part 60, appendix A § 63.7(d)(1)(i)	(a) If using a control device, the sampling site must be located at the outlet of the control device.
		ii. Determine the O_2concentration of the stationary RICE exhaust at the sampling port location; and	(1) Method 3 or 3A or 3B of 40 CFR part 60, appendix A, or ASTM Method D6522-00 (Reapproved 2005)[a]	(a) Measurements to determine O_2concentration must be made at the same time and location as the measurements for formaldehyde or CO concentration.
		iii. Measure moisture content of the stationary RICE exhaust at the sampling port location; and	(1) Method 4 of 40 CFR part 60, appendix A, or Test Method 320 of 40 CFR part 63, appendix A, or ASTM D 6348-03[a]	(a) Measurements to determine moisture content must be made at the same time and location as the measurements for formaldehyde or CO concentration.
		iv. Measure formaldehyde at the exhaust of the stationary RICE; or	(1) Method 320 or 323 of 40 CFR part 63, appendix A; or ASTM D6348-03,[a] provided in ASTM D6348-03 Annex A5 (Analyte Spiking Technique), the percent R must be greater than or equal to 70 and less than or equal to 130	(a) Formaldehyde concentration must be at 15 percent O_2, dry basis. Results of this test consist of the average of the three 1-hour or longer runs.
		v. Measure CO at the exhaust of the stationary RICE	(1) Method 10 of 40 CFR part 60, appendix A, ASTM Method D6522-00 (2005),[a,c] Method 320 of 40 CFR part 63, appendix A, or ASTM D6348-03.[a]	(a) CO Concentration must be at 15 percent O_2, dry basis. Results of this test consist of the average of the three 1-hour longer runs.

a Incorporated by reference, see 40 CFR 63.14. You may also obtain copies from University Microfilms International, 300 North Zeeb Road, Ann Arbor, MI 48106.

b You may also use Method 320 of 40 CFR part 63, appendix A, or ASTM D6348–03.

c ASTM–D6522–00 (2005) may be used to test both CI and SI stationary RICE. [75 FR 51597, Aug. 20, 2010]

Table 5 to Subpart ZZZZ of Part 63—Initial Compliance With Emission Limitations, Operating Limitations, and Other Requirements

As stated in §§ 63.6612, 63.6625 and 63.6630, you must initially comply with the emission and operating limitations as required by the following:

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
1. New or reconstructed non-emergency 2SLB stationary RICE >500 HP located at a major source of HAP, new or reconstructed non-emergency 4SLB stationary RICE >=250 HP located at a major source of HAP, non-emergency stationary CI RICE >500 HP located at a major source of HAP, and existing non-emergency stationary CI RICE >500 HP located at an area source of HAP.	a. Reduce CO emissions and using oxidation catalyst, and using a CPMS.	i. The average reduction of emissions of CO determined from the initial performance test achieves the required CO percent reduction; and ii. You have installed a CPMS to continuously monitor catalyst inlet temperature according to the requirements in Sec. 63.6625(b); and iii. You have recorded the catalyst pressure drop and catalyst inlet temperature during the initial performance test.
2. Non-emergency stationary CI RICE >500 HP located at a major source of HAP, and existing non-emergency stationary CI RICE >500 HP located at an area source of HAP.	a. Limit the concentration of CO, using oxidation catalyst, and using a CPMS.	i. The average CO concentration determined from the initial performance test is less than or equal to the CO emission limitation; and ii. You have installed a CPMS to continuously monitor catalyst inlet temperature according to the requirements in Sec. 63.6625(b); and inlet temperature during the initial performance test.

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
		iii. You have recorded the catalyst pressure drop and catalyst
3. New or reconstructed non-emergency 2SLB stationary RICE >500 HP located at a major source of HAP, new or reconstructed non-emergency 4SLB stationary RICE >=250 HP located at a major source of HAP, non-emergency stationary CI RICE >500 HP located at a major source of HAP, and existing non-emergency stationary CI RICE >500 HP located at an area source of HAP.	a. Reduce CO emissions and not using oxidation catalyst.	i. The average reduction of emissions of CO determined from the initial performance test achieves the required CO percent reduction; and ii. You have installed a CPMS to continuously monitor operating parameters approved by the Administrator (if any) according to the requirements in Sec. 63.6625(b); and iii. You have recorded the approved operating parameters (if any) during the initial performance test.
4. Non-emergency stationary CI RICE >500 HP located at a major source of HAP, and existing non-emergency stationary CI RICE >500 HP located at an area source of HAP.	a. Limit the concentration of CO, and not using oxidation catalyst.	i. The average CO concentration determined from the initial performance test is less than or equal to the CO emission limitation; and ii. You have installed a CPMS to continuously monitor operating parameters approved by the Administrator (if any) according to the requirements in Sec. 63.6625(b); And

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
		iii. You have recorded the approved operating parameters (if any) during the initial performance test.
5. New or reconstructed non-emergency 2SLB stationary RICE >500 HP located at a major source of HAP, new or reconstructed non-emergency 4SLB stationary RICE >=250 HP located at a major source of HAP, non-emergency stationary CI RICE >500 HP located at a major source of HAP, and existing non-emergency stationary CI RICE >500 HP located at an area source of HAP.	a. Reduce CO emissions, and using a CEMS.	i. You have installed a CEMS to continuously monitor CO and either O2 or CO2 at both the inlet and outlet of the oxidation catalyst according to the requirements in Sec. 63.6625(a); and ii. You have conducted a performance evaluation of your CEMS using PS 3 and 4A of 40 CFR part 60, appendix B; and iii. The average reduction of CO calculated using Sec. 63.6620 equals or exceeds the required percent reduction. The initial test comprises the first 4-hour period after successful validation of the CEMS. Compliance is based on the average percent reduction achieved during the 4-hour period.

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
6. Non-emergency stationary CI RICE >500 HP located at a major source of HAP, and existing non-emergency stationary CI RICE >500 HP located at an area source of HAP.	a. Limit the concentration of CO, and using a CEMS.	i. You have installed a CEMS to continuously monitor CO and either O2 or CO2 at the outlet of the oxidation catalyst according to the requirements in Sec. 63.6625(a); and ii. You have conducted a performance evaluation of your CEMS using PS 3 and 4A of 40 CFR part 60, appendix B; and iii. The average concentration of CO calculated using Sec. 63.6620 is less than or equal to the CO emission limitation. The initial test comprises the first 4-hour period after successful validation of the CEMS. Compliance is based on the average concentration measured during the 4-hour period.

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
7. Non-emergency 4SRB stationary RICE >500 HP located at a major source of HAP.	a. Reduce formaldehyde emissions and using NSCR.	i. The average reduction of emissions of formaldehyde determined from the initial performance test is equal to or greater than the required formaldehyde percent reduction, or the average reduction of emissions of THC determined from the initial performance test is equal to or greater than 30 percent; and ii. You have installed a CPMS to continuously monitor catalyst inlet temperature according to the requirements in Sec. 63.6625(b); and iii. You have recorded the catalyst pressure drop and catalyst inlet temperature during the initial performance test.

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
8. Non-emergency 4SRB stationary RICE >500 HP located at a major source of HAP.	a. Reduce formaldehyde emissions and not using NSCR.	i. The average reduction of emissions of formaldehyde determined from the initial performance test is equal to or greater than the required formaldehyde percent reduction or the average reduction of emissions of THC determined from the initial performance test is equal to or greater than 30 percent; and ii. You have installed a CPMS to continuously monitor operating parameters approved by the Administrator (if any) according to the requirements in Sec. 63.6625(b); and iii. You have recorded the approved operating parameters (if any) during the initial performance test.
9. New or reconstructed non-emergency stationary RICE >500 HP located at a major source of HAP, new or reconstructed non-emergency 4SLB stationary RICE 250<=HP<=500 located at a major source of HAP, and existing non-emergency 4SRB stationary RICE >500 HP located at a major source of HAP.	a. Limit the concentration of formaldehyde in the stationary RICE exhaust and using oxidation catalyst or NSCR.	i. The average formaldehyde concentration, corrected to 15 percent O2, dry basis, from the three test runs is less than or equal to the formaldehyde emission limitation; and

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
		ii. You have installed a CPMS to continuously monitor catalyst inlet temperature according to the requirements in Sec. 63.6625(b); and iii. You have recorded the catalyst pressure drop and catalyst inlet temperature during the initial performance test.
10. New or reconstructed non-emergency stationary RICE >500 HP located at a major source of HAP, new or reconstructed non-emergency 4SLB stationary RICE 250<=HP<=500 located at a major source of HAP, and existing non-emergency 4SRB stationary RICE >500 HP located at a major source of HAP.	a. Limit the concentration of formaldehyde in the stationary RICE exhaust and not using oxidation catalyst or NSCR.	i. The average formaldehyde concentration, corrected to 15 percent O2, dry basis, from the three test runs is less than or equal to the formaldehyde emission limitation; and ii. You have installed a CPMS to continuously monitor operating parameters approved by the Administrator (if any) according to the requirements in Sec. 63.6625(b); And iii. You have recorded the approved operating parameters (if any) during the initial performance test.

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
11. Existing non-emergency stationary RICE 100<=HP<=500 located at a major source of HAP, and existing non-emergency stationary CI RICE 300<HP<=500 HP located at an area source of HAP. .	a. Reduce CO emissions.	i. The average reduction of emissions of CO or formaldehyde, as applicable determined from the initial performance test is equal to or greater than the required CO or formaldehyde, as applicable, percent reduction.
12. Existing non-emergency stationary RICE 100<=HP<=500 located at a major source of HAP, and existing non-emergency stationary CI RICE 300<HP<=500 HP located at an area source of HAP.	a. Limit the concentration of formaldehyde or CO in the stationary RICE exhaust.	i. The average formaldehyde or CO concentration, as applicable corrected to 15 percent O2, dry basis, from the three test runs is less than or equal to the formaldehyde or CO emission limitation, as applicable.
13. Existing non-emergency 4SLB stationary RICE >500 HP located at an area source Of HAP that are not remote stationary RICE and that are operated more than 24 hours per calendar year.	a. Install an oxidation catalyst.	i. You have to conduct intial compliance demonstration as specified in 63.6630(e) to show that the average reduction of emissions of CO is 93 percent or more, or the average CO concentration is less than or equal to 47 ppmvd at 15 percent O2;
14. Existing non-emergency 4SRB stationary RICE >500 HP located at an area source of HAP that are not remote stationary RICE and that are operated more than 24 hours per calendar year.	a. Install NSCR.....	i. You have conducted an initial compliance demonstration as specified in Sec. 63.6630(e) to show that the average reduction of emissions of CO is 75 percent or more, the average CO concentration is less than or equal to 270 ppmvd at 15 percent O2, or the average reduction of emissions of THC is 30 percent or more;

For each . . .	Complying with the requirement to . . .	You have demonstrated initial compliance if . . .
		ii. You have installed a CPMS to continuously monitor catalyst inlet temperature according to the requirements in Sec. 63.6625(b), or you have installed equipment to automatically shut down the engine if the catalyst inlet temperature exceeds 1250 [deg]F.

[76 FR 12867, Mar. 9, 2011]

Table 6 to Subpart ZZZZ of Part 63—Continuous Compliance With Emission Limitations, Operating Limitations, Work Practices, and Management Practices

As stated in § 63.6640, you must continuously comply with the emissions and operating limitations and work or management practices as required by the following:

For each . . .	Complying with the requirement to . . .	You must demonstrate continuous compliance by . . .
1. New or reconstructed non-emergency 2SLB stationary RICE >500 HP located at a major source of HAP, new or reconstructed non-emergency 4SLB stationary RICE ≥250 HP located at a major source of HAP, and new or reconstructed non-emergency CI stationary RICE >500 HP located at a major source of HAP	a. Reduce CO emissions and using an oxidation catalyst, and using a CPMS	i. Conducting semiannual performance tests for CO to demonstrate that the required CO percent reduction is achieved; [a]and ii. Collecting the catalyst inlet temperature data according to § 63.6625(b); and iii. Reducing these data to 4-hour rolling averages; and iv. Maintaining the 4-hour rolling averages within the operating limitations for the catalyst inlet temperature; and
		v. Measuring the pressure drop across the catalyst once per month and demonstrating that the pressure drop across the catalyst is within the operating limitation established during the performance test.

For each . . .	Complying with the requirement to . . .	You must demonstrate continuous compliance by . . .
2. New or reconstructed non-emergency 2SLB stationary RICE >500 HP located at a major source of HAP, new or reconstructed non-emergency 4SLB stationary RICE ≥250 HP located at a major source of HAP, and new or reconstructed non-emergency CI stationary RICE >500 HP located at a major source of HAP	a. Reduce CO emissions and not using an oxidation catalyst, and using a CPMS	i. Conducting semiannual performance tests for CO to demonstrate that the required CO percent reduction is achieved; [a]and ii. Collecting the approved operating parameter (if any) data according to § 63.6625(b); and iii. Reducing these data to 4-hour rolling averages; and
		iv. Maintaining the 4-hour rolling averages within the operating limitations for the operating parameters established during the performance test.
3. New or reconstructed non-emergency 2SLB stationary RICE >500 HP located at a major source of HAP, new or reconstructed non-emergency 4SLB stationary RICE ≥250 HP located at a major source of HAP, new or reconstructed non-emergency stationary CI RICE >500 HP located at a major source of HAP, existing non-emergency stationary CI RICE >500 HP, existing non-emergency 4SLB stationary RICE >500 HP located at an area source of HAP that are operated more than 24 hours per calendar year	a. Reduce CO emissions or limit the concentration of CO in the stationary RICE exhaust, and using a CEMS	i. Collecting the monitoring data according to § 63.6625(a), reducing the measurements to 1-hour averages, calculating the percent reduction or concentration of CO emissions according to § 63.6620; and ii. Demonstrating that the catalyst achieves the required percent reduction of CO emissions over the 4-hour averaging period, or that the emission remain at or below the CO concentration limit; and iii. Conducting an annual RATA of your CEMS using PS 3 and 4A of 40 CFR part 60, appendix B, as well as daily and periodic data quality checks in accordance with 40 CFR part 60, appendix F, procedure 1.
4. Non-emergency 4SRB stationary RICE >500 HP located at a major source of HAP	a. Reduce formaldehyde emissions and using NSCR	i. Collecting the catalyst inlet temperature data according to § 63.6625(b); and
		ii. Reducing these data to 4-hour rolling averages; and
		iii. Maintaining the 4-hour rolling averages within the operating limitations for the catalyst inlet temperature; and
		iv. Measuring the pressure drop across the catalyst once per month and demonstrating that the pressure drop across the catalyst is within the operating limitation established during the performance test.

For each . . .	Complying with the requirement to . . .	You must demonstrate continuous compliance by . . .
5. Non-emergency 4SRB stationary RICE >500 HP located at a major source of HAP	a. Reduce formaldehyde emissions and not using NSCR	i. Collecting the approved operating parameter (if any) data according to § 63.6625(b); and ii. Reducing these data to 4-hour rolling averages; and
		iii. Maintaining the 4-hour rolling averages within the operating limitations for the operating parameters established during the performance test.
6. Non-emergency 4SRB stationary RICE with a brake HP ≥5,000 located at a major source of HAP	a. Reduce formaldehyde emissions	Conducting semiannual performance tests for formaldehyde to demonstrate that the required formaldehyde percent reduction is achieved.[a]
7. New or reconstructed non-emergency stationary RICE >500 HP located at a major source of HAP and new or reconstructed non-emergency 4SLB stationary RICE 250 ≤HP≤500 located at a major source of HAP	a. Limit the concentration of formaldehyde in the stationary RICE exhaust and using oxidation catalyst or NSCR	i. Conducting semiannual performance tests for formaldehyde to demonstrate that your emissions remain at or below the formaldehyde concentration limit; [a]and ii. Collecting the catalyst inlet temperature data according to § 63.6625(b); and
		iii. Reducing these data to 4-hour rolling averages; and
		iv. Maintaining the 4-hour rolling averages within the operating limitations for the catalyst inlet temperature; and
		v. Measuring the pressure drop across the catalyst once per month and demonstrating that the pressure drop across the catalyst is within the operating limitation established during the performance test.
8. New or reconstructed non-emergency stationary RICE >500 HP located at a major source of HAP and new or reconstructed non-emergency 4SLB stationary RICE 250 ≤HP≤500 located at a major source of HAP	a. Limit the concentration of formaldehyde in the stationary RICE exhaust and not using oxidation catalyst or NSCR	i. Conducting semiannual performance tests for formaldehyde to demonstrate that your emissions remain at or below the formaldehyde concentration limit; [a]and ii. Collecting the approved operating parameter (if any) data according to § 63.6625(b); and
		iii. Reducing these data to 4-hour rolling averages; and

For each . . .	Complying with the requirement to . . .	You must demonstrate continuous compliance by . . .
		iv. Maintaining the 4-hour rolling averages within the operating limitations for the operating parameters established during the performance test.
9. Existing emergency and black start stationary RICE ≤500 HP located at a major source of HAP, existing non-emergency stationary RICE <100 HP located at a major source of HAP, existing emergency and black start stationary RICE located at an area source of HAP, existing non-emergency stationary CI RICE ≤300 HP located at an area source of HAP, existing non-emergency 2SLB stationary RICE located at an area source of HAP, existing non-emergency landfill or digester gas stationary SI RICE located at an area source of HAP, existing non-emergency 4SLB and 4SRB stationary RICE ≤500 HP located at an area source of HAP, existing non-emergency 4SLB and 4SRB stationary RICE >500 HP located at an area source of HAP that operate 24 hours or less per calendar year	a. Work or Management practices	i. Operating and maintaining the stationary RICE according to the manufacturer's emission-related operation and maintenance instructions; or ii. Develop and follow your own maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions.
10. Existing stationary CI RICE >500 HP that are not limited use stationary RICE, and existing 4SLB and 4SRB stationary RICE >500 HP located at an area source of HAP that operate more than 24 hours per calendar year and are not limited use stationary RICE	a. Reduce CO or formaldehyde emissions, or limit the concentration of formaldehyde or CO in the stationary RICE exhaust, and using oxidation catalyst or NSCR	i. Conducting performance tests every 8,760 hours or 3 years, whichever comes first, for CO or formaldehyde, as appropriate, to demonstrate that the required CO or formaldehyde, as appropriate, percent reduction is achieved or that your emissions remain at or below the CO or formaldehyde concentration limit; and
		ii. Collecting the catalyst inlet temperature data according to § 63.6625(b); and
		iii. Reducing these data to 4-hour rolling averages; and
		iv. Maintaining the 4-hour rolling averages within the operating limitations for the catalyst inlet temperature; and

For each . . .	Complying with the requirement to . . .	You must demonstrate continuous compliance by . . .
		v. Measuring the pressure drop across the catalyst once per month and demonstrating that the pressure drop across the catalyst is within the operating limitation established during the performance test.
11. Existing stationary CI RICE >500 HP that are not limited use stationary RICE, and existing 4SLB and 4SRB stationary RICE >500 HP located at an area source of HAP that operate more than 24 hours per calendar year and are not limited use stationary RICE	a. Reduce CO or formaldehyde emissions, or limit the concentration of formaldehyde or CO in the stationary RICE exhaust, and not using oxidation catalyst or NSCR	i. Conducting performance tests every 8,760 hours or 3 years, whichever comes first, for CO or formaldehyde, as appropriate, to demonstrate that the required CO or formaldehyde, as appropriate, percent reduction is achieved or that your emissions remain at or below the CO or formaldehyde concentration limit; and
		ii. Collecting the approved operating parameter (if any) data according to § 63.6625(b); and
		iii. Reducing these data to 4-hour rolling averages; and
		iv. Maintaining the 4-hour rolling averages within the operating limitations for the operating parameters established during the performance test.
12. Existing limited use CI stationary RICE >500 HP and existing limited use 4SLB and 4SRB stationary RICE >500 HP located at an area source of HAP that operate more than 24 hours per calendar year	a. Reduce CO or formaldehyde emissions or limit the concentration of formaldehyde or CO in the stationary RICE exhaust, and using an oxidation catalyst or NSCR	i. Conducting performance tests every 8,760 hours or 5 years, whichever comes first, for CO or formaldehyde, as appropriate, to demonstrate that the required CO or formaldehyde, as appropriate, percent reduction is achieved or that your emissions remain at or below the CO or formaldehyde concentration limit; and
		ii. Collecting the catalyst inlet temperature data according to § 63.6625(b); and
		iii. Reducing these data to 4-hour rolling averages; and
		iv. Maintaining the 4-hour rolling averages within the operating limitations for the catalyst inlet temperature; and

For each . . .	Complying with the requirement to . . .	You must demonstrate continuous compliance by . . .
		v. Measuring the pressure drop across the catalyst once per month and demonstrating that the pressure drop across the catalyst is within the operating limitation established during the performance test.
13. Existing limited use CI stationary RICE >500 HP and existing limited use 4SLB and 4SRB stationary RICE >500 HP located at an area source of HAP that operate more than 24 hours per calendar year	a. Reduce CO or formaldehyde emissions or limit the concentration of formaldehyde or CO in the stationary RICE exhaust, and not using an oxidation catalyst or NSCR	i. Conducting performance tests every 8,760 hours or 5 years, whichever comes first, for CO or formaldehyde, as appropriate, to demonstrate that the required CO or formaldehyde, as appropriate, percent reduction is achieved or that your emissions remain at or below the CO or formaldehyde concentration limit; and
		ii. Collecting the approved operating parameter (if any) data according to § 63.6625(b); and
		iii. Reducing these data to 4-hour rolling averages; and
		iv. Maintaining the 4-hour rolling averages within the operating limitations for the operating parameters established during the performance test.

a After you have demonstrated compliance for two consecutive tests, you may reduce the frequency of subsequent performance tests to annually. If the results of any subsequent annual performance test indicate the stationary RICE is not in compliance with the CO or formaldehyde emission limitation, or you deviate from any of your operating limitations, you must resume semiannual performance tests.

[76 FR 12870, Mar. 9, 2011]

Table 7 to Subpart ZZZZ of Part 63—Requirements for Reports

As stated in § 63.6650, you must comply with the following requirements for reports:

For each ...	You must submit a ...	The report must contain ...	You must submit the report ...
1. Existing non-emergency, non-black start stationary RICE 100 ≤ HP ≤ 500 located at a major source of HAP; existing non-emergency, non-black start stationary CI RICE > 500 HP located at a major source of HAP; existing non-emergency 4SRB stationary RICE > 500 HP located at a major source of HAP; existing non-emergency, non-	Compliance report	a. If there are no deviations from any emission limitations or operating limitations that apply to you, a statement that there were no deviations from the emission limitations or operating limitations during the reporting period. If there were no periods during which the CMS, including CEMS and CPMS, was out-of-control, as specified in § 63.8(c)(7), a	i. Semiannually according to the requirements in § 63.6650(b)(1)-(5) for engines that are not limited use stationary RICE subject to numerical emission limitations; and ii. Annually according to the requirements in

For each ...	You must submit a ...	The report must contain ...	You must submit the report ...
black start stationary CI RICE > 300 HP located at an area source of HAP; existing non-emergency, non-black start 4SLB and 4SRB stationary RICE > 500 HP located at an area source of HAP and operated more than 24 hours per calendar year; new or reconstructed non-emergency stationary RICE > 500 HP located at a major source of HAP; and new or reconstructed non-emergency 4SLB stationary RICE 250 ≤ HP ≤ 500 located at a major source of HAP		statement that there were not periods during which the CMS was out-of-control during the reporting period; or b. If you had a deviation from any emission limitation or operating limitation during the reporting period, the information in § 63.6650(d). If there were periods during which the CMS, including CEMS and CPMS, was out-of-control, as specified in § 63.8(c)(7), the information in § 63.6650(e); or c. If you had a malfunction during the reporting period, the information in § 63.6650(c)(4)	§ 63.6650(b)(6)-(9) for engines that are limited use stationary RICE subject to numerical emission limitations. i. Semiannually according to the requirements in § 63.6650(b). i. Semiannually according to the requirements in § 63.6650(b).
2. New or reconstructed non-emergency stationary RICE that combusts landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis	Report	a. The fuel flow rate of each fuel and the heating values that were used in your calculations, and you must demonstrate that the percentage of heat input provided by landfill gas or digester gas, is equivalent to 10 percent or more of the gross heat input on an annual basis; and	i. Annually, according to the requirements in § 63.6650.
		b. The operating limits provided in your federally enforceable permit, and any deviations from these limits; and	i. See item 2.a.i.
		c. Any problems or errors suspected with the meters.	i. See item 2.a.i.

[75 FR 51603, Aug. 20, 2010]

Table 8 to Subpart ZZZZ of Part 63—Applicability of General Provisions to Subpart ZZZZ.

As stated in § 63.6665, you must comply with the following applicable general provisions.

General provisions citation	Subject of citation	Applies to subpart	Explanation
§ 63.1	General applicability of the General Provisions	Yes.	
§ 63.2	Definitions	Yes	Additional terms defined in § 63.6675.
§ 63.3	Units and abbreviations	Yes.	

General provisions citation	Subject of citation	Applies to subpart	Explanation
§ 63.4	Prohibited activities and circumvention	Yes.	
§ 63.5	Construction and reconstruction	Yes.	
§ 63.6(a)	Applicability	Yes.	
§ 63.6(b)(1)-(4)	Compliance dates for new and reconstructed sources	Yes.	
§ 63.6(b)(5)	Notification	Yes.	
§ 63.6(b)(6)	[Reserved]		
§ 63.6(b)(7)	Compliance dates for new and reconstructed area sources that become major sources	Yes.	
§ 63.6(c)(1)-(2)	Compliance dates for existing sources	Yes.	
§ 63.6(c)(3)-(4)	[Reserved]		
§ 63.6(c)(5)	Compliance dates for existing area sources that become major sources	Yes.	
§ 63.6(d)	[Reserved]		
§ 63.6(e)	Operation and maintenance	No.	
§ 63.6(f)(1)	Applicability of standards	No.	
§ 63.6(f)(2)	Methods for determining compliance	Yes.	
§ 63.6(f)(3)	Finding of compliance	Yes.	
§ 63.6(g)(1)-(3)	Use of alternate standard	Yes.	
§ 63.6(h)	Opacity and visible emission standards	No	Subpart ZZZZ does not contain opacity or visible emission standards.
§ 63.6(i)	Compliance extension procedures and criteria	Yes.	
§ 63.6(j)	Presidential compliance exemption	Yes.	
§ 63.7(a)(1)-(2)	Performance test dates	Yes	Subpart ZZZZ contains performance test dates at §§ 63.6610, 63.6611, and 63.6612.
§ 63.7(a)(3)	CAA section 114 authority	Yes.	
§ 63.7(b)(1)	Notification of performance test	Yes	Except that § 63.7(b)(1) only applies as specified in § 63.6645.

General provisions citation	Subject of citation	Applies to subpart	Explanation
§ 63.7(b)(2)	Notification of rescheduling	Yes	Except that § 63.7(b)(2) only applies as specified in § 63.6645.
§ 63.7(c)	Quality assurance/test plan	Yes	Except that § 63.7(c) only applies as specified in § 63.6645.
§ 63.7(d)	Testing facilities	Yes.	
§ 63.7(e)(1)	Conditions for conducting performance tests	No.	Subpart ZZZZ specifies conditions for conducting performance tests at § 63.6620.
§ 63.7(e)(2)	Conduct of performance tests and reduction of data	Yes	Subpart ZZZZ specifies test methods at § 63.6620.
§ 63.7(e)(3)	Test run duration	Yes.	
§ 63.7(e)(4)	Administrator may require other testing under section 114 of the CAA	Yes.	
§ 63.7(f)	Alternative test method provisions	Yes.	
§ 63.7(g)	Performance test data analysis, recordkeeping, and reporting	Yes.	
§ 63.7(h)	Waiver of tests	Yes.	
§ 63.8(a)(1)	Applicability of monitoring requirements	Yes	Subpart ZZZZ contains specific requirements for monitoring at § 63.6625.
§ 63.8(a)(2)	Performance specifications	Yes.	
§ 63.8(a)(3)	[Reserved]		
§ 63.8(a)(4)	Monitoring for control devices	No.	
§ 63.8(b)(1)	Monitoring	Yes.	
§ 63.8(b)(2)-(3)	Multiple effluents and multiple monitoring systems	Yes.	
§ 63.8(c)(1)	Monitoring system operation and maintenance	Yes.	
§ 63.8(c)(1)(i)	Routine and predictable SSM	No.	
§ 63.8(c)(1)(ii)	SSM not in Startup Shutdown Malfunction Plan	Yes.	
§ 63.8(c)(1)(iii)	Compliance with operation and maintenance requirements	No.	
§ 63.8(c)(2)-(3)	Monitoring system installation	Yes.	

General provisions citation	Subject of citation	Applies to subpart	Explanation
§ 63.8(c)(4)	Continuous monitoring system (CMS) requirements	Yes	Except that subpart ZZZZ does not require Continuous Opacity Monitoring System (COMS).
§ 63.8(c)(5)	COMS minimum procedures	No	Subpart ZZZZ does not require COMS.
§ 63.8(c)(6)-(8)	CMS requirements	Yes	Except that subpart ZZZZ does not require COMS.
§ 63.8(d)	CMS quality control	Yes.	
§ 63.8(e)	CMS performance evaluation	Yes	Except for § 63.8(e)(5)(ii), which applies to COMS.
		Except that § 63.8(e) only applies as specified in § 63.6645.	
§ 63.8(f)(1)-(5)	Alternative monitoring method	Yes	Except that § 63.8(f)(4) only applies as specified in § 63.6645.
§ 63.8(f)(6)	Alternative to relative accuracy test	Yes	Except that § 63.8(f)(6) only applies as specified in § 63.6645.
§ 63.8(g)	Data reduction	Yes	Except that provisions for COMS are not applicable. Averaging periods for demonstrating compliance are specified at §§ 63.6635 and 63.6640.
§ 63.9(a)	Applicability and State delegation of notification requirements	Yes.	
§ 63.9(b)(1)-(5)	Initial notifications	Yes	Except that § 63.9(b)(3) is reserved.
		Except that § 63.9(b) only applies as specified in § 63.6645.	
§ 63.9(c)	Request for compliance extension	Yes	Except that § 63.9(c) only applies as specified in § 63.6645.
§ 63.9(d)	Notification of special compliance requirements for new sources	Yes	Except that § 63.9(d) only applies as specified in § 63.6645.
§ 63.9(e)	Notification of performance test	Yes	Except that § 63.9(e) only applies as specified in § 63.6645.

General provisions citation	Subject of citation	Applies to subpart	Explanation
§ 63.9(f)	Notification of visible emission (VE)/opacity test	No	Subpart ZZZZ does not contain opacity or VE standards.
§ 63.9(g)(1)	Notification of performance evaluation	Yes	Except that § 63.9(g) only applies as specified in § 63.6645.
§ 63.9(g)(2)	Notification of use of COMS data	No	Subpart ZZZZ does not contain opacity or VE standards.
§ 63.9(g)(3)	Notification that criterion for alternative to RATA is exceeded	Yes	If alternative is in use.
		Except that § 63.9(g) only applies as specified in § 63.6645.	
§ 63.9(h)(1)-(6)	Notification of compliance status	Yes	Except that notifications for sources using a CEMS are due 30 days after completion of performance evaluations. § 63.9(h)(4) is reserved.
			Except that § 63.9(h) only applies as specified in § 63.6645.
§ 63.9(i)	Adjustment of submittal deadlines	Yes.	
§ 63.9(j)	Change in previous information	Yes.	
§ 63.10(a)	Administrative provisions for recordkeeping/reporting	Yes.	
§ 63.10(b)(1)	Record retention	Yes.	Except that the most recent 2 years of data do not have to be retained on site.
§ 63.10(b)(2)(i)-(v)	Records related to SSM	No.	
§ 63.10(b)(2)(vi)-(xi)	Records	Yes.	
§ 63.10(b)(2)(xii)	Record when under waiver	Yes.	
§ 63.10(b)(2)(xiii)	Records when using alternative to RATA	Yes	For CO standard if using RATA alternative.
§ 63.10(b)(2)(xiv)	Records of supporting documentation	Yes.	
§ 63.10(b)(3)	Records of applicability determination	Yes.	
§ 63.10(c)	Additional records for sources using CEMS	Yes	Except that § 63.10(c)(2)-(4) and (9) are reserved.

General provisions citation	Subject of citation	Applies to subpart	Explanation
§ 63.10(d)(1)	General reporting requirements	Yes.	
§ 63.10(d)(2)	Report of performance test results	Yes.	
§ 63.10(d)(3)	Reporting opacity or VE observations	No	Subpart ZZZZ does not contain opacity or VE standards.
§ 63.10(d)(4)	Progress reports	Yes.	
§ 63.10(d)(5)	Startup, shutdown, and malfunction reports	No.	
§ 63.10(e)(1) and (2)(i)	Additional CMS Reports	Yes.	
§ 63.10(e)(2)(ii)	COMS-related report	No	Subpart ZZZZ does not require COMS.
§ 63.10(e)(3)	Excess emission and parameter exceedances reports	Yes.	Except that § 63.10(e)(3)(i) (C) is reserved.
§ 63.10(e)(4)	Reporting COMS data	No	Subpart ZZZZ does not require COMS.
§ 63.10(f)	Waiver for recordkeeping/reporting	Yes.	
§ 63.11	Flares	No.	
§ 63.12	State authority and delegations	Yes.	
§ 63.13	Addresses	Yes.	
§ 63.14	Incorporation by reference	Yes.	
§ 63.15	Availability of information	Yes.	

[75 FR 9688, Mar. 3, 2010]

Downloaded from the ECFR on January 7, 2013 and updated with January 30, 2013 amendments. The amendments are effective on April 1, 2013.

Indiana Department of Environmental Management
Office of Air Quality

Addendum to the
Technical Support Document for a Part 70 Operating Permit and Enhanced New Source Review (ENSR)

Source Description and Location

Source Name:	Magnetation LLC
Source Location:	64 East 100 North, Reynolds, Indiana 47980
County:	White
SIC Code:	1011
Operating Permit No.:	T181-32081-00054
Permit Reviewer:	Kristen Willoughby

On February 16, 2013, the Office of Air Quality (OAQ) had a notice published in the Herald Journal, Monticello, Indiana, stating that Magnetation LLC had applied for a Part 70 Operating Permit to construct and operate an iron concentrate pelletizing plant. The notice also stated that OAQ proposed to issue a permit for this operation and provided information on how the public could review the proposed permit and other documentation. Finally, the notice informed interested parties that there was a period of thirty (30) days to provide comments on whether or not this permit should be issued as proposed.

On March 20, 2013, the Office of Air Quality (OAQ) held a public meeting and a public hearing at the former Reynolds Elementary School, Reynolds, Indiana, for citizens and interested parties to discuss questions and concerns related to the project.

Upon further review, the OAQ has made the following revisions to the permit (bolded language has been added, the language with a line through it has been deleted). The Table Of Contents has been modified to reflect these changes.

IDEM, OAQ Change

On October 27, 2010, the Indiana Air Pollution Control Board issued revisions to 326 IAC 2. These revisions resulted in changes to the rule citations listed in the permit. These changes are not changes to the underlining provisions. The change is only to citations for these rules in the Section E Facility Description Boxes and Section D - Preventative Maintenance Plan.

D.1.3 Preventive Maintenance Plan [326 IAC 2-7-5(~~13~~**12**)]

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D.2.3 Preventive Maintenance Plan [326 IAC 2-7-5(~~13~~**12**)]

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D.3.4 Preventive Maintenance Plan [326 IAC 2-7-5(~~13~~**12**)]

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D.4.2 Preventive Maintenance Plan [326 IAC 2-7-5(~~13~~**12**)]

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D.5.2 Preventive Maintenance Plan [326 IAC 2-7-5(~~13~~**12**)]

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D.6.3 Preventive Maintenance Plan [326 IAC 2-7-5(~~13~~**12**)]

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SECTION E.1 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(~~15~~**14**)]: Nonmetallic Mineral Processing Plants

***

SECTION E.2 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(~~15~~**14**)]: Spark Ignition Internal Combustion Engines

***

SECTION E.3 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(~~15~~**14**)]: Reciprocating Internal Combustion Engines

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Comments from the U.S. EPA

On March 25, 2013, Ms. Genevieve Damico, on behalf of the U.S. EPA, submitted comments on the proposed Part 70 permit. The summary of the comments is as follows:

Comment 1:

The Particulate Matter (PM) Potential to Emit (PTE) from the furnace hood exhaust and furnace windbox exhaust is smaller than the PTE for PM10 and PM2.5 (Appendix A, pages 1, 2, and 5). PM, as defined at 326 IAC 1-2-52, is any airborne finely divided solid or liquid material, excluding uncombined water, with an aerodynamic diameter smaller than 100 microns. PM2.5 and PM10, as defined at 326 IAC 1-2-52.2 and 1-2-52.4, are PM with an aerodynamic diameter smaller than 2.5 and 10 microns, respectively. By these definitions, PM should be equal to or larger than the amount of PM10 and PM2.5 emitted at the source. Please explain this discrepancy in the permit documents.

IDEM, OAQ Response 1:

IDEM, OAQ acknowledges that the EPA is correct concerning the definitions in 326 IAC 1-2-52, 326 IAC 1-2-52.2, and 326 IAC 1-2-52.4. However, the definitions only address filterable PM, PM10, and PM2.5. IDEM, OAQ also considers the definitions under 326 IAC 2-1.1-1 when evaluating PM10 and PM2.5. Under 326 IAC 2-1.1-1, PM10 "has the meaning set forth at 326 IAC 1-2-52.4 and, for purposes of this article, includes gaseous emissions or liquid droplets from an air emissions source or activity that condense to form PM10 at ambient temperatures." Under 326 IAC 2-1.1-1, direct PM2.5 means "solid particles emitted directly from an air emissions source or activity, or gaseous emissions or liquid droplets from an air emissions source or activity that condense to form PM2.5 at ambient temperatures. Direct PM2.5 emissions include elemental carbon, directly emitted organic carbon, directly emitted sulfate, directly emitted nitrate, and other inorganic particles, including, but not limited to, crustal material, metals, and sea salt." These definitions explain that since PM10 and PM2.5 include filterable and condensable particulate matter, while PM excludes condensable particulate matter, that PM10 and PM2.5 emissions can be greater than PM emissions.

Comment 2:

The Best Available Control Technology (BACT) determination for PM, PM10, and PM25 requires a fugitive dust control plan for EU001b, EU002b, EU003b, EU002a, EU003a, and EU004a. However, a fugitive dust control plan was not included with the draft permit for review. Please clarify whether the fugitive dust control plan is available for review. If it hasn't been developed, please explain when a fugitive dust control plan will be developed and available for review, and how issues of adequacy of public notice and opportunity for comment are being addressed.

IDEM, OAQ Response 2:

The BACT determinations contained in the permit for PM, PM10, and PM2.5 specify the level of fugitive emission control that Magnetation's Fugitive Dust Control Plan (FDCP) must achieve. However, the FDCP required to comply with Magnetation's source-wide PM, PM10, and PM2.5 BACT determination has not yet been developed. Because the FDCP is required for the source to comply with its BACT obligations, the FDCP must be effective and incorporated into the source's operating permit prior to Magnetation operating those units that are required to comply with the FDCP. Accordingly, Magnetation must submit its FDCP to IDEM so that the agency can incorporate the plan's requirements into its operating permit. The incorporation of the FDCP will be treated as a Significant Permit Modification, and therefore, will comply with 326 IAC 2-7-12(d)(2)'s requirements for public participation and EPA review, just as any other significant permit modification does.

No change will be made as a result of this comment.

Comment 3:

The Greenhouse Gas (GHG) BACT analysis (Appendix B, pages 149 and 152) says "carbon sequestration is not considered to be fully commercially available technology." This statement appears to be regarding the technical feasibility of carbon sequestration in general and not specific to this source. EPA does not agree with a general statement that carbon sequestration is not commercially available, and indeed has stated in guidance that Carbon Capture and Sequestration (CCS) is typically available, at least "for industrial facilities with high-purity Carbon Dioxide (CO2) streams (e.g. hydrogen production, ammonia production, natural gas processing, ethanol production, ethylene oxide production, cement production, and iron and steel manufacturing)." "PSD and Title V Permitting Guidance for Greenhouse Gases" (March 2011) at 32. It may well be that CCS is not commercially available for this facility (perhaps, for example, due to lack of access to a geologic repository for captured CO2). In that case, the determination should be limited to this specific situation/circumstance. Please revise the BACT analysis to evaluate the technical or economic feasibility of carbon sequestration with respect to this specific source.

IDEM, OAQ Response 3:

IDEM, OAQ intended the statement "carbon sequestration is not considered to be fully commercially available technology" on pages 149 and 152 of the Greenhouse Gas (GHG) BACT analysis (Appendix B) to be specific to this proposed operation. IDEM, OAQ agrees with the EPA that this statement would be inaccurate if it was intended to apply generally.

No change will be made as a result of this comment.

Comment 4:

Compliance with the induration furnace CO2 equivalent (CO2e) BACT limit is to be determined by an equation that includes GHG emission factors, fuel usage, and heat content (permit condition D.3.10). Continuous emissions monitoring systems (CEMS) or stack testing are not required to determine this

BACT limit. Absent a CEMS requirement, EPA recommends that the permit require periodic stack testing to validate the emission factors used to determine compliance with the CO2e BACT limit.

IDEM, OAQ Response 4:

The equation used to determine compliance with the CO2e BACT limit for the hardening furnace includes CO2, CH4, and N2O emissions from natural gas combustion and CO2 emissions from iron ore concentrate, limestone, dolomite, coke breeze, and soda ash. CO2 is the predominant GHG pollutant with 660,989 tons per year of CO2e derived from CO2, 88 tons per year of CO2e derived from CH4, and 131 tons per year of CO2e derived from NO2.

The source has no legal obligation to install a CEMS, therefore, IDEM is requiring periodic CO2 testing to determine compliance with the CO2e BACT limit for the induration furnace. Additionally, Condition D.3.10 - Greenhouse Gases (GHGs) has been revised to make it easier to read, identify the source of limestone, dolomite, and soda ash conversion factors as 40 CFR 98, Subpart C, and include a requirement to maintain records of the iron ore concentrate, limestone, dolomite, coke breeze, and soda ash usage .

The following revisions have been made to the permit.

D.3.8 Testing Requirements [326 IAC 2-7-6(1),(6)] [326 IAC 2-1.1-11]

Group 1 Testing Requirements

* * *

(e) Not later than 180 days from plant startup, in order to demonstrate compliance with Condition D.3.1(c), the Permittee shall perform CO2 testing for stacks SV013A and SV013B utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section.

D.3.10 Greenhouse Gases (GHGs)

To determine the compliance status with Condition D.3.1(c), the **Permittee shall calculate the** ~~following equation shall be used to determine the~~ CO_2e emissions from the hardening furnace **using the following equation**:

CO_2e emissions (tons/month) =
{Natural Gas Usage (mmscf/month) x Heat Content (mmbtu/mmscf) x [CO_2 EF_{NG} (kg/mmbtu) x CO_2 GWP + CH_4 EF_{NG} (kg/mmbtu) x CH_4 GWP + N_2O EF_{NG} (kg/mmbtu) x N_2O GWP] x 2.2046 (lb/kg) x 1/2000 (ton/lb)}
+ {Iron **Ore** Concentrate Usage (metric tonnes/month) x ~~0.006~~ $\mathbf{CO_2EF_{IRN}}$ (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}
+ {Limestone Usage (metric tonnes/month) x ~~0.44~~ $\mathbf{CO_2EF_{LMST}}$ (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}
+ {Dolomite Usage (metric tonnes/month) x ~~0.48~~ $\mathbf{CO_2EF_{DOL}}$ (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}
+ {Coke Breeze Usage (metric tonnes/month) x ~~3.66~~ $\mathbf{CO_2EF_{CKBZ}}$ (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}
+ {Soda Ash Usage (metric tonnes/month) x ~~0.41~~ $\mathbf{CO_2EF_{SODA}}$ (metric tonne CO_2/metric tonne material) x 1.1023 (ton/metric tonne) x CO_2 GWP}

Where:

Parameter	Numerical Value	Source
Fuel Usage (mmscf/month)	******	**Monthly natural gas usage from company records.**
Heat Content (mmbtu/mmscf)	**1020**	**or vendor data**
CO_2 EF_{NG} (kg/mmbtu)	**53.02**	**40 CFR 98, Subpart C**
CH_4 EF_{NG} (kg/mmbtu)	**1.0E-03**	**40 CFR 98, Subpart C**
N_2O EF_{NG} (kg/mmbtu)	**1.0E-04**	**40 CFR 98, Subpart C**
CO_2 GWP	**1**	**40 CFR 98, Subpart A**
CH_4 GWP	**21**	**40 CFR 98, Subpart A**
N_2O GWP	**310**	**40 CFR 98, Subpart A**
Iron Ore Concentrate Usage (metric tonnes / month)	******	**Monthly iron ore concentrate usage data from company records.**
Iron Ore Concentrate CO_2 EF_{IRN} (metric tonne CO_2/metric tonne material)	**0.006**	**Midland Research Center analysis obtained from 1998 Minnesota Iron & Steel pilot study.**
Limestone Usage (metric tonnes / month)	******	**Monthly limestone usage data from company records.**
Limestone CO_2 EF_{LMST} (metric tonne CO_2/metric tonne material)	**0.43971**	**40 CFR 98, Subpart U**
Dolomite Usage (metric tonnes / month)	******	**Monthly dolomite usage data from company records.**
Dolomite CO_2 EF_{DOL} (metric tonne CO_2/metric tonne material)	**0.47732**	**40 CFR 98, Subpart U**
Coke Breeze Usage (metric tonnes / month)	******	**Monthly coke breeze usage data from company records.**
Coke Breeze CO_2 EF_{CKBZ} (metric tonne CO_2/metric tonne material)	**3.66**	**Assume coke breeze is 100% carbon and it all converts to CO_2.**
Soda Ash Usage (metric tonnes / month)	******	**Monthly soda ash usage data from company records.**
Soda Ash CO_2 EF_{SODA} (metric tonne CO_2/metric tonne material)	**0.41492**	**40 CFR 98, Subpart U**

**** Value based on monthly data.**

~~Fuel Usage (mmscf/month) = monthly natural gas usage data from company records~~
~~Heat Content (mmbtu/mmscf) = 1020 mmbtu/mmscf or vendor data, if available~~

~~CO_2 EF (kg/mmbtu) = emission factor from GHG Mandatory Reporting Rule (MRR) (40 CFR 98, Subpart C) for natural gas~~
~~CH_4 EF (kg/mmbtu) = emission factor from GHG MRR (40 CFR 98, Subpart C) for natural gas~~
~~N_2O EF (kg/mmbtu) = emission factor from GHG MRR (40 CFR 98, Subpart C) for natural gas~~
~~CO_2 GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)~~
~~CH_4 GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)~~
~~N_2O GWP = global warming potential from GHG MRR (40 CFR 98, Subpart A)~~
~~Iron Concentrate Usage (metric tonnes/month) = monthly iron concentrate usage data from company records~~
~~0.006 (metric tonne CO_2/metric tonne material) = emission factor for carbon fraction of iron concentrate~~
~~Limestone Usage (metric tonnes/month) = monthly limestone usage data from company records~~
~~0.44 (metric tonne CO_2/metric tonne material) = emission factor for carbon fraction of limestone~~
~~Dolomite Usage (metric tonnes/month) = monthly dolomite usage data from company records~~
~~0.48 (metric tonne CO_2/metric tonne material) = emission factor for carbon fraction of dolomite~~
~~Coke Breeze Usage (metric tonnes/month) = monthly coke breeze usage data from company records~~
~~3.66 (metric tonne CO_2/metric tonne material) = emission factor for carbon fraction of coke breeze~~
~~Soda Ash Usage (metric tonnes/month) = monthly soda ash usage data from company records~~
~~0.41 (metric tonne CO_2/metric tonne material) = emission factor for carbon fraction of soda ash~~

Comment 5:

The induration furnace CO2e BACT limit equation (permit condition D.3.10) includes usage of iron concentrate, limestone, dolomite, soda ash, and coke breeze. However, the record keeping requirements of condition D.3.16 do not require that the source track the amount of each of these materials. The permit should include a requirement to maintain records of iron concentrate, limestone, dolomite, soda ash, and coke breeze usage in order to document compliance with the CO2e BACT limit.

IDEM, OAQ Response 5:

Condition D.3.16 has been modified as shown below:

D.3.1~~6~~**8** Record Keeping Requirements

(a) To document the compliance status with Conditions D.3.1(b), ~~D.3.1(c), D.3.1(d),~~ **and** D.3.9, ~~and D.3.10,~~ the Permittee shall ~~maintain records in accordance with (1) through (5) below. Records maintained for (1) through (5) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1.~~ **comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(b).**

~~(1) Calendar dates covered in the compliance determination period.~~

~~(2) Fluoride content of the iron concentrate.~~

~~(3) Natural gas usage for the induction hardening furnace.~~

~~(4) Monthly records of CO2e emissions.~~

~~(5) Total dissolved solids (TDS) concentration of the cooling water utilized in the cooling tower.~~

(b) To document the compliance status with Conditions D.3.1(a), D.3.12, and D.3.13, the Permitee shall maintain monthly records in accordance with (10 through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(a).

(1) Calendar dates and times covered in the compliance period.

(2) Sulfur content of coke breeze for each shipment and the documentation and methodology for how the content was obtained.

(3) 3-hr rolling average of coke breeze usage.

(4) 3-hr rolling average sulfur input to the hardening furnace.

(c) To document the compliance status with Conditions D.3.1(c) and D.3.10, the Permittee shall maintain monthly records in accordance with (1) through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(c).

(1) Calendar dates covered in the compliance determination period.

(2) Natural gas usage for the induction hardening furnace.

(3) Monthly usage (metric tonnes) of iron ore concentrate, limestone, dolomite, coke breeze, and soda ash.

(4) Monthly records of CO2e emissions.

(~~b~~**d**) To document the compliance status with Condition**s D.3.1(d) and** D.3.11, the Permittee shall maintain a log that contains the date and result of each TDS test, the water circulation rate at the time of the test, and the resulting mass emission rates. The Permittee shall include in its log when the testing in not conducted and the reason for the lack of a log (e.g. the cooling tower was not operational for the prescribed period.)

(~~c~~**e**) To document the compliance status with Condition D.3.1~~2~~**4**, the Permittee shall maintain a daily record of visible emission notations of the exhausts from the hardening furnace and baghouse CE013, CE016, CE017. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(~~d~~**f**) To document the compliance status with Condition D.3.1~~3~~**5**, the Permittee shall maintain a daily record of the pressure drop across baghouses CE013, CE016, and CE017. The Permittee shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).

(~~e~~**g**) To document the compliance status with Condition D.3.1~~5~~**7**, the Permittee shall maintain a daily record of the minimum air flow rate through the reactor of gas suspension absorber CE015. The Permittee shall include in its daily record when a minimum air flow rate reading is not taken and the reason for the lack of a minimum air flow rate reading (e.g. the process did not operate that day).

(~~f~~**h**) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

Comment 6:

The Sulfur Dioxide (SO2) BACT analysis (Appendix B, page 91) explains that the induration furnace is designed to only fire natural gas in its burners. It also mentions adding coke breeze to the iron ore as it is being processed and further states that "coke breeze will be limited to 1.5%". However, the amount of coke breeze used within the process does not appear to be limited as part of BACT for SO2 from the furnace. Given that excessive coke breeze in the process may influence the source's ability to comply with the SO2 emission limit, please evaluate and add, as necessary, an enforceable condition that limits the amount of coke breeze added to the iron ore.

IDEM, OAQ Response 6:

SO2 emissions from the hardening furnace as a function of the coke breeze used is directly related to the sulfur content of the coke breeze. Therefore, a limitation of 1.5% coke breeze will not be sufficient to ensure compliance with the SO2 BACT limits for the induration furnace. Instead a requirement to limit the amount of sulfur introduced into the induration furnace and the calculation methodology, a requirement to test the coke breeze sulfur content, and associated record keeping and reporting requirements have been added to the permit. This revision does not change the potential or allowable SO2 emissions and is based on information contained in the calculations and BACT Analysis as they were Public Noticed.

D.3.12 Sulfur Content

In order to demonstrate compliance with Condition D.3.1(a), the input of sulfur, as a component of coke breeze, shall not exceed 101 pounds on a three (3) hour average.

(a) The Permittee shall calculate the three (3) hour average sulfur input from the hardening furnace using the following equation:

$$S(lb/3hr-ave) = [(\%SCCB) \times CB(ton/3hr-ave) \times \left(\frac{2000lb}{1ton}\right)] \div 3$$

Where:

S (lbs/3hr-ave)	**=**	**3-hr rolling average of Sulfur input to the hardening furnace as a component of coke breeze**
% SCCB	**=**	**74% Sulfur Content of Coke Breeze**
CB (ton/3 hr-ave)	**=**	**3-hr rolling average of coke breeze usage from company records**

(b) The sulfur content of the coke breeze (% SCCB) shall not exceed 0.74%.

D.3.13 Sulfur Content of Coke Breeze

The sulfur content of the coke breeze shall be determined using one of the following options:

(a) Providing vendor analysis of coke breeze delivered. The certification shall include:

(1) The name of the coke breeze supplier; and

(2) The location of the coke breeze when the sample was collected for analysis to determine the properties of the coke breeze, specifically including whether the coke breeze was sampled as delivered to the affected facility or whether the coke breeze was collected from coke breeze in storage at a coke breeze preparation plant, at a coke breeze supplier's facility, or at another location. The certification shall include the name of the coke breeze storage facility, or coke breeze preparation plant (where the sample was collected); and

(3) The results of the analysis of the coke breeze from which the shipment came (or of the shipment itself); and

(4) The methods used to determine the sulfur concentration of the coke breeze; or

(b) Sampling and analyzing the coke breeze by using the following procedures:

(1) Minimum coke breeze Sampling Requirements and Analysis Methods:

(A) The coke breeze sample acquisition point shall be at a location where representative samples of the total coke breeze are delivered to Magnetation, LLC;

(B) Coke breeze shall be sampled at least one (1) time per delivery;

(C) Preparation of the coke breeze sample and sulfur concentration analysis shall be conducted utilizing methods as approved by the commissioner.

***

D.3.1~~6~~**8** Record Keeping Requirements

(a) To document the compliance status with Conditions D.3.1(b), ~~D.3.1(c), D.3.1(d),~~ **and** D.3.9, ~~and D.3.10,~~ the Permittee shall ~~maintain records in accordance with (1) through (5) below. Records maintained for (1) through (5) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1.~~ **comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(b).**

~~(1) Calendar dates covered in the compliance determination period.~~

~~(2) Fluoride content of the iron concentrate.~~

~~(3) Natural gas usage for the induction hardening furnace.~~

~~(4) Monthly records of CO2e emissions.~~

~~(5) Total dissolved solids (TDS) concentration of the cooling water utilized in the cooling tower.~~

(b) To document the compliance status with Conditions D.3.1(a), D.3.12, and D.3.13, the Permitee shall maintain monthly records in accordance with (10 through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(a).

(1) Calendar dates and times covered in the compliance period.

(2) Sulfur content of coke breeze for each shipment and the documentation and methodology for how the content was obtained.

(3) 3-hr rolling average of coke breeze usage.

(4) 3-hr rolling average sulfur input to the hardening furnace.

(c) To document the compliance status with Conditions D.3.1(c) and D.3.10, the Permittee shall maintain monthly records in accordance with (1) through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(c).

(1) Calendar dates covered in the compliance determination period.

(2) Natural gas usage for the induction hardening furnace.

(3) Monthly usage (metric tonnes) of iron ore concentrate, limestone, dolomite, coke breeze, and soda ash.

(4) Monthly records of CO2e emissions.

(~~b~~**d**) To document the compliance status with Condition**s D.3.1(d) and** D.3.11, the Permittee shall maintain a log that contains the date and result of each TDS test, the water circulation rate at the time of the test, and the resulting mass emission rates. The Permittee shall include in its log when the testing in not conducted and the reason for the lack of a log (e.g. the cooling tower was not operational for the prescribed period.)

(~~c~~**e**) To document the compliance status with Condition D.3.1~~2~~**4**, the Permittee shall maintain a daily record of visible emission notations of the exhausts from the hardening furnace and baghouse CE013, CE016, CE017. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(~~d~~**f**) To document the compliance status with Condition D.3.1~~3~~**5**, the Permittee shall maintain a daily record of the pressure drop across baghouses CE013, CE016, and CE017. The Permittee shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).

(~~e~~**g**) To document the compliance status with Condition D.3.1~~5~~**7**, the Permittee shall maintain a daily record of the minimum air flow rate through the reactor of gas suspension absorber CE015. The Permittee shall include in its daily record when a minimum air flow rate reading is not taken and the reason for the lack of a minimum air flow rate reading (e.g. the process did not operate that day).

(~~f~~**h**) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.3.1~~7~~**9** Reporting Requirements

(a) A quarterly report of the **weighted average** fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.3.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) A quarterly report of the 3- hr rolling average sulfur input to the indurating furnace and a quarterly summary of the information to document the compliance status with D.3.1(a) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(~~b~~**c**) A quarterly report of CO2e emissions to document the compliance status with Condition D.3.1(c) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(~~c~~**d**) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Usage Report
(Submit Report Quarterly)

Source Name: **Magnetation LLC**
Source Address: **64 East 100 North, Reynolds, Indiana 47980**
Part 70 Permit No.: **T181-32081-00054**
Facility: **Induration Machine**
Parameter: **Input of Sulfur as a component of Coke Breeze**
Limit: **Shall not exceed 101 pounds on a three (3) hour average.**

Month: _____ **Day:** _____ **Year:** _____

Hour	3-hr Average	Hour	3-hr Average
1		13	
2		14	
3		15	
4		16	
5		17	
6		18	
7		19	
8		20	

Hour	3-hr Average	Hour	3-hr Average
9		21	
10		22	
11		23	
12		24	

☐ **No deviation occurred in this month.**

☐ **Deviation/s occurred in this month.**
Deviation has been reported on_____

Submitted by: _____
Title / Position:_____
Signature:_____
Date: _____
Phone: _____

Comment 7:

In the air quality analysis (Appendix D, page 4), the maximum modeled 24-hour S02 impact is listed as 8.38 J.lg/m3. The Significant Impact Level (SIL) tor 24-hour S02 is listed as 5 J.lg/m3 Since the maximum modeled 24-hour S02 impact exceeds the SIL, further cumulative analysis is required to determine compliance with the 24-hour S02 standard as required in 326 lAC 2-2-5 and 2-2-6.

IDEM, OAQ Response 7:

A refined analysis was conducted on 24-hr SO2 standard prior to public notice. However, this was not reflected in the Air Quality Analysis (Appendix D). The following portions of the Air Quality Analysis have been updated in the Addendum to the Air Quality Analysis.

***

Analysis Summary

Based on the potential emissions after controls, a PSD air quality analysis was triggered for SO_2, PM_{10}, $PM_{2.5}$, NO_2, and fluorides. The significant impact analysis for SO_2, determined that modeling concentrations did not exceed the significant impact levels for the 3-hour~~, 24-hour,~~ and annual standards. A refined analysis was required for all the other standards for PM_{10}, $PM_{2.5}$, NO_2, **24-hour SO_2** and 1-hour SO_2. The refined modeling showed NAAQS violations for 1-hour ~~SO_2~~**NO_2** but Magnetation was below significance whenever the violations occurred. Pre-construction monitoring requirements were not necessary since existing monitoring is available and Magnetation was below the monitoring significance levels. An additional impact analysis was conducted and showed no significant impact. A Hazardous Air Pollutant (HAP) analysis was performed since one HAP was above the 10 ton per year threshold.

***

Section C - Significant Impact Level/Area (SIA) and Background Air Quality Levels

A significant impact analysis was conducted to determine if the source would exceed the PSD significant impact levels (concentrations). If the source's concentrations exceed these levels, further air quality analysis is required. Refined modeling for $PM_{2.5}$, PM_{10}, **24-hour SO_2,** 1-hour SO_2, and NO_2, was

required because the results did exceed significant impact levels. Keramida modeled the worst case operating scenario to predict maximum concentrations. Significant impact levels are defined by the following time periods in Table 2 below with all maximum-modeled concentrations from the worst case operating scenario. A Tier II 80% conversion of NO to NO_2 was assumed based on the March 01, 2011, Tyler Fox memorandum.

TABLE 2
Significant Impact Analysis[4]

POLLUTANT	TIME AVERAGING PERIOD	MAXIMUM MODELED IMPACTS (µg/m^3)	SIGNIFICANT IMPACT LEVEL (µg/m^3)	REFINED AQ ANALYSIS REQUIRED
NO_2	Annual[1]	1.58[5]	1	Yes
NO_2	1 hour[2]	33.8[5]	7.55	Yes
PM_{10}	Annual[1]	3.13	1	Yes
PM_{10}	24 hour[1]	14.51	5	Yes
$PM_{2.5}$	Annual[3]	1.24	.3	Yes
$PM_{2.5}$	24 hour[3]	5.89	1.2	Yes
SO_2	3 hour[1]	15.47	25	No
SO_2	24 hour[1]	8.38	5	~~No~~**Yes**
SO_2	Annual[1]	.4	1	No
SO_2	1 hour[2]	13.55	7.80	Yes
Fluorides	24 hour[1]	1.79	N/A[6]	No

[1] The first highest values per the EPA NSR manual dated October 1990.
[2] In accordance with recent U.S. EPA guidance, the highest of the five year modeled averages predicted each year at each receptor. See the March 01, 2011, memorandum.
[3] In accordance with recent U.S. EPA guidance, the highest modeled average over the five years at each receptor. See the March 23, 2010, memorandum.
[4] Impacts are from Magnetation only.
[5] NO_2 values were multiplied by .8.
[6] There is no significant impact level for fluorides. This value exceeds the monitoring threshold of .25 µg/m^3 as stated in 326 IAC 2-2-4. There is no way to monitor for fluorides and no standard to monitor against.

***

TABLE 5[3]
NAAQS Analysis

Pollutant	Year	Time-Averaging Period	Maximum Concentration ug/m3	Background Concentration ug/m3	Total ug/m3	NAAQS Limit ug/m3	NAAQS Violation
NO_2	2010	Annual[1]	1.58	20.9	22.48	100	No
NO_2	2006-2010	1 hour[4]	132.74	69.6	202.34	188.68	Yes
PM_{10}	2010	Annual[1]	3.13	20.9	28.43	50	No

Pollutant	Year	Time-Averaging Period	Maximum Concentration ug/m3	Background Concentration ug/m3	Total ug/m3	NAAQS Limit ug/m3	NAAQS Violation
PM_{10}	2006-2010	24 hour[3]	13.02	61.6	74.62	150	No
$PM_{2.5}$	2006-2010	Annual	1.24	11	12.24	15	No
$PM_{2.5}$	2006-2010	24 hour	5.89	24	29.89	35	No
SO_2	2006-2010	1 hour[5]	81.06	47.9	128.96	195.0	No
SO_2	n/a	3 Hour[2]	Not Required	36.8	n/a	1300	No
SO_2	n/a	24 hour[2]	~~Not Required~~**5.86**	17.0	~~n/a~~**22.86**	365	No
SO_2	n/a	Annual[1]	Not Required	4.9	n/a	80	No

[1] First highest values per EPA NSR manual October 1990.
[2] High 2nd high values per EPA NSR manual October 1990.
[3] High 6th High
[4] Any differences between the maximum concentration numbers in Tables 5 and 6 are due to different sources used for the NAAQS and the increment inventories. Table 3 maximum concentrations are from Magnetation only.
[5] Based on the new 1-hour design values.

***

Source Impact

Since Magnetation impacts for $PM_{2.5}$, PM_{10}, **SO_2,** and NO_2 modeled greater than or equal to significant impact levels, a PSD increment analysis for Magnetation was required. Because $PM_{2.5}$ increment values were established in 2010 and the PM_{10} surrogacy policy was removed, the baseline date for the increment is within the last few years. The 1-hour SO_2 and NO_2 have no increment standards.

Results of the increment modeling are summarized in Table 6 below.

TABLE 6[1]
Increment Analysis

Pollutant	Year	Time-Averaging Period	Maximum Concentration µg/m3	PSD Increment µg/m3	Percent Impact on the PSD Increment	Increment Violation
$PM_{2.5}$	2007	24-hour[2]	5.86	9	65.1%	No
$PM_{2.5}$	2010	Annual[3]	1.33	4	33.3%	No
PM_{10}	2009	24-hour	13.79	30	46%	No
PM_{10}	2010	Annual	3.13	17	18.4%	No
NO_2	2010	Annual	1.58	25	6.3%	No
SO_2	**2009**	**24-hour[2]**	**5.86**	**91**	**6.4%**	**No**

[1]Any differences between the maximum concentration numbers in Tables 5 and 6 are due to different sources used for the NAAQS and the increment inventories, and different averaging techniques to obtain maximum concentrations. Tables 3 and 6 maximum concentrations are from Magnetation only.
[2]In accordance with the Federal Register dated October 20, 2010; the high 2nd high is used.
[3]In accordance with the Federal Register dated October 20, 2010; the highest annual average is used from any of the years modeled.

***

Comment 8:

As part of this source's part 70 operating permit requirements, the "Federal Rule Applicability Determination" section of the technical support document (pages 10-19) should include an explanation of why this source is not subject to the requirements of the National Emission Standards for Hazardous Air Pollutants for taconite iron ore processing (40 CFR Part 63, Subpart RRRRR).

IDEM, OAQ Response 8:

The requirements of National Emission Standards for Hazardous Air Pollutants: Taconite Iron Ore Processing, 40 CFR 63, Subpart RRRRR, are not included in the permit for this source because Magnetation LLC does not process taconite iron ore. The iron concentrate which will serve as the primary raw material for the Magnetation LLC pellet production facility is recovered from waste materials left over from historic processing of this high grade natural iron ore on the Mesabi Iron Range, mined primarily prior to and during World War II.

In numerous places along the length of the Mesabi Iron Range, notably along fault zones, silica was leached out from the iron formation, thereby enriching the iron content to over 55 percent and hematite (Fe_2O_3) was a more common iron constituent in the material due to the natural oxidation. These pockets became the high-grade natural ore mines; there were more than 500 individual mines prior to merging into larger mines as the ore between adjacent properties was removed. Underlying these high-grade natural ore deposits is taconite, which is characterized by a lower iron concentration (<30%) in the hard rock chert and unoxidized portions of the iron formation, thus the relative prevalence of magnetite (Fe_3O_4).

The mineral processing of this high-grade natural iron ore was mechanical, with three principal technologies being used. Direct Shipping ore was simply dug, sometimes crushed and then shipped. Wash ore was a process of mixing the natural ore with sand or clay, then literally washing and screening the material to remove the coarser, high grade iron particles. The third technology separated iron oxides by their specific gravities. Hematite is found in the waste streams of the natural ore processed by these technologies.

The process of recovering valuable iron (hematite) concentrate from waste materials is often referred to as “SCRAM” mining. Because hematite is only paramagnetic (and not fully magnetic like magnetite), a special process – the Magnetation Process TM – is used to attract and separate the weakly magnetic hematite minerals. The core of the process is Magnetation’s patented Rev3™ Separator.

Once all the high-grade natural ore was mined out in the late 1960’s, the steel industry developed the technology to economically get the magnetite out of taconite ore.

The following link provides additional information on the iron mining progression over the years. It also discusses the differences between taconite and the earlier high-grade natural ore.

http://geography.about.com/library/misc/ucmesabi.htm

Comments from Magnetation LLC

On March 15, 2013, Mr. Michael G. Twite, on behalf of Magnetation LLC, submitted comments on the proposed Part 70 permit. The summary of the comments is as follows:

Comment 1:

There are several typographical errors throughout the permit, Technical Support Document (TSD), BACT analysis, Air Quality Analysis, and MACT Analysis.

IDEM, OAQ Response 1:

The typographical errors in the permit, BACT analysis, Air Quality Analysis, and MACT Analysis have been corrected in the final permit, addendum to the BACT analysis, addendum Air Quality Analysis, and the addendum to the MACT Analysis. No change will be made to the original TSD. The OAQ prefers that the TSD reflect the permit that was on public notice.

Comment 2:

Magnetation LLC is an iron concentrate pelletizing plant not an iron ore pelletizing plant. Please change this description throughout all documents.

IDEM, OAQ Response 2:

IDEM, OAQ has changed the description of what the Permittee operates throughout all documents as shown below:

stationary iron **ore concentrate** pelletizing plant

Comment 3:

The PM/PM10/PM2.5 combustion emissions from the ground limestone / dolomite additive system air heater (EU010) are limited as part of the material handling operations PM/PM10/PM2.5 limits. Please remove the separate combustion BACT limits and retain the material handling limits which account for the total PM/PM10/PM2.5 emissions from the operation.

IDEM, OAQ Response 3:

The following changes have been made to the permit, TSD, and BACT Analysis (Appendix B).

Permit Changes:

D.2.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

***

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for the Additive Grinding and Mixing operations shall be as follows:

Emission Unit Description (ID)	Control Device	Pollutant	Emission Limitations
Ground Limestone/ Dolomite Additive	No Control	~~PM~~	~~0.0072 lb/MMBtu~~
		~~PM_{10}*~~	~~0.0072 lb/MMBtu~~

Emission Unit Description (ID)	Control Device	Pollutant	Emission Limitations
System Air Heater (EU010)		~~$PM_{2.5}$*~~	~~0.0072 lb/MMBtu~~
		SO_2	0.00048 lb/MMBtu
	Low NO_x Burners	NO_x	0.012 lb/MMBtu
	No Control	F	9.40×10^{-6} lb/MMBtu
		GHG (as CO_2e)	9,737 tons per 12-month period

~~*PM_{10} and $PM_{2.5}$ include both filterable and condensible.~~***Note: PM, PM10, and PM2.5 combustion emissions for EU010 are accounted for in the material handling limits under Condition D.2.1(a).**

TSD Changes:

***

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for the Additive Grinding and Mixing operations shall be as follows:

Emission Unit Description (ID)	Control Device	Pollutant	Emission Limitations
Ground Limestone/ Dolomite Additive System Air Heater (EU010)	No Control	~~PM~~	~~0.0072 lb/MMBtu~~
		~~PM_{10}*~~	~~0.0072 lb/MMBtu~~
		~~$PM_{2.5}$*~~	~~0.0072 lb/MMBtu~~
		SO_2	0.00048 lb/MMBtu
	Low NO_x Burners	NO_x	0.012 lb/MMBtu
	No Control	F	9.40×10^{-6} lb/MMBtu
		GHG (as CO_2e)	9,737 tons per 12-month period

~~*PM_{10} and $PM_{2.5}$ include both filterable and condensible.~~ ***Note: PM, PM10, and PM2.5 combustion emissions for EU010 are accounted for in the material handling limits under (a).**

***

BACT Analysis (Appendix B) Changes:

***

PM BACT Determinations - Heaters Firing Natural Gas					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	PM: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation*		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	PM: **Baghouse**, use of natural gas, good combustion practices~~, 0.0072 lb/MMBtu~~	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	PM: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD

PM BACT Determinations - Heaters Firing Natural Gas					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Existing PM BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	TPM: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
City of Victorville: Victorville, CA	CA-1191/ SE 07-02 (3/11/2010)	Auxiliary Heater (40 MMBtu/hr)	TPM: Use of pipeline quality natural gas, 1000 hours/year, 0.20 gr/100 dscf	NI	BACT-PSD
Pryor Plant Chemical : Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	TPM: 0.15 lb/hr	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	ASU Regen Heater SRC13 (0.1 MMBtu/hr)	PM: Good combustion practices, 20% opacity	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	Gasifier Heaters SRC14 & SRC15 (25 MMBtu/hr)	PM: Good combustion practices, 20% opacity	NI	BACT-PSD
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	TPM: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	TPM: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD

***Note: PM combustion emissions for EU010 are accounted for in the material handling limits.**

***

PM_{10} BACT Determinations - Heaters Firing Natural Gas					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	PM_{10}: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation*****		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	PM_{10}: **Baghouse**, use of natural gas, good combustion practices~~, 0.0072 lb/MMBtu~~	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	PM_{10}: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	TPM_{10}: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
Pryor Plant Chemical : Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	TPM_{10}: 0.15 lb/hr	NI	BACT-PSD

PM_{10} BACT Determinations - Heaters Firing Natural Gas					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	ASU Regen Heater SRC13 (0.1 MMBtu/hr)	Filterable PM_{10}: Good combustion practices	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	Gasifier Heaters SRC14 & SRC15 (25 MMBtu/hr)	Filterable PM_{10}: Good combustion practices	NI	BACT-PSD
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	Filterable PM_{10}: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	Filterable PM_{10}: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD

***Note: PM10 combustion emissions for EU010 are accounted for in the material handling limits.**

***

$PM_{2.5}$ BACT Determinations - Heaters Firing Natural Gas					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation*****		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	$PM_{2.5}$: **Baghouse,** use of natural gas, good combustion practices~~, 0.0072 lb/MMBtu~~	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	$TPM_{2.5}$: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
City of Victorville: Victorville, CA	CA-1191/ SE 07-02 (3/11/2010)	Auxiliary Heater (40 MMBtu/hr)	$TPM_{2.5}$: 1000 hours/year, 0.20 gr/100 dscf	NI	BACT-PSD

***Note: PM2.5 combustion emissions for EU010 are accounted for in the material handling limits.**

<u>Comment 4:</u>

Please change the PM/PM10/PM2.5 limits in the BACT analysis (Appendix B) and permit for EU003a and EU002a to match the BACT limits in the calculations.

IDEM, OAQ Response 4:

IDEM, OAQ agrees the PM/PM10/PM2.5 limits for EU003a in the permit and BACT Analysis should be changed from 5.53E-04 to match the lower value of 5.33E-04 found in the calculations.

IDEM, OAQ agrees that the PM10 and PM2.5 limits for EU002a should be changed in BACT Analysis to match the limit used in the calculations and the permit. The correct PM limit was placed in the BACT Analysis for EU002a, however, a typographical error was made and the incorrect value was placed in the PM10 and PM2.5 BACT Analysis.

The following changes have been made to the permit, TSD, and BACT Analysis (Appendix B).

Permit Changes:

D.1.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

(a) ***

(b) ***

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the following Truck Unloading operations shall be a fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM	1.07 E-03	2.20 E-03
		PM_{10}*	1.07 E-03	2.20 E-03
		$PM_{2.5}$*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
		PM_{10}*	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
		$PM_{2.5}$*	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM	7.45 E-04	3.26 E-03
		PM_{10}*	3.52 E-04	1.54 E-03
		$PM_{2.5}$*	1.02 E-04	4.45 E-04

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(d) ***

TSD Changes:

***

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the following Truck Unloading operations shall be a fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM	1.07 E-03	2.20 E-03
		PM_{10}*	1.07 E-03	2.20 E-03
		$PM_{2.5}$*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
		PM_{10}*	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
		$PM_{2.5}$*	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM	7.45 E-04	3.26 E-03
		PM_{10}*	3.52 E-04	1.54 E-03
		$PM_{2.5}$*	1.02 E-04	4.45 E-04

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

***

BACT Analysis (Appendix B) Changes:

***

PM BACT - Material Handling Operations					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Proposed BACT for Magnetation		Material Handling Operations: EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	PM: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	PM: Fugitive Dust Control Plan 5% opacity (6-min avg) 1.07 E-03 lb/hr and 2.20 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	PM: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.~~5~~**3**3 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD

***

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM	7.45 E-04	3.26 E-03

***

PM_{10} BACT Determinations - Material Handling Operations					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Proposed BACT for Magnetation		Material Handling Operations: EU001, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	PM_{10}: Fugitive Dust Control Plan 5% opacity (6-min avg) ~~5.33E-04~~ **1.07E-03** lb/hr and ~~1.22~~ **2.20**E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	PM_{10}: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.~~53~~3 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD

***

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM_{10}*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM_{10}*	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM_{10}*	3.52 E-04	1.54 E-03

***

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Proposed BACT for Magnetation		Material Handling Operations: EU001, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	$PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	$PM_{2.5}$: Fugitive Dust Control Plan 5% opacity (6-min avg) ~~5.53E-04~~**1.07 E-03** lb/hr and ~~1.22~~**2.20** E-03 tpy	NI	BACT-PSD

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: ~~County~~**City**, State	RBLC ID/ Permit # (Issuance Date)	Process	Pollutant: Control, Emission Limits	Control Efficiency	Basis
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	$PM_{2.5}$: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.~~5~~**3**3 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD

***

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	$PM_{2.5}$*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	$PM_{2.5}$*	~~5.53 E-04~~ **5.33 E-04**	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	$PM_{2.5}$*	1.02 E-04	4.45 E-04

***

Comment 5:

Please revise Condition D.1.1(d)(1). The current language is equivalent to an emission factor. Therefore, it cannot have a time dependency attached to it. Remove the 12 consecutive month period, as this implies that the fluoride concentration cannot exceed 50 mg/kg over 12 months. Please make this a 12-month rolling average period.

IDEM, OAQ Response 5:

IDEM, OAQ disagrees that the PSD BACT limit in D.1.1(d)(1) cannot have a time dependency attached to it. To clarify the intention of the limit, the term "weighted average" has been added to the limit in Condition D.1.1(d)(1), and Condition D.1.6 has been modified to clarify how the monthly weighted average Fluoride concentration shall be determined, and the record keeping in Condition D.1.12 has been modified to reflect this. Additionally, the PSD BACT Fluoride limits in Conditions D.2.1(d)(1), D.3.1(b)(1), D.4.1(b)(1), D.5.1(b)(1), and D.6.1(d)(1) have been revised.

D.1.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

* * *

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Raw Material Handling operations shall be as follows:

(1) The **weighted average** Fluoride Concentration in the Iron Ore Concentrate shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and the following:

* * *

D.1.6 Total Fluorides Emissions and Fluoride Content

(l) In order to ensure compliance with Condition D.1.1(d), the Permittee shall utilize one of the following options:

(a) Providing vendor analysis of iron **ore** concentrate delivered. The certification shall include:

(1) The name of the iron **ore** concentrate supplier; and

(2) The location of the iron **ore** concentrate when the sample was collected for analysis to determine the properties of the iron **ore** concentrate, specifically including whether the iron **ore** concentrate was sampled as delivered to the affected facility or whether the iron **ore** concentrate was collected from iron **ore** concentrate in storage at an iron **ore** concentrate preparation plant, at a iron **ore** concentrate supplier's facility, or at another location. The certification shall include the name of the iron **ore** concentrate storage facility, or iron **ore** concentrate preparation plant (where the sample was collected); and

(3) The results of the analysis of the iron **ore** concentrate from which the shipment came (or of the shipment itself).

(4) The methods used to determine the fluoride concentration of the iron **ore** concentrate; or

(b) Sampling and analyzing the iron **ore** concentrate by using the following procedures:

(1) Minimum Iron **Ore** Concentrate Sampling Requirements and Analysis Methods:

(A) The iron **ore** concentrate sample acquisition point shall be at a location where representative samples of the total iron **ore** concentrate are delivered to Magnetation, LLC;

(B) Iron **ore** concentrate shall be sampled at least one (1) time per delivery;

(C) Preparation of the iron **ore** concentrate sample and fluoride concentration analysis shall be conducted utilizing methods as approved by the commissioner.

For samples for which the fluoride concentration is less than the detection limit, the Permittee shall use a fluoride concentration level equal to one-half the detection limit.

(II) Compliance with the Fluoride Concentration limit in Condition D.1.1(d) shall be determined using a monthly weighted average. The monthly weighted average concentration shall be determined by the following equation:

$$WA_{Month} = \left[\sum_i \left(A_i \times S_i\right)\right] \div \left[\sum_i S_i\right]$$

Where:

WA_{MONTH} = the Fluoride Concentrate weighted average in mg/kg for the month

A_i = the Fluoride concentration of the iron ore concentrate shipment (i) as determined under Condition D.1.6(l).
S_i = the weight of the iron ore concentrate shipment (i).

***

D.1.12 Record Keeping Requirements

(a) To document the compliance status with Condition D.1.1(d) and D.1.6, the Permittee shall maintain **monthly** records in accordance with (1) through (~~2~~**4**) below. Records maintained for (1) through (~~2~~**4**) shall be ~~taken monthly and shall be~~ complete and sufficient to establish compliance with the emission limits established in Condition D.1.1**(d)**.

(1) Calendar dates covered in the compliance determination period.

(2) Fluoride ~~content~~**concentration** of the iron **ore** concentrate **from each shipment**.

(3) The weight of each shipment of iron ore concentrate.

(4) The weighted average Fluoride concentration in the iron ore concentrate for the compliance period.

***

D.1.13 Reporting Requirements

(a) A quarterly report of the **weighted average** fluoride concentration of the iron ore concentrate delivered to EU001 and a quarterly summary of the information to document the compliance status with D.1.1(d) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

***

D.2.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

***

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Additive Grinding and Mixing operations shall be as follows:

(1) The **weighted average** Fluoride Concentration in the blended filter cake handled by the mixing area material handling system (EU011) and hearth layer bin system (EU012) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Mixing Area Material Handling System (EU011)	Baghouse CE011 (inside building)	F	1.71 E-05
Hearth Layer Bin System (EU012)	Baghouse CE012 (SV012)	F	7.55 E-06

***

D.2.14 Record Keeping Requirements

(a) To document the compliance status with Conditions D.2.1(c)~~, D.2.1(d), D.2.7,~~ and D.2.8 the Permittee shall maintain records in accordance with (1) through (~~4~~**3**) below. Records maintained for (1) through (~~4~~**3**) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.2.1**(c)**.

(1) Calendar dates covered in the compliance determination period.

~~(2) Fluoride content of the iron ore concentrate.~~

(~~3~~**2**) Natural gas usage for the Ground Limestone/ Dolomite Additive System Air Heater (EU010).

(~~4~~**3**) Monthly records of the CO_2e emissions.

(b) To document the compliance status with Conditions D.2.1(d) and D.2.7, the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.2.1(d).

(~~b~~**c**) To document the compliance status with Condition D.2.9, the Permittee shall maintain a daily record of visible emission notations of the exhausts from baghouses CE009, CE010, and CE012. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(~~c~~**d**) To document the compliance status with Condition D.2.10, the Permittee shall maintain a daily record of the pressure drop across baghouses CE009, CE010, and CE012. The Permittee shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).

(~~d~~**e**) To document the compliance status with Condition D.2.11, the Permittee shall maintain a record of the semi-annual inspections of bin vent CE008 and baghouses CE023 and CE011.

(~~e~~**f**) To document compliance status with Condition D.2.1(a), the Permittee shall maintain records of the manufacturer's specifications for bin vent CE008 and baghouses CE023 and CE011.

(~~f~~**g**) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.2.15 Reporting Requirements

(a) A quarterly report of CO_2e emissions and a quarterly summary of the information to document the compliance status with Condition D.2.1(c) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) A quarterly report of the **weighted average** fluoride concentration of the iron ore concentrate, utilized at EU011 and EU012, and a quarterly summary of the information to

document the compliance status with D.2.1(d) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(c) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official," as defined by 326 IAC 2-7-1(34).

D.3.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

***

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Furnace Discharge System (EU015) shall be as follows:

(1) The **weighted average** Fluoride Concentration in the oxide pellets handled by the furnace discharge system (EU015) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Furnace Discharge System (EU015)	Baghouse CE017 (SV014)	F	3.65 E-05

***

D.3.1~~6~~**8** Record Keeping Requirements

(a) To document the compliance status with Conditions D.3.1(b), ~~D.3.1(c), D.3.1(d),~~ **and** D.3.9, ~~and D.3.10,~~ the Permittee shall ~~maintain records in accordance with (1) through (5) below. Records maintained for (1) through (5) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1.~~ **comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(b).**

~~(1) Calendar dates covered in the compliance determination period.~~

~~(2) Fluoride content of the iron concentrate.~~

~~(3) Natural gas usage for the induction hardening furnace.~~

~~(4) Monthly records of CO2e emissions.~~

~~(5) Total dissolved solids (TDS) concentration of the cooling water utilized in the cooling tower.~~

(b) To document the compliance status with Conditions D.3.1(a), D.3.12, and D.3.13, the Permitee shall maintain monthly records in accordance with (10 through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(a).

(1) Calendar dates and times covered in the compliance period.

(2) Sulfur content of coke breeze for each shipment and the documentation and methodology for how the content was obtained.

(3) 3-hr rolling average of coke breeze usage.

(4) 3-hr rolling average sulfur input to the hardening furnace.

(c) To document the compliance status with Conditions D.3.1(c) and D.3.10, the Permittee shall maintain monthly records in accordance with (1) through (4) below. Records maintained for (1) through (4) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.3.1(c).

(1) Calendar dates covered in the compliance determination period.

(2) Natural gas usage for the induction hardening furnace.

(3) Monthly usage (metric tonnes) of iron ore concentrate, limestone, dolomite, coke breeze, and soda ash.

(4) Monthly records of CO2e emissions.

(~~b~~**d**) To document the compliance status with Condition**s D.3.1(d) and** D.3.11, the Permittee shall maintain a log that contains the date and result of each TDS test, the water circulation rate at the time of the test, and the resulting mass emission rates. The Permittee shall include in its log when the testing in not conducted and the reason for the lack of a log (e.g. the cooling tower was not operational for the prescribed period.)

(~~c~~**e**) To document the compliance status with Condition D.3.1~~2~~**4**, the Permittee shall maintain a daily record of visible emission notations of the exhausts from the hardening furnace and baghouse CE013, CE016, CE017. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(~~d~~**f**) To document the compliance status with Condition D.3.1~~3~~**5**, the Permittee shall maintain a daily record of the pressure drop across baghouses CE013, CE016, and CE017. The Permittee shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).

(~~e~~**g**) To document the compliance status with Condition D.3.1~~5~~**7**, the Permittee shall maintain a daily record of the minimum air flow rate through the reactor of gas suspension absorber CE015. The Permittee shall include in its daily record when a minimum air flow rate reading is not taken and the reason for the lack of a minimum air flow rate reading (e.g. the process did not operate that day).

(~~f~~**h**) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.3.1~~7~~**9** Reporting Requirements

(a) A quarterly report of the **weighted average** fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.3.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) A quarterly report of CO2e emissions to document the compliance status with Condition D.3.1(c) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(c) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a "responsible official," as defined by 326 IAC 2-7-1(34).

D.4.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

***

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Separation and Loadout operations shall be as follows:

(1) The **weighted average** Fluoride Concentration in the finished oxide pellets handled by the hearth layer separation system (EU016) and the oxide pellet storage and unloading system (EU019) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Hearth Layer Separation System (EU016)	Baghouse CE018 (inside building)	F	3.94 E-05
Oxide Pellet Storage and Unloading System (EU019)	Baghouse CE019 (SV018)	F	3.15 E-05

***

D.4.10 Record Keeping Requirements

(a) To document the compliance status with Condition D.4.1(b)~~,~~ **and D.4.5** the Permittee shall ~~maintain records in accordance with (1) through (2) below. Records maintained for (1) through (2) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.4.1.~~ **the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.4.1(b).**

~~(1) Calendar dates covered in the compliance determination period; and~~

~~(2) Fluoride content of the iron concentrate.~~

(b) To document the compliance status with Condition D.4.6, the Permittee shall maintain a daily record of visible emission notations of the exhausts from baghouse CE019. The Permittee shall include in its daily record when a visible emission notation is not taken and the reason for the lack of visible emission notation (e.g. the process did not operate that day).

(c) To document the compliance status with Condition D.4.7, the Permittee shall maintain a daily record of the pressure drop across baghouses CE018 and CE019. The Permittee

shall include in its daily record when a pressure drop reading is not taken and the reason for the lack of a pressure drop reading (e.g. the process did not operate that day).

(d) To document the compliance status with Condition D.4.8, the Permittee shall maintain a record of the semi-annual inspections of baghouse CE018.

(e) To document compliance status with Condition D.4.1(a), the Permittee shall maintain records of the manufacturer's specifications for baghouse CE018.

(f) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.4.11 Reporting Requirements

(a) A quarterly report of the **weighted average** fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.4.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

D.5.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

***

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Windbox Exhaust Air Pollution Control Equipment shall be as follows:

(1) The **weighted average** Fluoride Concentration in the recycled handled by the recycled dust storage areas (EU026) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Recycled Dust Storage Area (EU026)	Baghouse CE024 (inside building)	F	7.88 E-06

***

D.5.9 Record Keeping Requirements

(a) To document the compliance status with Conditions D.5.1(b) and D.5.5, the Permittee shall ~~maintain records in accordance with (1) through (2) below. Records maintained for (1) through (2) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.5.1~~**. the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.5.1(b).**

~~(1) Calendar dates covered in the compliance determination period; and~~

~~(2) Fluoride content of the iron concentrate.~~

(b) To document the compliance status with Condition D.5.6, the Permittee shall maintain a record of the semi-annual inspections of bin vents CE020 and CE021 and baghouse CE024.

(c) To document compliance status with Condition D.5.1(a), the Permittee shall maintain records of the manufacturer's specifications for bin vents CE020 and CE021 and for baghouse CE024.

(d) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.5.10 Reporting Requirements

(a) A quarterly report of the **weighted average** fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.5.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

D.6.1 Prevention of Significant Deterioration (PSD) [326 IAC 2-2-3]

***

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the insignificant activities shall be as follows:

(1) The **weighted average** Fluoride Concentration in the material handled by the iron ore concentrate wet grinding and filter cake production and greenball production system shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly.

***

D.6.8 Record Keeping Requirements

(a) To document the compliance status with Conditions D.6.1~~, D.6.6,~~ and D.6.7, the Permittee shall maintain records in accordance with (1) through (4) below. Records maintained for (1) through (4) shall be taken monthly and shall be complete and sufficient to establish compliance with the emission limits established in Condition D.6.1**(b)**.

(1) Calendar dates covered in the compliance determination period;

(2) Hours of operation for the Emergency Generator (EU017) and Fire Pump (EU018).

(3) Natural gas usage for the Emergency Generator (EU017), Fire Pump (EU018), Space Heaters (EU021), and Coke Breeze Additive System Air Heater (EU009).

~~(4) Fluoride content of the iron ore concentrate.~~

(4) Monthly records of the CO_2e emissions.

(b) To document the compliance status with Conditions D.6.1(d) and D.6.6, the Permittee shall comply with the record keeping requirements of Condition D.1.12(a) (Weighted Average Fluoride Concentration). Records maintained in accordance with Condition D.1.12(a) shall be complete and sufficient to establish compliance with the emission limits established in Condition D.6.1(d).

(~~b~~**c**) Section C - General Record Keeping Requirements contains the Permittee's obligation with regard to the records required to be maintained by this condition.

D.6.9 Reporting Requirements

(a) A quarterly report of the **weighted average** fluoride concentration of the iron ore concentrate and a quarterly summary of the information to document the compliance status with D.6.1(d) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(b) A quarterly report of hours of operation to document the compliance status with Conditions D.6.1(a)(2) and D.6.1(a)(3) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(c) A quarterly report of CO_2e emissions to document the compliance status with Condition D.6.1(b) shall be submitted not later than thirty (30) days after the end of the quarter being reported.

(d) Section C – General Reporting contains the Permittee's obligations with regard to the reporting required by this condition. The report submitted by the Permittee does require a certification that meets the requirements of 326 IAC 2-7-6(1) by a “responsible official,” as defined by 326 IAC 2-7-1(34).

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE AND ENFORCEMENT BRANCH

Part 70 Quarterly Report

Source Name:	Magnetation LLC
Source Address:	64 East 100 North, Reynolds, Indiana 47980
Part 70 Permit No.:	T181-32081-00054
Facility:	Iron Ore Concentrate Unloading and Storage Area (EU001), Mixing Area Material Handling System (EU011), Hearth Layer Bin System (EU012), Furnace Discharge System (EU015), Hearth Layer Separation System (EU016), Oxide Pellet Storage and Unloading System (EU019), Recycled Dust Storage Area (EU026), Iron Ore Concentrate Wet Grinding and Filter Cake Production, Greenball Production System
Parameter:	**Weighted Average** Fluoride Concentration of Iron **Ore** Concentrate
Limit:	Shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined at the end of each month

FACILITY :_____ QUARTER : _____ YEAR: _____

Month	Column 1	Column 2	[Column 1 + Column 2]/ 12
	This Month	Previous 11 Months	12 Month **Average**~~Total~~

***

Comment 6:

In Condition D.2.6, please move the testing for CE023 and CE010 from Group 2 to Group 1 in order to comply with 40 CFR 60.672(a).

IDEM, OAQ Response 6:

Condition D.2.6 has been changed as follows and all conditions referencing the test group for CE023 and CE010 have been updated.

D.2.6 Testing Requirements [326 IAC 2-7-6(1), (6)] [326 IAC 2-1.1-11]

(a) Group 1 Testing Requirements

Not later than 180 days from plant startup, in order to demonstrate compliance with Conditions D.2.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouse**s** CE009**, CE023, and CE010** utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

(b) Group 2 Testing Requirements

Not later than 180 days from the date the last of the tests required in Conditions D.1.5(a), D.2.6(a), D.3.~~7~~**8**, **and** D.4.4(a)~~, and D.5.4(a)~~ is completed or not later than 360 days from plant startup, whichever is later, in order to demonstrate compliance with Condition D.2.1, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing for baghouses ~~CE023, CE010,~~ CE011~~,~~ and CE012 utilizing methods as approved by the Commissioner at least once every five (5) years from the date of the most recent valid compliance demonstration. Testing shall be conducted in accordance with the provisions of 326 IAC 3-6 (Source Sampling Procedures). Section C - Performance Testing contains the Permittee's obligation with regard to the performance testing required by this section. PM_{10} and $PM_{2.5}$ includes filterable and condensible PM_{10} and $PM_{2.5}$.

Comment 7:

Please revise Condition D.3.6 as follows:

D.3.6 SO2, Fluorides, and HF Control

In order to comply with Conditions D.3.1 and D.3.3, gas suspension absorber CE015 for SO_2, fluorides, and HF control shall be in operation and control SO_2, fluorides, and HF emissions from emission unit EU014 at all times the emission unit is in operation**, which is defined as when green pellets are being processed by the furnace**.

IDEM, OAQ Response 7:

Pursuant to 326 IAC 2-2 (BACT) and Condition D.3.1(a), SO2, fluorides, and HF emissions shall be controlled by a GSA dry scrubber at all times.

No change will be made as a result of this comment.

Comment 8:

Please revise the pressure drop range for the baghouses CE013, CE016, CE017, and CE019 from 5.0 to 10.0 inches of water to 0.5 to 10.0 inches of water.

IDEM, OAQ Response 8:

For new baghouses, IDEM, OAQ has established an initial pressure drop range not greater than 5.5 inches of water. If the Permittee can demonstrate through testing, actual operating data, or the manufacturer of the baghouse can provide adequate documentation that the unit can meet permit limits at a larger pressure drop range, then the range can be modified through an Administrative Amendment. Current permit language allows for a new upper bound or lower bound range to be established through compliance testing with no modification to the permit required.

No change will be made as a result of this comment.

Comment 9:

Some units were included in Section E.1 which are not subject to 40 CFR 60, Subpart OOO. Please revise this section to only include applicable units.

IDEM, OAQ Response 9:

Pursuant to 40 CFR 60.670 and 40 CFR 60.671, the truck unloaders (EU002a and EU003a), load hopper (EU025), and the ground limestone and dolomite additive system' s natural gas-fired air heater are not affected units under 40 CFR 60, Subpart OOO. The facility description box for Section E.1 has been revised as follows:

SECTION E.1 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(~~15~~**14**)]: Nonmetallic Mineral Processing Plants

(b) One (1) limestone unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

~~(1) One (1) truck unloader, identified as EU002a, exhausting uncontrolled to atmosphere.~~

(2) One (1) covered conveyor, identified as EU002b, exhausting inside the limestone storage pile enclosure. Under 40 CFR 60, Subpart OOO, the limestone unloading and storage area conveyor is considered an affected facility.

(c) One (1) dolomite unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

~~(1) One (1) truck unloader, identified as EU003a, exhausting uncontrolled to atmosphere.~~

(2) One (1) covered conveyor, identified as EU003b, exhausting inside the dolomite storage pile enclosure. Under 40 CFR 60, Subpart OOO, the dolomite unloading and storage area conveyor is considered an affected facility.

(j) One (1) limestone and dolomite grinding mill bin area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

~~(1) One (1) load hopper, one (1) enclosed vibrating grizzly feeder/screener, and one (1) covered belt feeder, identified as EU025a, exhausting uncontrolled to the atmosphere.~~

(2) One (1) additive conveyor, one (1) dolomite grinding mill bin with a maximum capacity of 440 tons, and one (1) limestone grinding mill bin with a maximum capacity of 440 tons, identified as EU025b, using baghouse CE023 as control, exhausting inside the building. Under 40 CFR 60, Subpart OOO, these units of the limestone and dolomite grinding mill bin area are considered affected facilities.

(k) One (1) ground limestone and dolomite additive system, identified as EU010, approved in 2013 for construction, with a maximum capacity of 132 tons per hour, using baghouse CE010 as control, exhausting to stack SV010, consisting of the following:

(1) One (1) limestone feed conveyor, one (1) dolomite feed conveyor, one (1) roller mill feed conveyor, one (1) roller mill for limestone and dolomite, one (1) product separation cyclone, and one (1) limestone and dolomite bin with a maximum capacity of 1,100 tons. Under 40 CFR 60, Subpart OOO, these units of the ground limestone and dolomite additive system are considered affected facilities.

~~(2) One (1) natural gas fired air heater, with a maximum heat input capacity of 19 MMBtu per hour.~~

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

Comment 10:

Please revise page 90 of the BACT Analysis (Appendix B) to read as follows:

***

MEA also reacts with other ~~acid~~ gas**es** such as H_2S, SO_2, and NO_x. The reaction between MEA and SO_2 and the reaction of MEA with NO_x is irreversible, and the chemical bonds cannot be broken in a regeneration column. In a CO_2 capture systems, MEA reacting with SO_2 and NO_x is consumed and fresh MEA must be added to replace the MEA consumed by SO_2 and NO_x. There are also operating costs for removing the MEA salts from the MEA sorbent solution and disposal of the waste material. SO_2 and NO_x removal by MEA is considered an unwanted collateral reaction within a CO_2 capture system. Therefore, SO_2 and NO_x concentrations in coal-fired boiler applications must be reduced to a minimum in an MEA sorbent based CO_2 capture system to control operating costs.

***

IDEM, OAQ Response 10:

This paragraph is continuing a discussion of how MEA can be used in an acid base reaction from the previous paragraph. Therefore, a reference to the acidic nature of H_2S, SO_2, and NO_x gases is appropriate. The paragraph has been modified as follows.

***

MEA also reacts with other acid**ic** gas**es** such as H_2S, SO_2, and NO_x. The reaction between MEA and SO_2 and the reaction of MEA with NO_x is irreversible, and the chemical bonds cannot be broken in a regeneration column. In a CO_2 capture systems, MEA reacting with SO_2 and NO_x is consumed and fresh MEA must be added to replace the MEA consumed by SO_2 and NO_x. There are also operating costs for removing the MEA salts from the MEA sorbent solution and disposal of the waste material. SO_2 and NO_x removal by MEA is considered an unwanted collateral reaction within a CO_2 capture system. Therefore, SO_2 and NO_x concentrations in coal-fired boiler applications must be reduced to a minimum in an MEA sorbent based CO_2 capture system to control operating costs.

***

Comment 11:

Please revise page 108 of the BACT Analysis (Appendix B) to remove the following sentences as they do not apply to this facility:

***

SCR Installation Downstream of Other Air Pollution Control Equipment

The second potential alternative for application of SCR is to install it downstream of the other pollution control equipment for the pellet plant. To do this, the waste gas stream would require re-heating the gas to SCR catalyst operating temperatures. Re-heating the waste gas pollution control exhaust for SCR would require an excessive amount of energy. ~~Use of a regenerative SCR system is discussed as an energy efficient option to SCR with re-heat in the following section.~~

~~A potential source of energy for re-heating the exhaust gases would be to recover the heat from a hot waste gas stream elsewhere in the plant. The DRI reformer heater exhaust already includes a heat recovery system and is not available for this service. The EAF exhaust is too dust laden before the baghouse system and too cold after the baghouse. The tunnel furnace exhaust is hot enough, but will be located about 2,200 feet from the pellet plant; this is too far from the pellet plant to feasibly run a large diameter refractory lined duct. In addition, the tunnel furnace and the EAFs have cyclic operating patterns, so it would not be feasible to provide the steady flow of heat needed to operate an SCR system. Due to the infeasibility of the above options for re-heating the exhaust streams, installation of SCR downstream of the other air pollution control devices would require a standalone re-heat system located at the SCR.~~

***

IDEM, OAQ Response 11:

IDEM, OAQ agrees this language does not apply to this Permittee, nor did it impact the final BACT determination. The removal of this language does not change the reasoning as to why SCR was not chosen as BACT. Therefore, Appendix B has been modified as follows:

***

SCR Installation Downstream of Other Air Pollution Control Equipment

The second potential alternative for application of SCR is to install it downstream of the other pollution control equipment for the pellet plant. To do this, the waste gas stream would require re-heating the gas to SCR catalyst operating temperatures. Re-heating the waste gas pollution control exhaust for SCR would require an excessive amount of energy. ~~Use of a regenerative SCR system is discussed as an energy efficient option to SCR with re-heat in the following section.~~

~~A potential source of energy for re-heating the exhaust gases would be to recover the heat from a hot waste gas stream elsewhere in the plant. The DRI reformer heater exhaust already includes a heat recovery system and is not available for this service. The EAF exhaust is too dust laden before the baghouse system and too cold after the baghouse. The tunnel furnace exhaust is hot enough, but will be located about 2,200 feet from the pellet plant; this is too far from the pellet plant to feasibly run a large diameter refractory lined duct. In addition, the tunnel furnace and the EAFs have cyclic operating patterns, so it would not be feasible to provide the steady flow of heat needed to operate an SCR system. Due to the infeasibility of the above options for re-heating the exhaust streams, installation of SCR downstream of the other air pollution control devices would require a standalone re-heat system located at the SCR.~~

***

Comment 12:

Please add the following statement to page 132 of the BACT Analysis (Appendix B) for clarification:

***

Induration Furnace Hood Exhaust
SO2 control efficiencies have been used as a general indicator of the emission control effectiveness on fluoride compounds in the exhaust streams.

Wet scrubbing and spray dryer absorption have been eliminated as control technologies for the Furnace Hood Exhaust (EU013) because the control technologies can feasibly achieve outlet concentrations of 10 and 25 ppmv, respectively. Since the uncontrolled concentration from the hood exhaust is 7.1 ppmv, these technologies will not be able to remove any further SO_2 from the air stream. No other technologies were eliminated from consideration because of technical infeasibility for the induration furnaces with regards to the Furnace Hood Exhaust (EU013).

***

IDEM, OAQ Response 12:

IDEM, OAQ concurs that the requested statement is correct. Page 132 of the BACT Analysis (Appendix B) has been modified as follows:

***

Induration Furnace Hood Exhaust
SO2 control efficiencies have been used as a general indicator of the emission control effectiveness on fluoride compounds in the exhaust streams.

Wet scrubbing and spray dryer absorption have been eliminated as control technologies for the Furnace Hood Exhaust (EU013) because the control technologies can feasibly achieve outlet concentrations of 10 and 25 ppmv, respectively. Since the uncontrolled concentration from the hood exhaust is 7.1 ppmv, these technologies will not be able to remove any further SO_2 from the air stream. No other technologies were eliminated from consideration because of technical infeasibility for the induration furnaces with regards to the Furnace Hood Exhaust (EU013).

***

Comment 13:

Please revise page 159 of the BACT Analysis (Appendix B) to match the permit and calculations. Step 4 should apply to the heaters not the fire pump and the heaters do not have a 500 hour per year operation limit.

IDEM, OAQ Response 13:

The following changes have been made to the permit, TSD, and BACT Analysis (Appendix B).

BACT Analysis (Appendix B) Changes:

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Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (GHG)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired heaters is the use of good combustion practices. Most facilities express exhaust emission limitations in terms of tons per year of carbon dioxide equivalent.

GHG BACT for the natural gas fired ~~fire pumps~~ **heaters** has been determined to be the restricted use of only natural gas, the use of good combustion practices, and ~~an operation limit of 500 hours per year along with~~ appropriate emission limits.

***

Comment 14:

Please revise page 160 of the BACT analysis (Appendix B) to match the hours of operation limit in the permit and calculations for the fire pump (EU018).

IDEM, OAQ Response 14:

The following change has been made to the BACT Analysis (Appendix B).

***

(2) GHG emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of ~~2~~**5**00 hours per year along with an emission limit of 66 tons of CO_2e per 12-month period.

***

Public Comments

Comment 1:

On March 20, 2013, Mr. Coffin commented on the proposed permit:

I just wanted to state for the record what I said in the public meeting that we were concerned about brown particulate fallout on our grass and buildings and that some of my family members have asthma and we were concerned about the air quality and if this operation would bother them. You guys have been very helpful and we appreciate the information that you gave us.

IDEM, OAQ Response 1:

IDEM thanks Mr. Coffin for participating in the public process by providing oral comment for the record on the proposed Part 70 Operating Permit.

National Ambient Air Quality Standards (NAAQS) have been established by the U.S. Environmental Protection Agency (EPA) to ensure protection of public health (primary standards) and protection of public welfare (secondary standards). The primary standards are set to provide protection of sensitive populations such as asthmatics, children, and the elderly. The secondary standards protect against decreased visibility, and damage to animals, crops, vegetation, and buildings. White County is currently in attainment for all NAAQS. This means the air in the County currently meets or is better than the NAQQS. An Air Quality Analysis (included as Appendix D and Addendum to Appendix D) was conducted for Magnetation LLC to ensure that the emissions from this new operation would not cause White County to become non-attainment for (i.e. to not meet or be worse than) any NAAQS.

The Part 70 Operating Permit establishes particulate matter limitations (i.e. PM, PM10, and PM2.5) on all parts of Magnetation LLC's operation. These limitations can be found in Conditions D.1.1, D.1.2, D.2.1, D.2.2, D.3.1, D.4.1, D.5.1, D.6.1, and D.6.2 of the permit. These limitations are designed to ensure the emissions from Magnetation LLC will not cause White County to no longer meet the NAAQS.

Should you need to contact someone in the future with concerns over Magnetation LLC, OAQ has air compliance inspectors who conduct inspections of permitted sources and respond to complaints. The air inspector for this source reports to Janusz Johnson. Mr. Johnson may be reached by phone at 317-233-1134. Environmental complaints may also be filed on-line at www.idem.IN.gov/5274.htm. or by calling IDEM's Complaint Coordinator at (800) 451-6027, ext. 2-4464.

No change will be made as a result of this comment.

No change will be made to the original TSD. The OAQ prefers that the TSD reflect the permit that was on public notice. Changes to the permit or technical support material that occur after the public notice are documented in this Addendum to the Technical Support Document. This accomplishes the desired result of ensuring that these types of concerns are documented and part of the record regarding this permit decision.

Indiana Department of Environmental Management
Office of Air Quality

Appendix B
Best Available Control Technology (BACT) Analysis Determination

Source Background and Description

Source Name:	Magnetation LLC
Source Location:	64 East 100 North, Reynolds, Indiana 47980
County:	White
SIC Code:	1011
Operation Permit No.:	T181-32081-00054
Permit Reviewer:	John Haney / Kristen Willoughby

Proposed Project

On July 2, 2012, Magnetation LLC submitted an application to the Indiana Department of Environmental Management (IDEM), Office of Air Quality (OAQ) for a New Source Construction and Part 70 Operating Permit to construct and operate an iron ore concentrate pelletizing plant to be located at 64 East 100 North, Reynolds, Indiana. This plant will consist of the following emission units and specifically regulated insignificant activities:

Note: All references to "tons" used throughout this document are short tons (i.e., one short ton equals 2,000 pounds).

(a) One (1) iron concentrate unloading and storage area, identified as EU001, approved in 2013 for construction, with a maximum capacity of 4,950 tons per hour, consisting of the following:

(1) One (1) thaw shed, one (1) rotary rail car dumper, one (1) pedestal mount breaker, two (2) grizzlies, two (2) apron feeders, one (1) dribble conveyor, one (1) breaker, identified as EU001a, using baghouse CE001 as control, exhausting to stack SV001.

(2) One (1) covered conveyor transferring to concentrate storage building which contains, four (4) covered conveyors, four (4) load hoppers, and a storage pile identified as EU001b, exhausting inside the building.

(b) One (1) limestone unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU002a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU002b, exhausting inside the limestone storage pile enclosure. Under 40 CFR 60, Subpart OOO, the limestone unloading and storage area conveyor is considered an affected facility.

(c) One (1) dolomite unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU003a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU003b, exhausting inside the dolomite storage pile enclosure. Under 40 CFR 60, Subpart OOO, the dolomite unloading and storage area conveyor is considered an affected facility.

(d) One (1) coke breeze unloading and storage area, approved in 2013 for construction, with a maximum capacity of 7 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU004a, exhausting uncontrolled to atmosphere.

(2) One (1) pneumatic conveyance system and one (1) coke breeze grinding mill bin identified as EU004b, with a maximum capacity of 1,100 tons, using baghouse CE004 as control, exhausting to stack SV004.

(e) One (1) bentonite unloading and storage area, identified as EU005, approved in 2013 for construction, consisting of one (1) bentonite storage bin with a maximum capacity of 440 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE005 as control, exhausting inside the building.

(f) One (1) organic binder unloading and storage area, identified as EU006, approved in 2013 for construction, consisting of one (1) organic binder feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE006 as control, exhausting inside the building.

(g) One (1) soda ash unloading and storage area, identified as EU007, approved in 2013 for construction, consisting of one (1) soda ash feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE007 as control, exhausting inside the building.

(h) One (1) bentonite additive system, identified as EU008, approved in 2013 for construction, consisting of one (1) bentonite feed bin with a maximum capacity of 220 ton, with a maximum capacity of 3.0 tons per hour, using bin vent CE008 as control, exhausting inside the building.

(i) One (1) coke breeze additive system, identified as EU009, approved in 2013 for construction, with a maximum capacity of 16.5 tons per hour, using baghouse CE009 as control, exhausting to stack SV009, consisting of one (1) coke breeze conveyor, one (1) roller mill for coke breeze grinding with a nominal capacity of 11 tons per hour, one (1) product separation cyclone, and one (1) coke breeze bin with a maximum capacity of 220 tons.

(j) One (1) limestone and dolomite grinding mill bin area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) load hopper, one (1) enclosed vibrating grizzly feeder/screener, and one (1) covered belt feeder, identified as EU025a, exhausting uncontrolled to the atmosphere.

(2) One (1) additive conveyor, one (1) dolomite grinding mill bin with a maximum capacity of 440 tons, and one (1) limestone grinding mill bin with a maximum capacity of 440 tons, identified as EU025b, using baghouse CE023 as control, exhausting inside the building. Under 40 CFR 60, Subpart OOO, these units of the limestone and dolomite grinding mill bin area are considered affected facilities.

(k) One (1) ground limestone and dolomite additive system, identified as EU010, approved in 2013 for construction, with a maximum capacity of 132 tons per hour, using baghouse CE010 as control, exhausting to stack SV010, consisting of the following:

(1) One (1) limestone feed conveyor, one (1) dolomite feed conveyor, one (1) roller mill feed conveyor, one (1) roller mill for limestone and dolomite, one (1) product separation cyclone, and one (1) limestone and dolomite bin with a maximum capacity of 1,100 tons. Under 40 CFR 60, Subpart OOO, these units of the ground limestone and dolomite additive system are considered affected facilities.

(2) One (1) natural gas fired air heater, with a maximum heat input capacity of 19 MMBtu per hour.

(l) One (1) mixing area material handling system, identified as EU011, approved in 2013 for construction, with a maximum capacity of 780 tons per hour, using baghouse CE011 as control, exhausting inside the building, consisting of two (2) filter cake feed conveyors, two (2) mixer feed conveyors, and two (2) mixers.

(m) One (1) hearth layer bin system, identified as EU012, approved in 2013 for construction, with a maximum capacity of 660 tons of iron oxide pellets per hour, using baghouse CE012 as control, exhausting to stack SV012, consisting of two (2) hearth layer conveyors and one (1) hearth layer bin.

(n) One (1) induration machine, approved in 2013 for construction, consisting of one (1) natural gas fired pellet hardening furnace, with a maximum heat input capacity of 436 MMBtu per hour and a maximum throughput rate of 450 tons per hour of iron oxide pellets, equipped with the following:

(1) One (1) furnace hood exhaust, identified as EU013, using hood exhaust baghouse CE013 as control, exhausting to stack SV013A.

(2) One (1) furnace windbox exhaust (WBE), identified as EU014, using one (1) gas suspension absorber (GSA) (CE015) and one (1) WBE baghouse (CE016) as control, exhausting to stack SV013B.

(3) One (1) furnace discharge system, identified as EU015, using baghouse CE017 as control, exhausting to stack SV014, consisting of one (1) dribble conveyor, one (1) discharge hopper, and two (2) discharge vibrating feeders each with a maximum throughput of 1,155 tons per hour.

(4) One (1) induced draft cross flow wet cooling tower, identified as EU024, with a capacity of 4,600 gallons of circulating water per minute and a maximum drift rate of 0.001%, exhausting to stack SV022.

(o) One (1) hearth layer separation system, identified as EU016, approved in 2013 for construction, using baghouse CE018 as control, exhausting inside the building, consisting of the following:

(1) Two (2) product conveyors, identified as P1 and P2, with a maximum capacity of 660 and 770 tons per hour respectively.

(2) Two (2) hearth layer conveyors, identified as HL-1 and HL-2, each with a maximum capacity of 440 tons per hour.

(3) One (1) hearth layer separation bin, one (1) hearth layer separation grizzly, and two (2) reclaim hoppers.

(p) One (1) oxide pellet storage and loadout system, identified as EU019, approved in 2013 for construction, with a maximum capacity of 550 tons per hour, using baghouse CE019 as control, exhausting to stack SV018, consisting of two (2) conveyors, two (2) 8800-ton storage bins, and two (2) 99-ton storage bins.

(q) One (1) WBE lime storage area, identified as EU020, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) lime feed conveyor and one (1) 80 cubic meter lime storage silo, using bin vent CE020 as control, exhausting inside the building.

(r) One (1) WBE residual product loading area, identified as EU022, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) GSA reactor conveyor, one (1) GSA product conveyor, one (1) WBE conveyor, and one (1) 100 cubic meter storage silo, using bin vent CE021 as control, exhausting inside the building.

(s) One (1) recycled dust storage area, identified as EU026, approved in 2013 for construction, consisting of one (1) 55-ton storage bin, with a maximum capacity of 7.0 tons per hour, using dust recycle baghouse CE024 as control, exhausting inside the building.

Specifically Regulated Insignificant Activities

(a) Natural gas-fired combustion sources with heat input equal to or less than ten million (10,000,000) Btu per hour, including the following:

(1) Seven (7) natural gas fired space heaters, identified as EU021, approved in 2013 for construction, each with a maximum heat input capacity of 1.0 MMBtu per hour. [326 IAC 2-2]

(2) One (1) coke breeze additive system (EU009) natural gas fired air heater, approved in 2013 for construction, with a maximum heat input capacity of 1.7 MMBtu per hour. [326 IAC 2-2]

(b) A petroleum fuel (other than gasoline) dispensing facility, having a storage tank capacity less than or equal to ten thousand five hundred (10,500) gallons, and dispensing three thousand five hundred (3,500) gallons per day or less. [326 IAC 2-2]

(c) Paved roads and parking lots with public access. [326 IAC 2-2] [326 IAC 6-4]

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(f) Other emission units, not regulated by a NESHAP, with PM_{10}, NO_x, and SO_2 emissions less than five (5) pounds per hour or twenty-five (25) pounds per day, CO emissions less than twenty-five (25) pounds per day, VOC emissions less than three (3) pounds per hour or fifteen (15) pounds per day, lead emissions less than six-tenths (0.6) tons per year or three and twenty-nine hundredths (3.29) pounds per day, and emitting greater than one (1) pound per day but less than five (5) pounds per day or one (1) ton per year of a single HAP, or emitting greater than one (1) pound per day but less than twelve and five tenths (12.5) pounds per day or two and five tenths (2.5) ton per year of any combination of HAPs:

(1) One (1) iron concentrate wet grinding and filter cake production system, approved in 2013 for construction, with a maximum capacity of 700 tons per hour, consisting of three (3) conveyors, and a filter cake feed bin, exhausting uncontrolled into a building. [326 IAC 2-2] [326 IAC 6-3-2]

(2) One (1) greenball production system, approved in 2013 for construction, with a maximum capacity of 900 tons per hour, using a wet spray process as control, consisting of six (6) 110-ton balling disc feed bins, six (6) balling discs, six (6) green pellet roller screens, six (6) shredders, one (1) single deck roller screen, and thirty-one (31) conveyors, exhausting into a building. [326 IAC 2-2] [326 IAC 6-3-2

Requirement for Best Available Control Technology (BACT)

326 IAC 2-2 requires a best available control technology (BACT) review to be performed for the construction of any new major stationary source or the major modification of any existing major stationary source in an area designated as attainment or unclassifiable in 326 IAC 1-4. White County has been designated attainment or unclassifiable for all criteria pollutants. Therefore, if the net emissions increase of any of the pollutants listed in 326 IAC 2-2-1(ww)(1) exceeds the corresponding significant levels, PSD BACT analysis shall be performed.

Each pollutant shall be evaluated separately. A discussion of the emissions units for which PSD BACT analysis has been conducted will be included under each pollutant evaluation.

This modification is subject to BACT analysis for PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, and GHGs because the proposed project has:

(1) Particulate matter (PM) potential to emit greater than 25 tons per year;

(2) Particulate matter with an aerodynamic diameter less than or equal to ten (10) micrometers (PM_{10}) potential to emit greater than 15 tons per year;

(3) Particulate matter with an aerodynamic diameter less than or equal to two-and-a-half (2.5) micrometers ($PM_{2.5}$) potential to emit greater than 10 tons per year;

(4) Sulfur dioxide potential to emit greater than 40 tons per year;

(5) Nitrogen oxides potential to emit greater than 40 tons per year;

(6) Fluorides potential to emit greater than 3 tons per year; and

(7) Greenhouse gases potential to emit greater than 100,000 tons per year CO_2e.

See Appendix A of this TSD for the detailed potential to emit (PTE) calculations.

The following table summarizes the emission units subject to BACT and which pollutants have been evaluated for each emission unit.

Emission Unit		Associated Emission Point (Control Device)	BACT Proposed for Following Pollutants:
Iron Concentrate Unloading	EU001a	SV001 (CE001)	PM, PM_{10}, $PM_{2.5}$, F
Iron Concentrate Transfer & Storage Area	EU001b	**fugitive	PM, PM_{10}, $PM_{2.5}$, F
Limestone Unloading (Truck)	EU002a	fugitive	PM, PM_{10}, $PM_{2.5}$
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	fugitive	PM, PM_{10}, $PM_{2.5}$
Dolomite Unloading (Truck)	EU003a	fugitive	PM, PM_{10}, $PM_{2.5}$
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	fugitive	PM, PM_{10}, $PM_{2.5}$
Coke Breeze Unloading (Truck)	EU004a	fugitive	PM, PM_{10}, $PM_{2.5}$
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	SV004 (CE004)	PM, PM_{10}, $PM_{2.5}$
Bentonite Unloading (Truck) & Storage Area	EU005	** (CE005)	PM, PM_{10}, $PM_{2.5}$
Organic Binder Unloading & Storage Area	EU006	** (CE006)	PM, PM_{10}, $PM_{2.5}$
Soda Ash Unloading & Storage Area	EU007	** (CE007)	PM, PM_{10}, $PM_{2.5}$
Bentonite Additive System	EU008	** (CE008)	PM, PM_{10}, $PM_{2.5}$
Coke Breeze Additive System	EU009	SV009 (CE009)	PM, PM_{10}, $PM_{2.5}$
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener	EU025a	**fugitive	PM, PM_{10}, $PM_{2.5}$
Limestone/Dolomite Grinding Mill Bin Area	EU025b	** (CE023)	PM, PM_{10}, $PM_{2.5}$
Ground Limestone/Dolomite Additive System	EU010	SV010 (CE010)	PM, PM_{10}, $PM_{2.5}$
Ground Limestone/Dolomite Additive System Air Heater	EU010	SV010 (CE010)	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Mixing Area Material Handling System	EU011	** (CE011)	PM, PM_{10}, $PM_{2.5}$, F
Hearth Layer Bin System	EU012	SV012 (CE012)	PM, PM_{10}, $PM_{2.5}$, F
Furnace Hood Exhaust	EU013	SV013A (CE013)	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Furnace Windbox Exhaust (WBE)	EU014	SV013B (CE015, CE016)	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Furnace Discharge System	EU015	SV014 (CE017)	PM, PM_{10}, $PM_{2.5}$, F
Cooling Tower	EU024	SV022	PM, PM_{10}, $PM_{2.5}$
Hearth Layer Separation System	EU016	** (CE018)	PM, PM_{10}, $PM_{2.5}$, F
Oxide Pellet Storage & Unloading System	EU019	SV018 (CE019)	PM, PM_{10}, $PM_{2.5}$, F
WBE Lime Storage Area	EU020	** (CE020)	PM, PM_{10}, $PM_{2.5}$
WBE Residual Product Loading Area	EU022	** (CE021)	PM, PM_{10}, $PM_{2.5}$
Recycled Dust Storage Area	EU026	** (CE024)	PM, PM_{10}, $PM_{2.5}$, F
Space Heaters	EU021	various	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Coke Breeze Additive System Air Heater	EU009	SV009 (CE009)	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Emergency Generator	EU017	SV016	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Fire Water Pump	EU018	SV017	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Iron Ore Wet Grinding and Filter Cake Production	IA	**fugitive	PM, PM_{10}, $PM_{2.5}$, F
Greenball Production System	IA	**fugitive	PM, PM_{10}, $PM_{2.5}$, F

**This process exhausts inside a building.

Summary of the Best Available Control Technology (BACT) Process

Pursuant to 326 IAC 2-2-1(i), Best Available Control Technology (BACT) is defined as "an emissions limitation, including a visible emissions standard, based on the maximum degree of reduction for each regulated NSR pollutant that would be emitted from any proposed major stationary source or major modification, that the commissioner, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for the source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the pollutant. In no event shall application of best available control technology result in emissions of any pollutant that would exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and 40 CFR Part 61. If the commissioner determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard not feasible, a design, equipment, work practice, operational standard, or combination thereof may be prescribed instead to satisfy the requirements for the application of best available control technology. The standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of the design, equipment, work practice, or operation and shall provide for compliance by means that achieve equivalent results."

Federal guidance on BACT requires an evaluation that follows a “top down” process, consisting of five (5) steps. The Office of Air Quality (OAQ) makes BACT determinations by following the five (5) steps as outlined below.

Step 1: Identify Potential Control Technologies

The first step is to identify potentially “available” control options for each emission unit and for each pollutant under review. Available options should consist of a comprehensive list of those technologies with a potentially practical application to the emissions unit and the regulated pollutant under evaluation. The list should include lowest achievable emission rate (LAER) technologies, innovative technologies, and controls applied to similar source categories. There is no requirement in the State or Federal regulations to require innovative control to be used as BACT.

Step 2: Eliminate Technically Infeasible Options

The second step is to eliminate technically infeasible options from further consideration. To be considered feasible, a technology must be both available and applicable. It is important in this step that any presentation of a technical argument for eliminating a technology from further consideration be clearly documented based on physical, chemical, engineering, and source-specific factors related to safe and successful use of the controls. Innovative control means a control that has not been demonstrated in a commercial application on similar units. Innovative controls are normally given a waiver from the BACT requirements due to the uncertainty of actual control efficiency. Based on this, the OAQ will not evaluate or require any innovative controls for this BACT analysis. Only available and proven control technologies are evaluated. A control technology is considered available when there are sufficient data indicating that the technology results in a reduction in emissions of regulated pollutants.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness

The third step is to rank the technologies not eliminated in Step 2 in order of descending control effectiveness for each pollutant of concern. The ranked alternatives are reviewed in terms of control effectiveness, expected emission rate, expected emission reduction, and environmental, energy, and economic impacts specific to the proposed modification. If the analysis determines that the evaluated alternative is not appropriate as BACT due to any of the impacts, then the next most effective is evaluated. This process is repeated until a control alternative is chosen as

BACT. If the highest ranked technology is proposed as BACT, it is not necessary to perform any further technical or economic evaluation, except for the environmental analyses.

Step 4: Evaluate the Most Effective Controls and Document the Results

The fourth step entails an evaluation of energy, environmental, and economic impacts for determining a final level of control. The evaluation begins with the most stringent control option and continues until a technology under consideration cannot be eliminated based on adverse energy, environmental, or economic impacts.

Step 5: Select BACT

The fifth and final step is to select as BACT the most effective of the remaining technologies under consideration for each pollutant of concern. For the technologies determined to be feasible, there may be several different limits that have been set as BACT for the same control technology. The permitting agency has to choose the most stringent limit as BACT unless the applicant demonstrates in a convincing manner why that limit is not feasible. The final BACT determination would be the technology with the most stringent corresponding limit that is economically feasible. BACT must, at a minimum, be no less stringent than the level of control required by any applicable New Source Performance Standard (NSPS) and National Emissions Standard for Hazardous Air Pollutants (NESHAP) or state regulatory standards applicable to the emission units included in the permits.

This BACT determination is based on the following information:

(1) The EPA RACT/BACT/LAER (RBLC) Clearinghouse;

(2) EPA and State air quality permits;

(3) Communications with control device equipment manufacturers;

(4) The EPA New Source Review website;

(5) Technical books and articles; and

(6) Guidance documents from and communications with state agencies.

Particulate Matter (PM) BACT

The PM BACT analysis is divided into five categories: material handling operations, induration furnace, combustion units, cooling towers, and fugitive emissions.

Step 1 of the BACT process is shown below for this PM BACT analysis describes particulate control devices that are applicable for controlling particulate across a wide range of processes. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific PM control devices may be discussed in individual BACT analyses.

Step 1: Identify Potential Control Technologies (PM)

Particulate matter (PM) is a complex mixture of small particles and liquid droplets. PM can be made up of a variety of components, including acids, organic chemicals, metals, and soil or dust particles. PM includes any size of filterable particulate. Filterable particulate is the particulate that is emitted directly as a solid or liquid at the stack.

Emissions of particulate matter (PM) are generally controlled with add-on control equipment designed to capture the emissions prior to the time they are exhausted to the atmosphere. In cases where the material being emitted is organic, particulate matter may be controlled through a combustion process. Generally, PM emissions are controlled through one of the following mechanisms:

(1) Mechanical collectors (such as cyclones or multiclones).

(2) Wet scrubbers.

(3) Electrostatic precipitators (ESP).

(4) Fabric filter dust collectors (baghouses).

PM emissions from a combustion process are typically controlled through one of the following mechanisms:

(1) Clean fuels.

(2) Good combustion practices.

(3) Usage limitation.

(4) Catalyzed diesel particulate filter (CDPF).

PM emissions from cooling towers are typically controlled through one of the following mechanisms:

(1) Drift eliminators.

(2) Minimizing total dissolved solids (TDS).

Fugitive PM emissions from paved roads are typically controlled through the use of work practices which include a site-specific Fugitive Dust Control Plan.

The choice of which technology is most appropriate for a specific application depends upon several factors, including particle size to be collected, particle loading, stack gas flow rate, stack gas physical characteristics (e.g., temperature, moisture content, presence of reactive materials), and desired collection efficiency.

Mechanical Collectors (such as Cyclones or Multiclones)

Mechanical collectors use the inertia of the particles for collection. The particulate-laden gas stream enters the control device and is forced to move in a cyclonic manner, which causes the particles to move toward the outside of the vortex. Most of the large-diameter particles enter a hopper below the cyclonic tubes while the gas stream turns and exits the device.

Cyclones are typically used to remove relatively large particles from gas streams. Conventional single cyclones are estimated to control PM at 70-90%, PM_{10} at 30-90%, and $PM_{2.5}$ at 0-40%. High efficiency single cyclones are designed to achieve higher control of smaller particles and multiclones may also achieve higher control of smaller particles. Collection efficiency generally increases with particle size and/or density, inlet duct velocity, cyclone body length, number of gas revolutions in the cyclone, ratio of cyclone body diameter to gas exit diameter, dust loading, and smoothness of the cyclone inner wall. Cyclone efficiency will decrease with increases in gas viscosity, body diameter, gas exit diameter, gas inlet duct area, and gas density.

Cyclones are often used for recovery and recycling of material or as precleaners for more expensive final control devices such as fabric filters or electrostatic precipitators. Cyclones are used for applications such as after spray drying operations in the food and chemical industries; after crushing/grinding/calcining operations in the mineral and chemical industries to collect salable or useful material; for first stage control of PM from sinter plants, roasters, kilns, and furnaces in the metallurgical industries; for catalyst recycling in the fluid-cracking process; and for precleaning fossil-fuel and wood-waste fired industrial and commercial fuel combustion units.

The typical gas flow rates for a single cyclone are 1,060 to 25,400 scfm. Flows that are higher use multiple cyclones in parallel. Inlet gas temperatures are only limited by the material of construction of the cyclone. Cyclones perform more efficiently with higher pollutant loadings, with loadings typically ranging from 1.0 to 100 gr/scf. Cyclones are unable to handle sticky or tacky materials.

Wet Scrubbers

A wet scrubber is an air pollution control device that removes PM from waste gas streams primarily through the impaction, diffusion, interception and/or absorption of the pollutant onto droplets of liquid. The liquid containing the pollutant is then collected for disposal. There are numerous types of wet scrubbers that remove PM, including venturi, impingement and sieve plate, spray towers, mechanically aided, condensation growth, packed beds, ejector, mobile bed, caternary grid, froth tower, oriented fiber pad, and wetted mist eliminators. Collection efficiencies for wet scrubbers vary with the particle size distribution of the waste gas stream. In general, collection efficiency decreases as the PM size decreases. Collection efficiencies also vary with scrubber type. Collection efficiencies range from greater than 99% for venturi scrubbers to 40-60% (or lower) for simple spray towers. Wet scrubbers are smaller and more compact than baghouses or ESPs. They have lower capital costs and comparable operation and maintenance (O&M) costs. Wet scrubbers are particularly useful in the removal of PM with the following characteristics:

(1) Sticky and/or hygroscopic materials (materials that readily absorb water);

(2) Combustible, corrosive and explosive materials;

(3) Particles which are difficult to remove in their dry form;

(4) PM in the presence of soluble gases; and

(5) PM in waste gas streams with high moisture content.

Some applications of wet scrubbers include the following:

- Condensation scrubbers: for controlling fine PM-containing waste-gas streams.
- Fiber-bed scrubbers (wetted-fiber scrubbers or mist eliminators): for controlling aerosol emissions from chemical, plastics, asphalt, sulfuric acid, and surface coating industries; for controlling lubricant mist emission from rotating machinery and storage tanks; and for eliminating visible plume downstream of other control devices.
- Impingement-plate/tray-tower scrubbers: for the food and agriculture industry and at gray and iron foundries. These types of scrubbers may be used to control other pollutants such as SO_2, VOC, and HAPs in other settings.
- Mechanically-aided scrubbers: for food processing paper, pharmaceuticals, chemicals, plastics, tobacco, fiberglass, ceramics, and fertilizer. Processes controlled include dryers, cookers, crushing and grinding operations, spraying, ventilation, and material handling.

- Orifice scrubbers: for food processing and packaging; pharmaceutical processing and packaging; manufacture of chemicals, rubber and plastics, ceramics, and fertilizer. Processes controlled include dryers, cookers, crushing and grinding operations, spraying, ventilation, and material handling.

- Packed-bed/packed-tower wet scrubbers: for the chemical, aluminum, coke and ferroalloy, food and agriculture, and chromium electroplating industries.

- Spray-chamber/spray-tower wet scrubbers: often used as part of a flue gas desulfurization systems, where they are used to control emissions from coal and oil combustion from electric utilities and industrial sources.

- Venturi scrubbers: for controlling PM emissions from utility, industrial, commercial, and institutional boilers fired with coal, oil, wood, and liquid waste; for sources in the chemical, mineral products, wood, pulp and paper, rock products, and asphalt manufacturing industries; for lead, aluminum, iron and steel, and gray iron production industries; for municipal solid waste incinerators. They are typically used where it is necessary to obtain high collection efficiencies for fine PM.

The primary disadvantage of wet scrubbers is that increased collection efficiency comes at the cost of increased pressure drop across the control system. Another disadvantage is that they generate waste in the form of a sludge which requires treatment and/or disposal. Lastly, downstream plume visibility problems can result unless the added moisture is removed from the gas stream.

Electrostatic Precipitators

An electrostatic precipitator (ESP) is a particle control device that uses electrical forces to move the particles out of the flowing gas stream and onto collector plates. The particles are given an electrical charge by forcing them to pass through a corona, a region in which gaseous ions flow. The electrical field that forces the charged particles to the walls comes from electrodes maintained at high voltage in the center of the flow lane.

Once the particles are collected on the plates, they must be removed from the plates without re-entraining them into the gas stream. This is usually accomplished by knocking them loose from the plates, allowing the collected layer of particles to slide down into a hopper from which they are evacuated. Some precipitators remove the particles by intermittent or continuous washing with water.

Dry-type ESPs are primarily used in the electric utility industry and may also be used by the textile industry, pulp and paper facilities, the metallurgical industry, cement and mineral industry, sulfuric acid manufacturing plants, as well as for coke ovens and hazardous waste incinerators. Dust characteristics are a limiting factor for dry-type ESPs. Sticky, moist, high resistivity, flammable, or explosive dusts and particles are not well-suited for dry-type ESPs. Wet ESPs are used in situations for which dry ESPs are not suited, such as when the material to be collected is wet, sticky, flammable, explosive, or has a high resistivity. Wet ESPs are commonly used by the textile industry, pulp and paper facilities, the metallurgical industry, and sulfuric acid manufacturing plants. The limiting factor for wet ESPs is temperature; typically wet ESPs cannot handle operating temperatures exceeding 170°F.

ESP control efficiencies are very high and can range from 95% to 99.9% due to the strong electrical forces applied to small particles and can handle high temperatures (dry ESPs), pressures, and gas flow rates. The composition of the particulate matter is very important because it influences the conductivity within the dust layers on the collection plate. Wet ESPs are effective at collecting sticky particles and mist, help to cool and condition gas streams, and may

provide for control of other aerosolized pollutants in the gas stream. ESPs in general are not suited for use in processes which are highly variable because they are very sensitive to fluctuations in gas stream conditions (flow rates, temperatures, particulate and gas composition, and particulate loadings). They have high capital costs and require large installation space. Dry ESPs are not recommended for removing sticky or moist particles. Wet ESPs can have potential problems with corrosion and they generate wastewater slurry that must be handled.

Fabric Filtration

A fabric filter unit consists of one or more isolated compartments containing rows of fabric bags in the form of round, flat, or shaped tubes, or pleated cartridges. Particle laden gas passes up (usually) along the surface of the bags then radially through the fabric. Particles are retained on the upstream face of the bags, and the cleaned gas stream is vented to the atmosphere. The filter is operated cyclically, alternating between relatively long periods of filtering and short periods of cleaning. During cleaning, dust that has accumulated on the bags is removed from the fabric surface and deposited in a hopper for subsequent disposal.

Fabric filters collect particles with sizes ranging from submicron to several hundred microns in diameter at efficiencies generally in excess of 99 or 99.9%. The layer of dust, or dust cake, collected on the fabric is primarily responsible for such high efficiency. The cake is a barrier with tortuous pores that trap particles as they travel through the cake. Gas temperatures up to about 500°F, with surges to about 550°F, can be accommodated routinely in some configurations. Most of the energy used to operate the system appears as pressure drop across the bags and associated hardware and ducting.

Fabric filters are used where high efficiency particle collection is required and can be used in most any process where dust is generated and can be collected and ducted to a central location. Limitations are imposed by gas characteristics (temperature and corrosivity) and particle characteristics (primarily stickiness) that affect the fabric or its operation and that cannot be economically accommodated. Important process variables include particle characteristics, gas characteristics, and fabric properties. The most important design parameter is the air- or gas-to-cloth ratio (the amount of gas in ft^3/min that penetrates one ft^2 of fabric) and the usual operating parameter of interest is pressure drop across the filter system. Fabric filters are usually made of woven or (more commonly) needle-punched felts sewn to the desired shape, mounted in a plenum with special hardware, and used across a wide range of dust concentrations.

Fabric filters provide high collection efficiency for both coarse and fine particles and are relatively insensitive to fluctuations in gas stream conditions. Operation is simple and fabric filters are useful for collecting particles with resistivities either too low or too high for collection with ESPs. Fabric filters have limited application for high temperatures and corrosive or moist exhaust.

Catalyzed Diesel Particulate Filter (CDPF)

The particulate matter emissions in exhaust gas is trapped by a ceramic filter and oxidized using a metallic catalyst or a base. The operating temperature ranges between 480 - 570°F. The exhaust gas temperature must be high enough over an extended period of time to allow for filter regeneration.

Fugitive Dust Control Plan

Fugitive dust emissions are particulate emissions which occur from the mechanical disturbance of granular material exposed to the air. These emissions are termed “fugitive” because they are not discharged to the atmosphere in a confined air stream.

A Fugitive Dust Control Plan typically contains a variety of methods for the minimization of these particulates including paving of roads, vacuum sweeping, water spreading, chemical treatment,

and vehicle speed reduction. Each Fugitive Dust Control Plan is site-specific; each source must determine the appropriate combination of controls depending the source location and layout.

(a) Material Handling Operations (PM)

The emissions from the material handling operations are in the form of particulate matter (PM, PM_{10}, and $PM_{2.5}$). Particulate matter emissions are primarily due to the attrition of particles (dust) from the feedstocks, iron oxide pellets, and by-products. This is caused by the abrasion of materials rubbing against each other and the process equipment as they move through the process.

The following new emission units associated with material handling operations are subject to PM BACT requirements:

Particulate Matter Emission Units Associated with Material Handling Operations	
Emission Unit	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Unloading (Truck)	EU002a
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Unloading (Truck)	EU003a
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b
Coke Breeze Unloading (Truck)	EU004a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder	EU025a
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

Existing PM BACT Determinations for Material Handling Operations
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for material handling operations at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

PM BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations: EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	PM: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	PM: Fugitive Dust Control Plan 5% opacity (6-min avg) 1.07 E-03 lb/hr and 2.20 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	PM: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.33 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU004a	PM: Fugitive Dust Control Plan 5% opacity (6-min avg) 7.45 E-04 lb/hr and 3.26 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU001b	PM: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 3.93 lb/hr and 17.21 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage EU002b	PM: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.05 lb/hr and 0.10 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU003b	PM: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.03 lb/hr and 0.06 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Transfer): EU025a	PM: Fugitive Dust Control Plan Enclosed conveyor and grizzly, 5% opacity (6-min avg), 0.90 lb/hr and 1.92 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Iron Ore Wet Grinding and Filter Cake Production	PM: 5% opacity (6-min avg.) 0.77 lb/hr and 3.37 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Greenball Production System	PM: 5% opacity (6-min avg.) 0.77 lb/hr and 3.37 tpy	NI	BACT-PSD
Existing PM BACT Determinations - Material Handling Operations					
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Oxide Pellet Stockpile Conveyor Gallery	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.77 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD

PM BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Bin	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 1.40 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Feed	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.12 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Discharge	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 3.30 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Screening and Handling	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 2.90 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Carbon Bin for Mercury Control	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Lime Bin for Scrubber	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Primary Grinding Mill Line 3	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.23 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Grizzly Transfer Tower	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.079 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Dozer Activity at Tailings Basin	PM: Fugitive Dust Control Plan, 5% opacity (6-min avg)	NI	BACT-PSD
		Grading at Tailings Basin	PM: Fugitive Dust Control Plan, 5% opacity (6-min avg)	NI	BACT-PSD
		120K Ton Concentrate Stockpile Loadout	PM: Fugitive Dust Control Plan, 5% opacity (6-min avg)	NI	BACT-PSD
		Oxide Product Loadout to Railcars	PM: Fugitive Dust Control Plan, 5% opacity (6-min avg)	NI	BACT-PSD
		These BACT requirements include daily check for visible emissions during daylight hours while fugitive emission operations are occurring.			
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Bentonite Bin	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.021 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	94%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Intermediate Dry Fuel Silo	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.11 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD

PM BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Prepared Dry Fuel Silo	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.07 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Final Transfer Conveyors and Loadout Conveyor	PM: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Reclaim Conveyor	PM: Baghouse with Leak Detection, 0.002 gr/dscf and 0.31 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Emergency Pellet Conveyor Transfer	PM: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Coal Bin 2	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.14 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Limestone Bin	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Mill Feeder 1	PM: Baghouse with Leak Detection, 0.002 gr/dscf and 0.51 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Lime Bin	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.02 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	PIL-102 Iron Ore Pellet Storage Piles (5,512 tons/hr)	Filterable PM: Wet Suppression, 5.61 lb/hr, 13.88 tons/yr	90%	BACT-PSD
Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	PIL-103 Flux Storage Piles (1,323 tons/hr)	Filterable PM: Wet Suppression, 1.98 lb/hr, 2.18 tons/yr	90%	BACT-PSD
		From Process Notes: Flux material includes Limestone and Dolomite			
Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	PIL-104 Pig Iron Storage Piles (1,102 tons/hr)	Filterable PM: Wet Suppression, 0.27 lb/hr, 0.78 tons/yr	NI	BACT-PSD
Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	PIL-107 Coke Breeze Storage Piles (661 tons/hr)	Filterable PM: Wet Suppression, 0.51 lb/hr, 1.27 tons/yr	NI	BACT-PSD
V & M Star: Youngstown, OH	OH-0316/ P0103660 (9/23/2008)	Alloy, Additives, & Flux Handling (134 tons/hr)	PM: Silo Bin Vent Filters, 6% opacity (6-min avg)	NI	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Direct Reduced Iron (DRI) Material Handling	PM: Enclosures/Baghouse, 0.47 lb/hr, 2.06 tons/yr, 0% opacity	NI	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Coal and Iron Ore Unloading	PM: Enclosures/Baghouse, 0.93 lb/hr, 4.07 tons/yr, 0% opacity	NI	BACT-PSD

PM BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
	Permit # 07-00587 (5/6/2008)	Coal and Iron Ore Unloading	PM: Fugitive Dust Control Plan, 6.15 tons/yr	NI	BACT-PSD
	A review of the permit shows that the process consists of a crane partially controlled by a three-sided enclosure transferring material to a hopper which is vented to the baghouse. The remaining emissions from the process are listed as fugitive emissions.				
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Alloy, Flux, Carbon, Limestone, & Coke Handling	PM: Enclosures/Baghouse, 1.4 lb/hr, 6.13 tons/yr, 0% opacity	NI	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Iron Ore Grinding (992 tons/yr)	PM: Baghouse with Cyclones, 1.04 lb/hr, 4.56 tons/yr, 0% opacity	NI	BACT-PSD
	Permit # 07-00587 (5/6/2008)	Iron Ore Handling Line (992 tons/yr)	PM: Fugitive Dust Control Plan, 1.03 tons/yr	NI	BACT-PSD
	A review of the permit shows that only Grinder 4A is controlled by the cyclones and baghouse. The remaining handling units (Grizzly Feeder 5A, Conveyor 6A, and Hopper 4A) are listed as fugitive emissions.				
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Conveyors, Hoppers, Screens to Rotary Hearth Furnace (227 tons/yr)	PM: Baghouse, 1.4 lb/hr, 6.13 tons/yr	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Ore Crushing and Handling	PM: No Control, 0.0025 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
		While the RBLC doesn't list a baghouse as control for PM, a baghouse is required for this process for the control of PM_{10} (filterable), lead, and fluorides.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Additive Handling	PM: Baghouse, 0.0025 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Oxide Pellet Handling	PM: Wet Scrubber, 0.005 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Small Material Loading Bins	PM: Baghouse, 0.0025 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Silos	PM: Baghouse, 0.0025 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Handling	PM: Wet Scrubber, 0.005 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Tertiary Ore Crushing: Crusher Lines 4 & 104 (700 LT/hr)	PM: Fabric Filter, 0.0025 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Nine Concentrate Storage Bins (200 LT/hr each)	PM: Fabric Filter, 0.003 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace Discharge (160 LT/hr each)	PM: Wet Scrubber, 0.005 gr/dscf	NI	BACT-PSD
Mesabi Nugget: Hoyt Lakes, MN	MN-0061/ 13700318-001 (6/26/2005)	Material Transfer Operations (100,000 dscfm)	PM: Fabric Filter, 0.005 gr/dscf, 10% opacity (6-min avg)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Material Handling Operations (PM)

Dry Material Handling
The air streams associated with dry material handling operations are characterized by air streams at or near ambient temperature and moisture content. Such streams would not be expected to contain materials that would be considered to be acidic or corrosive. As such, none of the listed particulate matter control devices were eliminated from consideration for the dry material handling operations because of technical infeasibility.

Raw Material Unloading and Storage Areas
Control devices draw pollutant laden air into themselves through ventilation hoods or other ducted enclosures, which must be close to the pollutant generation point in order to gather the air. The dumping of material from a truck is an irregular process, likely damaging or destroying any hoods near the truck's drop point. As such, stand-alone control devices were eliminated from consideration for the truck unloading areas because of technical infeasibility.

Similarly, when material is dropped from a conveyor onto a storage pile, the emission generation point is not at the conveyor but at the top of the storage pile itself. Since ventilation hoods or other ducted enclosures cannot be located close to the actual pollutant generation point, which is constantly changing in size, stand-alone control devices were eliminated from consideration for the storage piles and the loading of storage piles because of technical infeasibility.

Wet Material Handling Operations
The air streams associated with wet material handling operations are characterized by air streams at elevated moisture content. Such streams would be expected to clog and minimize the control efficiency of dry collection systems. As such, fabric filters and cyclones were eliminated from consideration for wet material handling operations because of technical infeasibility.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Material Handling Operations (PM)

The control technologies for dry material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 90%

(4) Cyclones: 70% - 90%

(5) Wet suppression: 50% - 90%

The control technologies for raw material unloading and storage areas are ranked as follows:

(1) Wet suppression: 50% - 90%

(2) Process enclosures: 50% - 90%

The control technologies for wet material handling operations are ranked as follows:

(1) Electrostatic precipitators: 95% - 99.9%+

(2) Wet scrubbers: 70% - 90%

(3) Wet suppression: 50% - 90%

Step 4: Evaluate the Most Effective Controls and Document the Results - Material Handling Operations (PM)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for dry material handling operations at iron ore pelletizing plants is fabric filtration. A few operations are controlled by wet scrubbers or wet suppression. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of PM. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.002 gr/dscf to 0.005 gr/dscf, with most processes being limited at 0.002 gr/dscf, which was determined to be BACT for many types of material handling operations.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material truck unloading at iron ore pelletizing plants is the use of a fugitive dust control plan.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material storage at iron ore pelletizing plants is the use of an enclosure. Inclusion of raw material storage into a fugitive dust control plan is also implemented.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material transfer at iron ore pelletizing plants is enclosures and fabric filtration that are appropriate to the material being handled and that are appropriate for the specific process. Since emission unit EU025a includes the dumping of material from a truck and the dropping of material from one conveyor to another, stand-alone control devices are not technical feasible as stated in Step 2. Therefore, emission unit EU025a (Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener) shall be controlled by the use of a site-specific fugitive dust control plan, enclosures for the Conveyor and Grizzly Feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Based on a review of the U.S. EPA RBLC and other Indiana permits, there is no primary control used for wet material handling operations (Iron Ore Wet Grinding and Filter Cake Production and Greenball Production) at iron ore pelletizing plants. In researching taconite ore processing (AP-42, Chapter 11.23.3), it specifically states that “because the ore remains wet, PM emissions are insignificant for the rest of the process until the dry stage of induration”. Additionally, these processes are generating less than ten tons per year each, and any type of control device for wet material (such as an electrostatic precipitator or wet scrubber) would be economically infeasible.

BACT Proposal

(a) Material Handling Group 1 Emission Units:

Group 1 Emission Units	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011

Group 1 Emission Units	
Description	Unit No.
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026

BACT for the Material Handling Group 1 emission units has been proposed to be the use of baghouses or bin vent filters with a grain loading of 0.002 gr/dscf and an appropriate pound per hour limitation.

(b) Material Handling Group 2 Emission Units (Raw Material Unloading):

Group 2 Emission Units	
Description	Unit No.
Limestone Unloading (Truck)	EU002a
Dolomite Unloading (Truck)	EU003a
Coke Breeze Unloading (Truck)	EU004a

BACT for the Material Handling Group 2 emission units has been proposed to be the use of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and an appropriate pound per hour and ton per year limitation.

(c) Material Handling Group 3 Emission Units (Raw Material Storage):

Group 3 Emission Units	
Description	Unit No.
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b

BACT for the Material Handling Group 3 emission units has been proposed to be the use of a site-specific fugitive dust control plan, the use of enclosures, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(d) Material Handling Group 4 Emission Units (Raw Material Transfer):

Group 4 Emission Units	
Description	Unit No.
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener	EU025a

BACT for the Material Handling Group 4 emission units has been proposed to be the use of a site-specific fugitive dust control plan, enclosures for the Conveyor and Grizzly Feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(e) Material Handling Group 5 Emission Units:

Group 5 Emission Units	
Description	Unit No.
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

BACT for the Material Handling Group 5 emission units has been proposed to be that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Step 5: Select BACT - Material Handling Operations (PM)

The proposed BACT for PM meets the most stringent BACT found in the RBLC for material handling operations. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM BACT for the above Material Handling Operations is given in the BACT Conclusion for PM.

(b) <u>Induration Furnaces (PM)</u>

Particulate matter emissions are primarily due to the attrition of particles (dust) from the iron oxide pellets. This is caused by the abrasion of pellets rubbing against each other and the process equipment as the pellets move through the induration furnace. Particulate matter is emitted from both the waste gas and hood exhaust vents.

The waste gas also contains a small amount of condensable particulate matter. The condensable particulates are primarily inorganic compounds like sulfates, acid gases, chlorides, and fluorides which are generated as a byproduct of pellet induration. The waste gas may also contain volatile organic compounds, which are products of incomplete natural gas combustion.

The following new emission units associated with the induration furnaces are subject to PM BACT requirements:

Particulate Matter Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust (WBE)	EU014	SV013B

Clean Fuels

Recent court and regulatory agency determinations have held that “clean fuels” must be considered as one of the emission control options in a BACT analysis. The fuels analysis will be based on pollutant emissions directly associated with the use of a particular fuel. Emissions from a specific fuel may be related to the inherent properties of the fuel (e.g., sulfur content) or by the nature of the combustion process and will be accounted for based on the uncontrolled pollutant emission factors for each fuel.

Historically EPA policy has held that a facility need not consider emission control options which would fundamentally “re-define” the proposed project. For example, a coal-fired power plant would not need to consider installation of a natural gas-fired turbine as BACT for emissions control as an alternative to the proposed coal-fired plant. However, recent court decisions have

held that clean fuels must be considered in a BACT review. So, for example, natural gas must be considered as an alternative fuel for a coal-fired boiler application (a turbine option is still excluded).

Good Combustion Practices

The organic particulate matter emissions are caused through incomplete combustion. When fuel and air are not well mixed in the combustion zone, low oxygen regions form in the fuel injection plume that cause unburned fuel to pyrolize at the high temperature and form soot. Soot formation can be minimized by improving the fuel air mixing through enhanced fuel injection systems, air management systems, and combustion system designs.

Existing PM BACT Determinations for Induration Furnaces

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

PM BACT Determinations – Induration Furnace					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 tons/hr pellets)	PM: Baghouse, 0.004 gr/dscf, 10.12 lb/hr, 5% opacity (6-min avg)	NI	BACT-PSD
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 tons/hr pellets)	PM: Baghouse, 0.004 gr/dscf, 12.12 lb/hr, 5% opacity (6-min avg)	NI	BACT-PSD
Existing PM BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**PM: Fabric Filter with Leak Detection, 0.004 gr/dscf and 27.00 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)**	**NI**	**BACT-PSD**
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**PM: Fabric Filter with Leak Detection, 0.004 gr/dscf and 18.00 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)**	**NI**	**BACT-PSD**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 1 (450 tons/hr pellets)	PM: Dry ESP, 0.006 gr/dscf and 10.50 lb/hr (3-hr rolling avg), 1% opacity (6-min avg)	99.9%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 2 (450 tons/hr pellets)	PM: Dry ESP, 0.006 gr/dscf and 7.10 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Furnace Hood Exhaust (624 st/hr pellets)	PM: Wet Scrubber, 0.006 gr/dscf and 23.00 lb/hr (3-hr rolling avg), 10% opacity (6-min avg)	93%	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Furnace Waste Gas (624 st/hr pellets)	PM: Wet Scrubber, 0.006 gr/dscf and 17.00 lb/hr (3-hr rolling avg), 10% opacity (6-min avg)	NI	BACT-PSD

PM BACT Determinations – Induration Furnace					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace 5 Hood Exhaust (Waste Gas #501, #502, #503) (160 LT/hr pellets)	PM: Wet ESP, 0.01 gr/dscf, 0.18 lb/MMBtu	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (PM)

Historically, baghouses have been deemed technically infeasible in iron induration furnaces due to the temperature limitations of the filter bag material. This is a concern primarily during malfunctions which result in high temperature excursions within the induration furnace. The straight grate induration furnace which Magnetation is proposing has features which can mitigate the effects of high temperature excursions which are not present in the grate/kiln design. The following is a description of those mitigating features that make a baghouse feasible on the Magnetation furnace:

- The traveling grate in a straight-grate furnace is not as susceptible to temperature swings as a grate/kiln. This is because a grate/kiln has one main burner while a traveling grate furnace has many individual gas burners. In Magnetation's case, multiple burners of varying size will be installed. This allows much more flexibility in temperature control within a straight grate furnace.

- A straight-grate furnace has the capability to divert gases from the hood exhaust stream into the firing zone for additional cooling via the tempering air stream to prevent high temperatures from damaging filter bags in waste gas service. The air in this stream is from the outlet of the second cooler and it has a much lower temperature than the firing zone gases. Additional cooling can be provided by drawing in ambient air via the air intake damper on the second cooler duct.

- A baghouse on the waste gas stream would receive exhaust gas after the proposed gas suspension absorber (see the SO_2 BACT determinations for furnace hood exhausts and furnace waste gas exhausts). Lime slurry and water are added in the absorber for SO_2 control. The evaporation of this water is a significant source of cooling, thus significantly reducing the potential for high temperature from reaching the waste gas baghouse.

- A baghouse on the hood exhaust would receive exhaust gas from the drying zone of the furnace where temperatures are low to begin with (<500°F) and the risk of temperature spiking very remote, and the risk of temperature spiking can be mitigated by adding the ability to introduce outside tempering air.

- Filter bags made with fiberglass and PTFE membrane coatings can withstand operating temperatures up to 500°F.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (PM)

The control technologies for induration furnace operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 99%+

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnaces (PM)

Based on a review of the U.S. EPA RBLC, the primary control used for induration furnaces is dry capture, either using fabric filtration or a dry ESP. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of PM. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.006 gr/dscf to 0.01 gr/dscf.

BACT Proposal – Induration Furnace (PM)

BACT for the PM emissions from the induration furnace has been proposed to be controlled through the use of a baghouse with a maximum outlet concentration of 0.004 gr/dscf, an appropriate pound per hour limitation, and that the opacity shall not exceed five percent (5%) on a six (6) minute average.

Step 5: Select BACT - Induration Furnace (PM)

The proposed BACT for PM meets the most stringent BACT found in the RBLC for induration furnaces. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM BACT for the induration furnace is given in the BACT Conclusion for PM.

(c) <u>Combustion Units (PM)</u>

The following emission units associated with combustion processes are subject to PM BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 MMBtu/hr total)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

Clean Fuels

Recent court and regulatory agency determinations have held that “clean fuels” must be considered as one of the emission control options in a BACT analysis. The fuels analysis will be based on pollutant emissions directly associated with the use of a particular fuel. Emissions from a specific fuel may be related to the inherent properties of the fuel (e.g., sulfur content) or by the nature of the combustion process and will be accounted for based on the uncontrolled pollutant emission factors for each fuel.

Historically EPA policy has held that a facility need not consider emission control options which would fundamentally “re-define” the proposed project. For example, a coal-fired power plant would not need to consider installation of a natural gas-fired turbine as BACT for emissions control as an alternative to the proposed coal-fired plant. However, recent court decisions have

held that clean fuels must be considered in a BACT review. So, for example, natural gas must be considered as an alternative fuel for a coal-fired boiler application (a turbine option is still excluded).

Good Combustion Practices

The organic particulate matter emissions are caused through incomplete combustion. When fuel and air are not well mixed in the combustion zone, low oxygen regions form in the fuel injection plume that cause unburned fuel to pyrolize at the high engine temperature and form soot. Soot formation can be minimized by improving the fuel air mixing through enhanced fuel injection systems, air management systems, combustion system designs, and pre-mixed diesel combustion.

(1) Natural Gas Fired Emergency Generator (PM)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (PM)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these PM BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to December 2012 for natural gas fired generators only used for emergency purposes.

PM BACT Determinations - Emergency Generator					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	PM: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing PM BACT Determinations - Emergency Generators					
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	TSP: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (860 hp)	TPM: Use of pipeline quality natural gas, 0.34 g/hp-hr (0.44 g/kw-hr)	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	PM: Use of pipeline quality natural gas, 0.54 g/kw-hr, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	PM: Use of pipeline quality natural gas, 0.20 g/kw-hr, 0.44 lb/hr, 0.04 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (PM)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (PM)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (PM)

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the emergency generator.

The natural gas fired emergency generator (EU017) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour and/or pounds per hour of PM. Grams per kilowatt-hour is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed generator. Additionally under 326 IAC 2-7, an emergency generator is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired generators in the same size category.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (PM)

A detailed PM BACT for the natural gas fired emergency generator is given in the BACT Conclusion for PM.

(2) Natural Gas Fired Fire Pump (PM)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (PM)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these PM BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

PM BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	PM: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing PM BACT Determinations – Emergency Generators					
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	TSP: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (860 hp)	TPM: Use of pipeline quality natural gas, 0.34 g/hp-hr (0.44 g/kw-hr)	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	PM: Use of pipeline quality natural gas, 0.54 g/kw-hr, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	PM: Use of pipeline quality natural gas, 0.20 g/kw-hr, 0.44 lb/hr, 0.04 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (PM)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (PM)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (PM)

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the fire pump.

The natural gas fired fire pump (EU018) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission

limitations in terms of grams per kilowatt-hour and/or pounds per hour of PM. Grams per kilowatt-hour is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency fire pump is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired fire pumps in the same size category.

Step 5: Select BACT - Natural Gas Fired Fire Pump (PM)

A detailed PM BACT for the natural gas fired fire pump is given in the BACT Conclusion for PM.

(3) Natural Gas Fired Space Heaters and Air Heaters (PM)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (PM)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these PM BACT determinations as provided by the RBLC. The search was limited to entries from January 2006 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

PM BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	PM: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation*		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	PM: Baghouse, use of natural gas, good combustion practices	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	PM: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Existing PM BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	TPM: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
City of Victorville: Victorville, CA	CA-1191/ SE 07-02 (3/11/2010)	Auxiliary Heater (40 MMBtu/hr)	TPM: Use of pipeline quality natural gas, 1000 hours/year, 0.20 gr/100 dscf	NI	BACT-PSD
Pryor Plant Chemical : Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	TPM: 0.15 lb/hr	NI	BACT-PSD

PM BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	ASU Regen Heater SRC13 (0.1 MMBtu/hr)	PM: Good combustion practices, 20% opacity	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	Gasifier Heaters SRC14 & SRC15 (25 MMBtu/hr)	PM: Good combustion practices, 20% opacity	NI	BACT-PSD
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	TPM: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	TPM: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD

*Note: PM combustion emissions for EU010 are accounted for in the material handling limits.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (PM)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (PM)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (PM)

Based on a review of the RBLC, add-on control devices are generally not used for controlling particulate emissions from natural gas fired space heaters or air heaters. Most facilities express emission limitations in terms of pounds per hour of PM. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. Emission limits for PM (when converted for comparison) varied from 0.0072 lb/MMBtu to 0.0075 lb/MMBtu.

BACT has been proposed to be the restricted use of only natural gas and the use of good combustion practices along with an emission limit, which is 0.0072 lb/MMBtu for each of the proposed heaters.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (PM)

A detailed PM BACT for natural gas fired heaters is given in the BACT Conclusion for PM.

(d) <u>Cooling Towers (PM)</u>

Particulate matter emissions are primarily due to the dissipation of heat loads from plant condensate to the atmosphere. Some of the liquid water may be entrained in the air stream and

can be carried out of the tower as "drift" droplets. As the droplet evaporates in the atmosphere, any suspended or dissolved material will solidify as particulate matter.

The following new emission units associated with the cooling towers are subject to PM BACT requirements:

Particulate Matter Emission Units Associated with the Cooling Tower		
Emission Unit		Associated Emission Point
Description	Unit No.	
Cooling Tower	EU024	SV022

Drift Eliminators

Cooling towers are a source of particulate matter emissions from the small amount of water mist that is entrained with the cooling air as “drift”. The cooling water contains small amounts of dissolved solids which become particulate emissions once the water mist evaporates. To reduce the drift from cooling towers, drift eliminators are typically incorporated into the tower design to remove as many droplets as practical from the air stream before exiting the tower.

Particulate matter emissions occur from cooling towers when suspended solids contained in water used in the cooling tower becomes airborne as the water is circulated and cooled. Drift eliminators contain packing which is used to limit the amount of this particulate matter which becomes airborne during the cooling process. As mist passes through the packing, the particles in the air contact and adhere to the surface of the packing. As condensed water flows down this packing, these particles are removed.

Total Dissolved Solids

The minimization of the total dissolved solids (TDS) of the water entering the cooling tower prior to the entrainment of the air reduces the amount of particulate emitted to atmosphere.

Existing PM BACT Determinations for Cooling Towers
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for cooling towers at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries), as well as various sources with cooling towers of comparable size, from January 2004 to January 2013.

PM BACT Determinations – Cooling Tower					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Cooling Tower EU024 (4,600 gpm)	Filterable PM: Drift eliminator with a maximum drift rate of 0.001% of the circulating water flow rate, use of cooling water with less than 6,009 milligrams per liter TDS concentration, 0.138 lb/hr, 10% opacity (6-min avg)	NI	BACT-PSD

PM BACT Determinations – Cooling Tower					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Existing PM BACT Determinations – Cooling Towers					
V & M Star: Youngstown, OH	OH-0344/ P0107088 (1/27/2011)	Cooling Water Towers (2) and Contact Water (1,372,000 gpm)	PM: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 10% opacity (6-min avg)	NI	Other Case-by-Case
			This BACT is listed under the pollutant Visible Emissions.		
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Melt Shop Spray Contact Cooling Tower (198,360 gpm)	TPM: 0.22 lb/hr, 0.96 tons/yr, 10% opacity (6-min avg)	NI	BACT-PSD
			Process Notes: Cooling tower with 0.005% drift rate and a maximum TDS content of 2,650 mg/L		
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Rolling Mill Contact Cooling Tower (225,000 gpm)	TPM: 0.46 lb/hr, 2.01 tons/yr, 10% opacity (6-min avg)	NI	BACT-PSD
			Process Notes: Cooling tower with 0.005% drift rate and a maximum TDS content of 2,650 mg/L		
Consolidated Environmental Management Inc. – Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	TWR-101: Blast Furnace Cooling Tower	Filterable PM: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration	NI	BACT-PSD
Consolidated Environmental Management Inc. – Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	TWR-102: Iron Solidification Cooling Tower	Filterable PM: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.042 lb/hr, 0.18 tons/yr	NI	BACT-PSD
Consolidated Environmental Management Inc. – Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	TWR-103: Air Separation Plant Cooling Tower	Filterable PM: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.026 lb/hr, 0.11 tons/yr	NI	BACT-PSD
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Pipe Mill Cooling Tower (1,800,000 gpm)	PM: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 10% opacity (6-min avg)	NI	Other Case-by-Case
			This BACT is listed under the pollutant Visible Emissions.		

PM BACT Determinations – Cooling Tower					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Melt Shop Cooling Tower (3,000,000 gpm)	PM: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 10% opacity (6-min avg)	NI	Other Case-by-Case
			This BACT is listed under the pollutant Visible Emissions.		
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Cooling Towers (12) (1,440,000 gpm)	PM: Drift Eliminators, 3.42 lb/hr and 14.99 tons/yr (combined)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Cooling Tower	PM: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 20% opacity (6-min avg)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Cooling Towers (PM)

No technologies were eliminated from consideration because of technical infeasibility for cooling towers.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Cooling Towers (PM)

The control technologies for cooling towers are ranked as follows:

(1) Drift eliminators.

(2) Minimization of total dissolved solids (TDS).

Step 4: Evaluate the Most Effective Controls and Document the Results – Cooling Tower (PM)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for cooling towers at iron ore pelletizing plants is drift eliminators. Most facilities express emission limitations in terms of maximum drift rate and an associated pound per hour limitation. However, all of the cooling towers listed in the RBLC for the pollutant PM are not comparable to the one proposed by Magnetation due to size differences; therefore, a second review of the RBLC was performed for similarly sized cooling towers under the pollutant PM_{10}. The only cooling tower in the range of the proposed cooling tower with a listed drift rate is located at Entergy New Orleans, Inc. (Michoud Electric Plant). The drift rate is 0.001%.

BACT Proposal

BACT has been proposed to be the use of drift eliminators with a maximum drift rate of 0.001%, use of cooling water with less than 6,009 milligrams per liter TDS concentration, and an appropriate pound per hour limitation. The basis for the TDS concentration is documented in the RBLC PM_{10} BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

Step 5: Select BACT – Cooling Tower (PM)

The proposed BACT for PM meets the most stringent BACT found in the RBLC for cooling towers of comparable size. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM BACT for the cooling tower is given in the BACT Conclusion for PM.

(e) <u>Fugitive Dust Emissions (PM) from Paved Roads</u>

Fugitive dust emissions will be generated from vehicles traveling over plant roads.

Existing BACT Determinations - Fugitive Dust Emissions (PM)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for fugitive dust emissions from paved roads at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2005 to January 2013.

PM BACT Determinations: Fugitive Dust Emissions					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fugitive Dust Emissions from Paved Roads	PM: Vacuum sweeping and water flushing as necessary, speed reduction plan, in accordance with the required fugitive dust control plan	NI	BACT-PSD
Existing PM BACT Determinations: Fugitive Dust Emissions					
V & M Star: Youngstown, OH	OH-0344/ P0107088 (1/27/2011)	Paved/Unpaved Roadways and Parking Areas	PM: Control measures (watering, sweeping, chemical stabilization, or suppressants), 38.30 tons/yr total PM	NI	BACT-PSD
			PM: Control measures (watering, sweeping, chemical stabilization, or suppressants), 0% opacity, no visible emissions except for 3 minutes during any 60-minute period	NI	Other Case-by-Case
				Note: This RBLC listing is listed under the pollutant Visible Emissions.	
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Roadways (8,375 VMT/yr)	PM: Control measures (watering, resurfacing, chemical stabilization, or speed reduction), 30.64 tons/yr total PM	NI	BACT-PSD
			PM: Control measures (watering, resurfacing, chemical stabilization, or speed reduction), 0% opacity, no visible emissions except for 3 minutes during any 60-minute period	NI	Other Case-by-Case
				Note: This RBLC listing is listed under the pollutant Visible Emissions.	
Sun Coke Energy, Inc.: Middletown, OH	OH-0332/ P0104768 (2/9/2010)	Roadways and Parking Areas	PM: Control measures, 1.08 tons/yr total PM	NI	BACT-PSD
			PM: Control measures, 0% opacity, no visible emissions except for 1	NI	LAER

PM BACT Determinations: Fugitive Dust Emissions					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
			minute during any 60-minute period	Note: This RBLC listing is listed under the pollutant Visible Emissions.	
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Roadways and Parking Areas	Filterable PM: Control measures, 62.60 tons/yr	NI	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Paved Roadways and Parking Areas	PM: Control measures (wet suppressants, watering, speed reduction, and vacuuming/sweeping), 153.40 tons/yr	NI	BACT-PSD
			PM: Control measures (wet suppressants, watering, speed reduction, and vacuuming/sweeping), 0% opacity, no visible emissions except for 1 minute during any 60-minute period	NI	Other Case-by-Case
				Note: This RBLC listing is listed under the pollutant Visible Emissions.	
Suncoke (Gateway Energy & Coke): Granite City, IL	IL-0109/ 06070020 (3/13/2008)	Roads, Parking Areas, Other Open Areas	Filterable PM: Work practices (paving, fugitive dust control program)	NI	BACT-PSD
Mesabi Nugget: Hoyt Lakes, MN	MN-0061/ 13700318-001 (6/26/2005)	Fugitives from Paved Roads	PM: Fugitive dust control plan, 5% opacity	NI	BACT-PSD
Auburn Nugget: Butler, IN	IN-0119/ 033-19475-00092 (5/31/2005)	Roads	PM: Fugitive dust control plan, 10% opacity	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Fugitive Dust Emissions (PM)

Fugitive dust emissions will be generated from vehicles traveling over plant roads. Typical particulate control devices such as fabric filtration, mechanical collectors, wet scrubbers, and ESPs are not technically feasible for the control of fugitive dust emissions because, by definition, fugitive emissions cannot be reasonable routed through a single point of exhaust. Therefore, these control devices will not be considered further for fugitive dust emissions.

Since the inclusions of opacity readings as limits were considered under LAER or other case-by-case basis and not as part of a BACT determination, the taking of opacity readings will not be considered further for fugitive dust emissions.

A review of the U.S. EPA RBLC shows that fugitive dust emissions from roads at other iron ore beneficiating plants, steel mills, and steel foundries are controlled through the paving of roads and then through the use of wetting agents or controlling the accumulation of dusty material on the roads. Removal of the accumulation of silt on the roadways can be accomplished various mechanical means including sweeping or vacuuming. Fugitive dust control plans are also typically implemented.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Fugitive Dust Emissions (PM)

The most effective control for fugitive dust emissions from roadways is paving of the roads and the implementation of a site-specific Fugitive Dust Control Plan.

Step 4: Evaluate the Most Effective Controls and Document the Results - Fugitive Dust Emissions (PM)

Based on a review of the RBLC, the most stringent BACT for fugitive dust control of roads is development, implementation and maintenance of a site specific Fugitive Dust Control Plan.

BACT Proposal

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Step 5: Select BACT - Fugitive Dust Emissions (PM)

BACT shall be the development, maintenance, and implementation of a site-specific fugitive dust control plan. Since the source is required to meet the most stringent BACT for fugitive emissions from paved roads, no further evaluation of these operations is required and an economic, energy, or environmental impact analysis is not required as part of the BACT evaluation for these operations.

A detailed PM BACT for fugitive dust emissions is given in the BACT Conclusion for PM.

BACT Conclusion for PM

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for PM emissions shall be as follows:

(a) Material Handling Operations

The material handling operations shall be limited as follows:

(1) PM emissions from the following emission units (EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, and EU026) shall be controlled by fabric filter dust collectors and shall not exceed the associated emission limits listed in the following table:

Emission Unit		Control	PM Limit (gr/dscf)	PM Limit (lb/hr)
Description	(Unit ID)			
Iron Concentrate Unloading	EU001a	Baghouse CE001	0.002	0.95
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	Baghouse CE004	0.002	0.0429
Bentonite Unloading (Truck) & Storage Area	EU005	Bin Vent CE005	0.002	0.0429
Organic Binder Unloading & Storage Area	EU006	Bin Vent CE006	0.002	0.0429
Soda Ash Unloading & Storage Area	EU007	Bin Vent CE007	0.002	0.0429
Bentonite Additive System	EU008	Bin Vent CE008	0.002	0.0429
Coke Breeze Additive System	EU009	Baghouse CE009	0.002	0.09
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse CE023	0.002	0.22

Emission Unit		Control	PM Limit (gr/dscf)	PM Limit (lb/hr)
Description	(Unit ID)			
Ground Limestone and Dolomite Additive System	EU010	Baghouse CE010	0.002	0.32
Mixing Area Material Handling System	EU011	Baghouse CE011	0.002	0.34
Hearth Layer Bin System	EU012	Baghouse CE012	0.002	0.15
Furnace Discharge System	EU015	Baghouse CE017	0.002	0.73
Hearth Layer Separation System	EU016	Baghouse CE018	0.002	0.79
Oxide Pellet Storage & Unloading System	EU019	Baghouse CE019	0.002	0.63
WBE Lime Storage Area	EU020	Bin Vent CE020	0.002	0.02
WBE Residual Product Loading Area	EU022	Bin Vent CE021	0.002	0.02
Recycled Dust Storage Area	EU026	Baghouse CE024	0.002	0.16

(2) PM emissions from the following emission units (EU002a, EU003a, and EU004a) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM	5.33 E-04	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM	7.45 E-04	3.26 E-03

(3) PM emissions from the following emission units (EU001b, EU002b and EU003b) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, by enclosures, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Iron Concentrate Transfer and Storage Area	EU001b	PM	3.93	17.21
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	PM	0.05	0.10
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	PM	0.03	0.06

(4) PM emissions from the following emission unit (EU025a) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control

plan, by enclosures, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Limestone/Dolomite Hopper, Belt Feeder & Grizzly Feeder/Screener	PM	0.90	1.92

(5) The Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System opacity shall not exceed five percent (5%) on a six (6) minute average and shall not exceed the emission limits listed in the following table:.

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Iron Ore Wet Grinding and Filter Cake Production	PM	0.77	3.37
Greenball Production System	PM	0.77	3.37

(b) Induration Furnace

The induration furnace operations shall be limited as follows:

PM emissions from the Furnace Hood Exhaust (EU013) and the Furnace Windbox Exhaust (EU014) shall be controlled by fabric filter dust collectors and shall not exceed the emission limits listed in the following table:

Emission Unit		Control	PM Limit (gr/dscf)	PM Limit (lb/hr)	Opacity (6-min avg)
Description	Unit No.				
Furnace Hood Exhaust	EU013	Baghouse CE013	0.004	10.12*	5%
Furnace Windbox Exhaust	EU014	Baghouse CE016	0.004	12.12*	5%

*The PM limits include process emissions and combustion emissions.

(c) Combustion Units

The combustion units shall be limited as follows:

(1) PM emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(2) PM emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(3) PM emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 0.0072 lb/MMBtu.

(d) Cooling Tower

The cooling tower emissions shall be controlled through the use of drift eliminators with a maximum drift rate of 0.001%, the use of cooling water with less than 6,009 milligrams per liter

TDS concentration, and a 0.138 pound per hour limitation. The basis for the TDS concentration is documented in the RBLC PM_{10} BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

(e) Fugitive Dust Emissions from Paved Roads

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (PSD BACT) with regards to PM.

Particulate Matter Less than 10 Microns (PM_{10}) BACT

The PM_{10} BACT analysis is divided into five categories: material handling operations, induration furnaces, combustion units, cooling towers, and fugitive emissions.

Step 1 of the BACT process is shown below for this PM_{10} BACT analysis to describe general particulate control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific PM_{10} control devices may be discussed in individual BACT analyses. A summary of the PM_{10} BACT determinations is provided at the end of this section.

Step 1: Identify Potential Control Technologies (PM_{10})

Particulate matter less than 10 microns (PM_{10}) is a subset of PM that includes particulate with a diameter of 10 micrometers or less. PM_{10} may be referred to as coarse particles and can cause health and environmental problems.

Particulate is typically measured as filterable or condensable particulate. Filterable particulate is emitted directly as solid or liquid at the stack, whereas condensable particulate is in the vapor phase at the stack and condenses upon cooling in the ambient air to form solid or liquid particulate. Filterable particulate may be PM, PM_{10}, or $PM_{2.5}$. Condensable particulate exists mostly as $PM_{2.5}$, but PM_{10} may also include a condensable portion. Combustion processes and industrial processes involving heat tend to form both filterable and condensable particulate. Industrial processes that don't involve heat and moisture typically only produce filterable particulate.

The control technologies for emissions of PM_{10} are generally going to be similar as those for PM. These technologies (mechanical collectors, wet scrubber, electrostatic precipitators, and fabric filter dust collectors) are discussed in the PM BACT analysis.

(a) <u>Material Handling Operations (PM_{10})</u>

The emissions from the material handling operations are in the form of particulate matter (PM, PM_{10}, and $PM_{2.5}$). Particulate matter emissions are primarily due to the attrition of particles (dust) from the feedstocks, iron oxide pellets, and by-products. This is caused by the abrasion of materials rubbing against each other and the process equipment as they move through the process.

The following new emission units associated with material handling operations are subject to PM_{10} BACT requirements:

PM_{10} Emission Units Associated with Material Handling Operations	
Emission Unit	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Unloading (Truck)	EU002a
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Unloading (Truck)	EU003a
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b
Coke Breeze Unloading (Truck)	EU004a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder	EU025a
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

Existing PM_{10} BACT Determinations for Material Handling Operations

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for material handling operations at iron ore pelletizing plants. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

PM_{10} BACT Determinations - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations: EU001, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	PM_{10}: Fugitive Dust Control Plan 5% opacity (6-min avg) 1.07E-03 lb/hr and 2.20E-03 tpy	NI	BACT-PSD

PM_{10} BACT Determinations - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	PM_{10}: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.33 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU004a	PM_{10}: Fugitive Dust Control Plan 5% opacity (6-min avg) 3.52 E-04 lb/hr and 1.54 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU001b	PM_{10}: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 1.57 lb/hr and 6.88 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage EU002b	PM_{10}: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.02 lb/hr and 0.04 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU003b	PM_{10}: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.01 lb/hr and 0.02 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Transfer): EU025a	PM_{10}: Enclosed conveyor and grizzly, 5% opacity (6-min avg) 0.33 lb/hr and 0.70 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Iron Ore Wet Grinding and Filter Cake Production	PM_{10}: 5% opacity (6-min avg) 0.07 lb/hr and 0.31 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Greenball Production System	PM_{10}: 5% opacity (6-min avg) 0.07 lb/hr and 0.31 tpy	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Material Handling Operations					
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Oxide Pellet Stockpile Conveyor Gallery	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.77 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Bin	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 1.40 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Feed	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.12 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Discharge	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 3.30 lb/hr (3-hr rolling avg)	NI	BACT-PSD

PM_{10} BACT Determinations - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Screening and Handling	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 2.90 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Carbon Bin for Mercury Control	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Lime Bin for Scrubber	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Primary Grinding Mill Line 3	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.23 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Grizzly Transfer Tower	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.079 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Dozer Activity at Tailings Basin	PM_{10}: Fugitive Dust Control Plan	NI	BACT-PSD
		Grading at Tailings Basin	PM_{10}: Fugitive Dust Control Plan	NI	BACT-PSD
		120K Ton Concentrate Stockpile Loadout	PM_{10}: Fugitive Dust Control Plan	NI	BACT-PSD
		Oxide Product Loadout to Railcars	PM_{10}: Fugitive Dust Control Plan	NI	BACT-PSD
		These BACTs are listed under the pollutant Visible Emissions. The BACT determination (Table 1-12) states the limit is the use of the Fugitive Dust Control Plan.			
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Bentonite Bin	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	94%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Intermediate Dry Fuel Silo	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.11 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Prepared Dry Fuel Silo	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.07 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Final Transfer Conveyors and Loadout Conveyor	Filterable PM_{10}: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD

PM_{10} BACT Determinations - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Reclaim Conveyor	Filterable PM_{10}: Baghouse with Leak Detection, 0.002 gr/dscf and 0.31 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Emergency Pellet Conveyor Transfer	Filterable PM_{10}: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Coal Bin 2	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.14 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Limestone Bin	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Mill Feeder 1	Filterable PM_{10}: Baghouse with Leak Detection, 0.002 gr/dscf and 0.51 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Lime Bin	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.02 lb/hr (3-hr rolling avg)	95%	BACT-PSD
V & M Star: Youngstown, OH	OH-0316 (9/23/2008)	Alloy, Additives, & Flux Handling (134 tons/hr)	Filterable PM_{10}: Silo Bin Vent Filters, 0.11 lb/hr, 0.33 tons/yr	NI	BACT-PSD
Mid American Steel Rolling Mill: Madill, OK	OK-0128/ 2003-106-C (M-1)(PSD) (9/8/2008)	Storage Silos (3) (Lime, Carbon, Baghouse Catch)	Filterable PM_{10}: Baghouses, 0.005 gr/dscf, 0.03 lb/hr/silo	99.9%	BACT-PSD
Mid American Steel Rolling Mill: Madill, OK	OK-0128/ 2003-106-C (M-1)(PSD) (9/8/2008)	Slag Processing	Filterable PM_{10}: Unit Must Process Wet Material	99.9%	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Direct Reduced Iron (DRI) Material Handling	PM_{10}: No control, 0.56 tons/yr	NI	LAER
		Coal and Iron Ore Unloading	PM_{10}: No control, 0.99 tons/yr	NI	BACT-PSD
		Alloy, Flux, Carbon, Limestone, & Coke Handling	PM_{10}: No control, 2.10 tons/yr	NI	BACT-PSD
		Iron Ore Grinding (992 tons/yr)	PM_{10}: No control, 0.40 tons/yr	NI	BACT-PSD
		Conveyors, Hoppers, Screens to Rotary Hearth Furnace (227 tons/yr)	PM_{10}: No control, 1.88 tons/yr	NI	BACT-PSD
		These BACTs are listed under the pollutant Particulate Matter, Fugitive.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Ore Crushing and Handling	Filterable PM_{10}: Baghouse, 0.0025 gr/dscf	NI	BACT-PSD

PM_{10} BACT Determinations - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Additive Handling	Filterable PM_{10}: Baghouse, 0.0025 gr/dscf	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Oxide Pellet Handling	Filterable PM_{10}: Wet Scrubber, 0.005 gr/dscf	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Small Material Loading Bins (Lime, Limestone, Carbon, Fluorospar, Bauxite)	Filterable PM_{10}: No Control, 0.0025 gr/dscf	NI	BACT-PSD
		While the RBLC doesn't list a baghouse as control for PM_{10}, a baghouse is required for this process for the control of PM.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Handling	Filterable PM_{10}: Wet Scrubber, 0.005 gr/dscf	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0090/ 1139-AOP-R6 (4/3/2006)	Slag Processing	Filterable PM_{10}: Water Sprays, 1.5 lb/hr, 2.2 tons/yr	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0090/ 1139-AOP-R6 (4/3/2006)	Miscellaneous Dust Sources (Scale Removal, Scale Breaker, Chromate Spray, Lime Silo)	Filterable PM_{10}: Fabric Filter, 0.003 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Tertiary Ore Crushing: Crusher Lines 4 & 104 (700 LT/hr)	Filterable PM_{10}: Fabric Filter, 0.0025 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Nine Concentrate Storage Bins (200 LT/hr each)	Filterable PM_{10}: Fabric Filter, 0.003 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace Discharge (160 LT/hr each)	Filterable PM_{10}: Fabric Filter, 0.01 gr/dscf, 0.18 lb/MMBtu	NI	BACT-PSD
Mesabi Nugget: Hoyt Lakes, MN	MN-0061/ 13700318-001 (6/26/2005)	Material Transfer Operations (100,000 dscfm)	Filterable PM_{10}: Fabric Filter, 0.005 gr/dscf	98%	BACT-PSD
Bluewater Project: Osceola, AR	AR-0077/ 2062-AOP-R0 (7/22/2004)	Material Handling Silos	Filterable PM_{10}: Fabric Filters, 0.01 gr/dscf	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0078/ 1139-AOP-R5 (6/9/2003)	Material Handling	Filterable PM_{10}: Fabric Filter, 0.01 gr/dscf	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0078/ 1139-AOP-R5 (6/9/2003)	Lime Silo	Filterable PM_{10}: Fabric Filter, 0.005 gr/dscf, 0.1 lb/hr, 0.1 tons/yr	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0078/ 1139-AOP-R5 (6/9/2003)	Carbon Silo	Filterable PM_{10}: Fabric Filter, 0.01 gr/dscf, 0.1 lb/hr, 0.5 tons/yr	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0078/ 1139-AOP-R5 (6/9/2003)	Slag Processing	Filterable PM_{10}: Use of Wet Material, 1.8 lb/hr, 4.1 tons/yr	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Material Handling Operations (PM_{10})

Dry Material Handling

The air streams associated with dry material handling operations are characterized by air streams at or near ambient temperature and moisture content. Such streams would not be expected to

contain materials that would be considered to be acidic or corrosive. As such, none of the listed particulate matter control devices were eliminated from consideration for the dry material handling operations because of technical infeasibility.

Raw Material Unloading and Storage Areas
Control devices draw pollutant laden air into themselves through ventilation hoods or other ducted enclosures, which must be close to the pollutant generation point in order to gather the air. The dumping of material from a truck is an irregular process, likely damaging or destroying any hoods near the truck's drop point. As such, stand-alone control devices were eliminated from consideration for the truck unloading areas because of technical infeasibility.

Similarly, when material is dropped from a conveyor onto a storage pile, the emission generation point is not at the conveyor but at the top of the storage pile itself. Since ventilation hoods or other ducted enclosures cannot be located close to the actual pollutant generation point, which is constantly changing in size, stand-alone control devices were eliminated from consideration for the storage piles and the loading of storage piles because of technical infeasibility.

Wet Material Handling Operations
The air streams associated with wet material handling operations are characterized by air streams at elevated moisture content. Such streams would be expected to clog and minimize the control efficiency of dry collection systems. As such, fabric filters and cyclones were eliminated from consideration for wet material handling operations because of technical infeasibility.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Material Handling Operations (PM_{10})

The control technologies for dry material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 90%

(4) Cyclones: 70% - 90%

(5) Wet suppression: 50% - 90%

The control technologies for truck unloading areas are ranked as follows:

(1) Wet suppression: 50% - 90%

(2) Process enclosures: 50% - 90%

The control technologies for wet material handling operations are ranked as follows:

(1) Electrostatic precipitators: 95% - 99.9%+

(2) Wet Scrubbers: 70% - 90%

(3) Wet Suppression: 50% - 90%

Step 4: Evaluate the Most Effective Controls and Document the Results - Material Handling Operations (PM_{10})

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for dry material handling operations at iron ore pelletizing plants is fabric filtration. A few operations are controlled by wet scrubbers or wet suppression. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of PM_{10}. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.002 gr/dscf to 0.005 gr/dscf, with most processes being limited at 0.002 gr/dscf, which was determined to be BACT for many types of material handling operations.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material truck unloading at iron ore pelletizing plants is the use of a fugitive dust control plan.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material storage at iron ore pelletizing plants is the use of an enclosure. Inclusion of raw material storage into a fugitive dust control plan can also be implemented.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material transfer at iron ore pelletizing plants is enclosures and fabric filtration that are appropriate to the material being handled and that are appropriate for the specific process. Since emission unit EU025a includes the dumping of material from a truck and the dropping of material from one conveyor to another, stand-alone control devices are not technical feasible as stated in Step 2. Therefore, emission unit EU025a (Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener) shall be controlled by the use of a site-specific fugitive dust control plan, enclosures for the Conveyor and Grizzly Feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Based on a review of the U.S. EPA RBLC and other Indiana permits, there is no primary control used for wet material handling operations (Iron Ore Wet Grinding and Filter Cake Production and Greenball Production) at iron ore pelletizing plants. In researching taconite ore processing (AP-42, Chapter 11.23.3), it specifically states that “because the ore remains wet, PM emissions are insignificant for the rest of the process until the dry stage of induration”. Additionally, these processes are generating less than ten tons per year each, and any type of control device for wet material (such as an electrostatic precipitator or wet scrubber) would be economically infeasible.

BACT Proposal

(a) Material Handling Group 1 Emission Units:

Group 1 Emission Units	
Description	Unit No.
Iron Concentrate Unloading & Storage Area	EU001
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012

Group 1 Emission Units	
Description	Unit No.
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026

BACT for the Material Handling Group 1 emission units has been proposed to be the use of baghouses or bin vent filters with a grain loading of 0.002 gr/dscf and an appropriate pound per hour limitation.

(b) Material Handling Group 2 Emission Units (Raw Material Unloading):

Group 2 Emission Units	
Description	Unit No.
Limestone Unloading (Truck)	EU002a
Dolomite Unloading (Truck)	EU003a
Coke Breeze Unloading (Truck)	EU004a

BACT for the Material Handling Group 2 emission units has been proposed to be the use of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and an appropriate pound per hour and ton per year limitation.

(c) Material Handling Group 3 Emission Units (Raw Material Storage):

Group 3 Emission Units	
Description	Unit No.
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b

BACT for the Material Handling Group 3 emission units has been proposed to be the use of a site-specific fugitive dust control plan, of enclosures, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(d) Material Handling Group 4 Emission Units (Raw Material Transfer):

Group 4 Emission Units	
Description	Unit No.
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener	EU025a

BACT for the Material Handling Group 4 emission units has been proposed to be the use of a site-specific fugitive dust control plan, enclosures, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(e) Material Handling Group 5 Emission Units:

Group 5 Emission Units	
Description	Unit No.
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

BACT for the Material Handling Group 5 emission units has been proposed to be that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Step 5: Select BACT - Material Handling Operations (PM_{10})

The proposed BACT for PM_{10} meets the most stringent BACT found in the RBLC for material handling operations. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM_{10} BACT for the above Material Handling Operations is given in the BACT Conclusion for PM_{10}.

(b) <u>Induration Furnace (PM_{10})</u>

Particulate matter emissions are primarily due to the attrition of particles (dust) from the iron oxide pellets. This is caused by the abrasion of pellets rubbing against each other and the process equipment as the pellets move through the induration furnace. Particulate matter is emitted from both the waste gas and hood exhaust vents.

The waste gas also contains a small amount of condensable particulate matter. The condensable particulates are primarily inorganic compounds like sulfates, acid gases, chlorides, and fluorides which are generated as a byproduct of pellet induration. The waste gas may also contain volatile organic compounds, which are products of incomplete natural gas combustion.

The following new emission units associated with the induration furnace are subject to PM_{10} BACT requirements:

Particulate Matter Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust	EU014	SV013B

Existing PM_{10} BACT Determinations for Induration Furnaces
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2002 to January 2012.

Existing PM_{10} BACT Determinations – Induration Furnaces					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 tons/hr pellets)	PM_{10}: Baghouse, 0.008 gr/dscf, 20.23 lb/hr	NI	BACT-PSD
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 tons/hr pellets)	PM_{10}: Baghouse, 0.008 gr/dscf, 24.25 lb/hr	NI	BACT-PSD
Existing PM10 BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**Filterable PM_{10}: Fabric Filter with Leak Detection, 0.008 gr/dscf and 54.00 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**Filterable PM_{10}: Fabric Filter with Leak Detection, 0.008 gr/dscf and 37.00 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 1 (450 t/hr pellets)	Filterable PM_{10}: Dry ESP, 0.012 gr/dscf and 21.00 lb/hr (3-hr rolling avg)	99%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 2 (450 t/hr pellets)	Filterable PM_{10}: Dry ESP, 0.012 gr/dscf and 14.20 lb/hr (3-hr rolling avg)	95%	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Indurating Furnace - Hood Exhaust (624 st/hr pellets)	PM_{10}: Wet Scrubber, 0.012 gr/dscf, 47 lb/hr	86%	BACT-PSD
		Pollutant Notes from PM Pollutant listing: PM_{10} includes condensible fraction.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Indurating Furnace - Waste Gas (624 st/hr pellets)	Filterable PM_{10}: Wet Scrubber, 0.012 gr/dscf, 33 lb/hr	90%	BACT-PSD
		Pollutant Notes: PM_{10} includes condensible fraction.			
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace 5 Hood Exhaust (Waste Gas #501, #502, #503) (160 LT/hr pellets)	Filterable PM_{10}: HE Wet Scrubber, 0.005 gr/dscf	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (PM_{10})

Historically, baghouses have been deemed technically infeasible in iron induration furnaces due to the temperature limitations of the filter bag material. This is a concern primarily during malfunctions which result in high temperature excursions within the induration furnace. The straight grate induration furnace which Magnetation is proposing has features which can mitigate the effects of high temperature excursions which are not present in the grate/kiln design. The following is a description of those mitigating features that make a baghouse feasible on the Magnetation furnace:

- The traveling grate in a straight-grate furnace is not as susceptible to temperature swings as a grate/kiln. This is because a grate/kiln has one main burner while a traveling grate furnace has many individual gas burners. In Magnetation's case, multiple burners of varying size will be installed. This allows much more flexibility in temperature control within a straight grate furnace.

- A straight-grate furnace has the capability to divert gases from the hood exhaust stream into the firing zone for additional cooling via the tempering air stream to prevent high temperatures from damaging filter bags in waste gas service. The air in this stream is from the outlet of the second cooler and it has a much lower temperature than the firing zone gases. Additional cooling can be provided by drawing in ambient air via the air intake damper on the second cooler duct.

- A baghouse on the waste gas stream would receive exhaust gas after the proposed gas suspension absorber (see the SO_2 BACT determinations for furnace hood exhausts and furnace waste gas exhausts). Lime slurry and water are added in the absorber for SO_2 control. The evaporation of this water is a significant source of cooling, thus significantly reducing the potential for high temperature from reaching the waste gas baghouse.

- A baghouse on the hood exhaust would receive exhaust gas from the drying zone of the furnace where temperatures are low to begin with (<500°F) and the risk of temperature spiking very remote, and the risk of temperature spiking can be mitigated by adding the ability to introduce outside tempering air.

- Filter bags made with fiberglass and PTFE membrane coatings can withstand operating temperatures up to 500°F.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (PM_{10})

The control technologies for induration furnace operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 99%+

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (PM_{10})

Based on a review of the U.S. EPA RBLC, the primary control used for induration furnaces is dry capture, either using fabric filtration or a dry ESP. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of PM_{10}. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.005 gr/dscf to 0.012 gr/dscf for a wet scrubber and from 0.008 gr/dscf to 0.012 gr/dscf for a baghouse.

The most stringent BACT for waste gas/windbox exhausts from the table above is for Cleveland - Cliffs, Inc. in Silver Bay, MN. BACT for the PM_{10} emissions from the induration furnace at this source is control through the use of a high-efficiency wet scrubber with a maximum outlet concentration of 0.005 gr/dscf. However, this induration furnace has a maximum throughput of 160 long tons of pellets per year whereas the proposed induration furnace has a maximum throughput of 450 tons of pellets; hence, the furnace at Cleveland - Cliffs, Inc. is not comparable in size with the proposed furnace. Therefore, the PM_{10} limits specified for Cleveland - Cliffs, Inc. will not be considered as BACT for Magnetation LLC.

BACT Proposal – Induration Furnace (PM_{10})

BACT for the PM_{10} emissions from the induration furnace has been proposed to be controlled through the use of a baghouse with a maximum outlet concentration of 0.008 gr/dscf and an appropriate pound per hour limitation.

Step 5: Select BACT - Induration Furnace (PM_{10})

The proposed BACT for PM_{10} meets the most stringent BACT found in the RBLC for induration furnaces controlled with a baghouse. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM_{10} BACT for the Induration Furnace is given in the BACT Conclusion for PM_{10}.

(c) Combustion Units (PM_{10})

The following emission units associated with combustion processes are subject to PM_{10} BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (PM_{10})
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (PM_{10})
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to December 2012 for natural gas fired generators only used for emergency purposes.

PM_{10} BACT Determinations - Emergency Generator					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	PM_{10}: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	TPM_{10}: Certified to meet NSPS Subpart JJJJ, proper combustion design, 0.01 lb/MMBtu	NI	BACT-PSD
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	TPM_{10}: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD

PM_{10} BACT Determinations - Emergency Generator					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (860 hp)	TPM_{10}: Use of pipeline quality natural gas, 0.34 g/hp-hr (0.44 g/kw-hr)	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	Filterable PM_{10}: Use of pipeline quality natural gas, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	Filterable PM_{10}: Use of pipeline quality natural gas, 0.44 lb/hr, 0.04 tons/yr, 200 hours/yr	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
Dominion Cove Point: Lusby, MD	MD-0036/ CPCN 9055 (3/10/2006)	Emergency Generator 770 kw (1,085 bhp)	Filterable PM_{10}: Use of low sulfur natural gas, good combustion practices, proper O&M Plan, 0.0099 lb/MMBtu, 200 hours/yr	NI	BACT-PSD
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	Filterable PM_{10}: 0.152 g/bhp-hr (0.20 g/kw-hr)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generators (PM_{10})

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generators (PM_{10})

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (PM_{10})

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the emergency generator.

The natural gas fired emergency generator (EU017) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour and/or pounds per hour of PM_{10}. Grams per kilowatt-hour is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The

emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM_{10} standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency generator is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired generators in the same size category.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (PM_{10})

A detailed PM_{10} BACT for the natural gas fired emergency generator is given in the BACT Conclusion for PM_{10}.

(2) Natural Gas Fired Fire Pump (PM_{10})
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (PM_{10})
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

PM_{10} BACT Determinations – Fire Pump					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	PM_{10}: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	TPM_{10}: Certified to meet NSPS Subpart JJJJ, proper combustion design, 0.01 lb/MMBtu	NI	BACT-PSD
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	TPM_{10}: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (860 hp)	TPM_{10}: Use of pipeline quality natural gas, 0.34 g/hp-hr (0.44 g/kw-hr)	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	Filterable PM_{10}: Use of pipeline quality natural gas, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	Filterable PM_{10}: Use of pipeline quality natural gas, 0.44 lb/hr, 0.04 tons/yr, 200 hours/yr	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

PM_{10} BACT Determinations – Fire Pump					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Dominion Cove Point: Lusby, MD	MD-0036/ CPCN 9055 (3/10/2006)	Emergency Generator 770 kw (1,085 bhp)	Filterable PM_{10}: Use of low sulfur natural gas, good combustion practices, proper O&M Plan, 0.0099 lb/MMBtu, 200 hours/yr	NI	BACT-PSD
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	Filterable PM_{10}: 0.152 g/bhp-hr (0.20 g/kw-hr)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (PM_{10})

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (PM_{10})

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (PM_{10})

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the fire pump.

The natural gas fired fire pump (EU018) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour and/or pounds per hour of PM_{10}. Grams per kilowatt-hour is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM_{10} standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency fire pump is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be

included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired fire pumps in the same size category.

Step 5: Select BACT - Natural Gas Fired Fire Pump (PM_{10})

A detailed PM_{10} BACT for the natural gas fired fire pump is given in the BACT Conclusion for PM_{10}.

(3) Natural Gas Fired Space Heaters and Air Heaters (PM_{10})
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC. The search was limited to entries from January 2006 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

PM_{10} BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	PM_{10}: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation*		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	PM_{10}: Baghouse, use of natural gas, good combustion practices	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	PM_{10}: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	TPM_{10}: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
Pryor Plant Chemical : Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	TPM_{10}: 0.15 lb/hr	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	ASU Regen Heater SRC13 (0.1 MMBtu/hr)	Filterable PM_{10}: Good combustion practices	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	Gasifier Heaters SRC14 & SRC15 (25 MMBtu/hr)	Filterable PM_{10}: Good combustion practices	NI	BACT-PSD
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	Filterable PM_{10}: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	Filterable PM_{10}: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD

***Note: PM10 combustion emissions for EU010 are accounted for in the material handling limits.**

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitation

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})

Based on a review of the RBLC, add-on control devices are generally not used for controlling particulate emissions from natural gas fired space heaters or air heaters. Most facilities express emission limitations in terms of pounds per hour of PM_{10}. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. Emission limits for PM_{10} (when converted for comparison) varied from 0.0072 lb/MMBtu to 0.0075 lb/MMBtu.

BACT for the natural gas fired heaters has been proposed to be the restricted use of only natural gas and the use of good combustion practices along with an emission limit, which is 0.0072 lb/MMBtu for each of the proposed heaters.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})

A detailed PM_{10} BACT for natural gas fired heaters is given in the BACT Conclusion for PM_{10}.

(d) <u>Cooling Towers (PM_{10})</u>

Particulate matter emissions are primarily due to the dissipation of heat loads from plant condensate to the atmosphere. Some of the liquid water may be entrained in the air stream and can be carried out of the tower as "drift" droplets. As the droplet evaporates in the atmosphere, any suspended or dissolved material will solidify as particulate matter.

The following new emission units associated with the cooling tower are subject to PM_{10}BACT requirements:

Particulate Matter Emission Units Associated with the Cooling Tower		
Emission Unit		Associated Emission Point
Description	Unit No.	
Cooling Tower	EU024	SV022

Existing PM_{10} BACT Determinations for Cooling Towers

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for cooling towers at iron ore pelletizing plants. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and

3325 (steel foundries), as well as various sources with cooling towers of comparable size, from January 2004 to January 2013.

PM_{10} BACT Determinations – Cooling Tower					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Cooling Tower EU024 (4,600 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.001% of the circulating water flow rate, use of cooling water with less than 6,009 milligrams per liter TDS concentration, 0.138 lb/hr	NI	BACT-PSD
Existing PM_{10} BACT Determinations – Cooling Towers					
Crawford Renewable Energy: Carbondale, PA	PA-0275/ 20-305A (10/24/2011)	Material Handling, Plant Roadways, and Cooling Tower (92,500 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.003% of the circulating water flow rate, use of cooling water with less than 1,115 milligrams per liter TDS concentration	NI	BACT-PSD
Consolidated Environmental Management Inc. - Nucor: Convent, LA	LA-0248/ PSD-LA-751 (1/27/2011)	DRI-113: DRI Unit #1 Process Water Cooling Tower (26,857 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.11 lb/hr, 0.40 tons/yr	NI	BACT-PSD
Consolidated Environmental Management Inc. - Nucor: Convent, LA	LA-0248/ PSD-LA-751 (1/27/2011)	DRI-213: DRI Unit #2 Process Water Cooling Tower (26,857 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.11 lb/hr, 0.40 tons/yr	NI	BACT-PSD
Consolidated Environmental Management Inc. - Nucor: Convent, LA	LA-0248/ PSD-LA-751 (1/27/2011)	DRI-114: DRI Unit #1 Clean Water Cooling Tower (17,611 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.07 lb/hr, 0.29 tons/yr	NI	BACT-PSD
Consolidated Environmental Management Inc. - Nucor: Convent, LA	LA-0248/ PSD-LA-751 (1/27/2011)	DRI-214: DRI Unit #2 Clean Water Cooling Tower (17,611 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.07 lb/hr, 0.29 tons/yr	NI	BACT-PSD

PM_{10} BACT Determinations – Cooling Tower					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
V & M Star: Youngstown, OH	OH-0344/ P0107088 (1/27/2011)	Cooling Water Towers (2) and Contact Water (1,372,000 gpm)	TPM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 0.572 lb/hr, 2.51 tons/yr	NI	Other Case-by-Case
Osceola Steel Co.: Adel, GA	GA-0142/ 3312-075-0024-P-01-0 (12/29/2010)	Cooling Towers CT1, CT21, CT22, and CT23	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration	NI	BACT-PSD
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Pipe Mill Cooling Tower (1,800,000 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.75 lb/hr, 3.29 tons/yr	NI	BACT-PSD
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Melt Shop Cooling Tower (3,000,000 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 1.25 lb/hr, 5.48 tons/yr	NI	BACT-PSD
Mid American Steel and Wire Company: Madill, OK	OK-0128/ 2003-106-C (M-1) PSD (9/8/2008)	Cooling Towers (3) (3,000 gpm)	Filterable PM_{10}: High efficiency drift eliminators	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Cooling Tower	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate	NI	BACT-PSD
Marathon Petroleum: Garyville, LA	LA-0211/ PSD-LA-719 (12/27/2006)	Cooling Tower Nos. 1 & 2 (24-08 & 32-08) and Hydrogen Plant Cooling Tower (53-08) (30,000 gpm; 96,250 gpm; and 2,500 gpm respectively)	Filterable PM_{10}: High efficiency drift eliminators with a maximum drift rate of 0.005% of the circulating water flow rate	NI	BACT-PSD
Entergy New Orleans, Inc. (Michoud Electric Plant): New Orleans, LA	LA-0191/ PSD-LA-700 (10/12/2004)	Cooling Tower (1,728 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.001% of the circulating water flow rate, 0.052 lb/hr, 0.205 tons/yr	NI	BACT-PSD
	Note: 0.052 lb/hr * 1000000 ppm / (8.346 lb/gal * 1728 gpm * 60 min/hr * 0.001%) = 6,009 ppm TDS				

Step 2: Eliminate Technically Infeasible Options – Cooling Towers (PM_{10})

No technologies were eliminated from consideration because of technical infeasibility for cooling towers.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Cooling Towers (PM_{10})

The control technologies for cooling towers are ranked as follows:

(1) Drift eliminators.

(2) Minimization of total dissolved solids (TDS).

Step 4: Evaluate the Most Effective Controls and Document the Results – Cooling Tower (PM_{10})

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for cooling towers at iron ore pelletizing plants is drift eliminators. Most facilities express emission limitations in terms of maximum drift rate and an associated pound per hour limitation. The only cooling tower in the range of the proposed cooling tower with a listed drift rate is located at Entergy New Orleans, Inc. (Michoud Electric Plant). The drift rate is 0.001%. Although the RBLC lists cooling towers with lower drift rates, the cooling towers are not comparable to the one proposed by Magnetation due to the size differences.

BACT Proposal

BACT has been proposed to be the use of drift eliminators with a maximum drift rate of 0.001%, use of cooling water with less than 6,009 milligrams per liter TDS concentration, and an appropriate pound per hour limitation. The basis for the TDS concentration is documented in the above RBLC BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

Step 5: Select BACT – Cooling Tower (PM_{10})

The proposed BACT for PM_{10} meets the most stringent BACT found in the RBLC for cooling towers of comparable size. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM_{10} BACT for the cooling tower is given in the BACT Conclusion for PM_{10}.

(e) <u>Fugitive Dust Emissions (PM_{10}) from Paved Roads</u>

Fugitive dust emissions will be generated from vehicles traveling over plant roads.

Existing BACT Determinations - Fugitive Dust Emissions (PM_{10})
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for fugitive dust emissions from paved roads at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2005 to January 2013.

PM_{10} BACT Determinations: Fugitive Dust Emissions					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fugitive Dust Emissions from Paved Roads	PM_{10}: Vacuum sweeping and water flushing as necessary, speed reduction plan, in accordance with the required fugitive dust control plan	NI	BACT-PSD

PM_{10} BACT Determinations: Fugitive Dust Emissions					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Existing PM_{10} BACT Determinations: Fugitive Dust Emissions					
V & M Star: Youngstown, OH	OH-0344/ P0107088 (1/27/2011)	Paved/Unpaved Roadways and Parking Areas	PM_{10}: Control measures (watering, sweeping, chemical stabilization, or suppressants), 7.70 tons/yr	NI	BACT-PSD
			Emission limit from Fugitive PM Pollutant listing		
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Roadways (8,375 VMT/yr)	PM_{10}: Control measures (watering, resurfacing, chemical stabilization, or speed reduction), 5.93 tons/yr	NI	BACT-PSD
			Emission limit from Fugitive PM Pollutant listing		
Sun Coke Energy, Inc.: Middletown, OH	OH-0332/ P0104768 (2/9/2010)	Roadways and Parking Areas	PM_{10}: Control measures, 0.21 tons/yr	NI	BACT-PSD
			Emission limit from Fugitive PM Pollutant listing		
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Roadways and Parking Areas	Filterable PM_{10}: Control measures, 12.40 tons/yr	NI	BACT-PSD
Suncoke (Gateway Energy & Coke): Granite City, IL	IL-0109/ 06070020 (3/13/2008)	Roads, Parking Areas, Other Open Areas	Filterable PM_{10}: Work practices (paving, fugitive dust control program)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Fugitive Dust Emissions (PM_{10})

Fugitive dust emissions will be generated from vehicles traveling over plant roads. Typical particulate control devices such as fabric filtration, mechanical collectors, wet scrubbers, and ESPs are not technically feasible for the control of fugitive dust emissions because, by definition, fugitive emissions cannot be reasonable routed through a single point of exhaust. Therefore, these control devices will not be considered further for fugitive dust emissions.

Since the inclusions of opacity readings as limits were considered under LAER or other case-by-case basis and not as part of a BACT determination, the taking of opacity readings will not be considered further for fugitive dust emissions.

A review of the U.S. EPA RBLC shows that fugitive dust emissions from roads at other iron ore beneficiating plants, steel mills, and steel foundries are controlled through the paving of roads and then through the use of wetting agents or controlling the accumulation of dusty material on the roads. Removal of the accumulation of silt on the roadways can be accomplished by either sweeping or vacuuming the silt from the roads. Fugitive dust control plans are also typically implemented.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Fugitive Dust Emissions (PM_{10})

The most effective control for fugitive dust emissions from roadways is paving of the roads and the implementation of a site-specific Fugitive Dust Control Plan.

Step 4: Evaluate the Most Effective Controls and Document the Results - Fugitive Dust Emissions (PM_{10})

Based on a review of the RBLC, the most stringent BACT for fugitive dust control of roads is development, implementation and maintenance of a site specific Fugitive Dust Control Plan.

BACT Proposal

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Step 5: Select BACT - Fugitive Dust Emissions (PM_{10})

BACT shall be the development, maintenance, and implementation of a site-specific fugitive dust control plan. Since the source is required to meet the most stringent BACT for fugitive emissions from paved roads, no further evaluation of these operations is required and an economic, energy, or environmental impact analysis is not required as part of the BACT evaluation for these operations.

A detailed PM_{10} BACT for fugitive dust emissions is given in the BACT Conclusion for PM_{10}.

BACT Conclusion for PM_{10}

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for PM_{10} emissions shall be as follows:

(a) Material Handling Operations

The material handling operations shall be limited as follows:

(1) PM emissions from the following emission units (EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, and EU026) shall be controlled by fabric filter dust collectors and shall not exceed the associated emission limits listed in the following table:

Emission Unit		Control	PM_{10} Limit (gr/dscf)	PM_{10} Limit (lb/hr)
Description	(Unit ID)			
Iron Concentrate Unloading	EU001a	Baghouse CE001	0.002	0.95
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	Baghouse CE004	0.002	0.0429
Bentonite Unloading (Truck) & Storage Area	EU005	Bin Vent CE005	0.002	0.0429
Organic Binder Unloading & Storage Area	EU006	Bin Vent CE006	0.002	0.0429
Soda Ash Unloading & Storage Area	EU007	Bin Vent CE007	0.002	0.0429
Bentonite Additive System	EU008	Bin Vent CE008	0.002	0.0429
Coke Breeze Additive System	EU009	Baghouse CE009	0.002	0.09
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse CE023	0.002	0.22
Ground Limestone and Dolomite Additive System	EU010	Baghouse CE010	0.002	0.32

Emission Unit		Control	PM_{10} Limit (gr/dscf)	PM_{10} Limit (lb/hr)
Description	(Unit ID)			
Mixing Area Material Handling System	EU011	Baghouse CE011	0.002	0.34
Hearth Layer Bin System	EU012	Baghouse CE012	0.002	0.15
Furnace Discharge System	EU015	Baghouse CE017	0.002	0.73
Hearth Layer Separation System	EU016	Baghouse CE017	0.002	0.79
Oxide Pellet Storage & Unloading System	EU019	Baghouse CE019	0.002	0.63
WBE Lime Storage Area	EU020	Bin Vent CE020	0.002	0.02
WBE Residual Product Loading Area	EU022	Bin Vent CE021	0.002	0.02
Recycled Dust Storage Area	EU026	Baghouse CE024	0.002	0.16

(2) PM_{10} emissions from the following emission units (EU002a, EU003a, and EU004a) shall be controlled through the development, implementation, and maintenance of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM_{10}*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM_{10}*	5.33 E-04	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM_{10}*	3.52 E-04	1.54 E-03

*PM_{10} includes both filterable and condensible PM_{10}.

(3) PM_{10} emissions from the following emission units (EU001b, EU002b, and EU003b) shall be controlled through the development, implementation, and maintenance of a site-specific fugitive dust control plan, by enclosures, that the opacity shall not exceed five percent (5%) on a six-minute average, and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Iron Concentrate Transfer and Storage Area	EU001b	PM_{10}*	1.57	6.88
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	PM_{10}*	0.02	0.04
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	PM_{10}*	0.01	0.02

*PM_{10} includes both filterable and condensible PM_{10}.

(4) PM_{10} emissions from the following emission unit (EU025a) shall be controlled through the development, implementation, and maintenance of a site-specific fugitive dust control plan, by enclosures and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Limestone/Dolomite Hopper, Belt Feeder & Grizzly Feeder/Screener	PM_{10}*	0.33	0.70

*PM_{10} includes both filterable and condensible PM_{10}.

(5) The Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System opacity shall not exceed five percent (5%) on a six (6) minute average and shall not exceed the limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Iron Ore Wet Grinding and Filter Cake Production	PM_{10}*	0.07	0.31
Greenball Production System	PM_{10}*	0.07	0.31

*PM_{10} includes both filterable and condensible PM_{10}.

(b) Induration Furnace

The induration furnace operations shall be limited as follows:

PM_{10} emissions from the Furnace Hood Exhaust (EU013) and the Furnace Windbox Exhaust (EU014) shall be controlled by fabric filter dust collectors and shall not exceed the emission limits listed in the following table:

Emission Unit		Control	PM_{10} Limit (gr/dscf)	PM_{10} Limit (lb/hr)	Opacity (6-min avg)
Description	Unit No.				
Furnace Hood Exhaust	EU013	Baghouse CE013	0.008	20.23*	5%
Furnace Windbox Exhaust	EU014	Baghouse CE016	0.008	24.25*	5%

*The PM_{10} limits include process emissions and combustion emissions.

(c) Combustion Units

The combustion units shall be limited as follows:

(1) PM_{10} emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(2) PM_{10} emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(3) PM_{10} emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 0.0072 lb/MMBtu.

(d) Cooling Tower

The cooling tower emissions shall be controlled through the use of drift eliminators with a maximum drift rate of 0.001%, the use of cooling water with less than 6,009 milligrams per liter TDS concentration, and a 0.138 pound per hour limitation. The basis for the TDS concentration

is documented in the RBLC PM_{10} BACT determination table for cooling towers with the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

(e) Fugitive Dust Emissions from Paved Roads

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (PSD BACT) with regards to PM_{10}.

Particulate Matter Less than 2.5 Microns ($PM_{2.5}$) BACT

The $PM_{2.5}$ BACT analysis is divided into five categories: material handling operations, induration furnaces, combustion units, cooling towers, and fugitive emissions.

Step 1 of the BACT process is shown below for this $PM_{2.5}$ BACT analysis to describe general particulate control devices. A discussion of $PM_{2.5}$ is then given as applicable to each of the categories of processes.

$PM_{2.5}$ Discussion

$PM_{2.5}$ is particulate matter that is 2.5 micrometers in diameter or smaller, otherwise known as fine particles. This subset of particulate matter is believed to pose a greater health threat than larger particles because the small size allows for deeper penetration into the lungs. They also remain suspended in the air for longer times and can travel farther distances than larger particles. These particles exist in solid, liquid, or gaseous form and are a result of combustion processes and various industrial processes. Fine particulate can be emitted either directly from the source (primary particles) or formed secondarily (secondary particulate) in the atmosphere from precursors such as SO_2, NO_x, VOC, NH_3, and VOCs that react in the atmosphere with condensable particulate matter.

Particulate is typically measured as filterable or condensable particulate. Filterable particulate is emitted directly as solid or liquid at the stack, whereas condensable particulate is in the vapor phase at the stack and condenses upon cooling in the ambient air to form solid or liquid particulate. Filterable particulate may be PM, PM_{10}, or $PM_{2.5}$. Condensable particulate exists mostly as $PM_{2.5}$ and can be a significant fraction of total $PM_{2.5}$. Combustion processes and industrial processes involving heat tend to form both filterable and condensable particulate. Industrial processes that don't involve heat and moisture typically only produce filterable particulate.

Step 1: Identify Potential Control Technologies ($PM_{2.5}$)

Data on the nature and amount of $PM_{2.5}$, specifically the condensable fraction, from various sources is limited. This may be in part due to the fact that $PM_{2.5}$ has not been directly regulated often and that accurate testing of the condensable fraction has proven to be challenging. Discussions of particulate control technologies in the literature do not usually include control efficiencies achievable for $PM_{2.5}$ and if they do, they tend to only include the filterable fraction of $PM_{2.5}$. In addition, the RBLC does not contain extensive entries for $PM_{2.5}$ (filterable or total) in comparison to the number of entries for PM and PM_{10}.

This $PM_{2.5}$ BACT review will use available information and best engineering judgment to evaluate the $PM_{2.5}$ BACT for the required facilities as part of this modification in light of the PM and PM_{10} BACT determinations. The main considerations will be evaluating the portions of filterable and condensable $PM_{2.5}$ from each unit and determining whether or not the existing PM and PM_{10} BACT determinations are also BACT for $PM_{2.5}$.

The control technologies for emissions of filterable $PM_{2.5}$ are generally going to be similar as those for PM and PM_{10}. However, due to the nature of the fine particles and the potentially high fraction of condensable particulate, some controls may be more effective at controlling PM and PM_{10} than $PM_{2.5}$. For example, a baghouse is not going to be as effective at controlling $PM_{2.5}$ that exists in a condensable phase as it is for controlling PM, which exists only as filterable particulate, and PM_{10} which may exist as larger filterable particulate and a condensable fraction. Current EPA approved test methods do not distinguish between condensable particle size.

Traditional particulate collection devices: mechanical collectors, wet scrubbers, electrostatic precipitators, and fabric filter dust collectors are discussed in the PM BACT analysis. Additional comments related to the control of $PM_{2.5}$ are included here along with other potential control technologies geared toward $PM_{2.5}$ control.

Mechanical Collectors (e.g. cyclones or multiclones)
Mechanical collectors have low capital and maintenance costs (due to lack of moving parts) and are good at removing larger particles and at pre-cleaning exhaust streams. However, mechanical collectors are not as efficient at controlling fine particles since inertial and gravitational forces are not as effective for the low mass of fine particles, and these types of control devices would likely have little impact on controlling condensable particulate. They may be viable as a pre-collection device for $PM_{2.5}$ as they would allow for time for a heated exhaust stream to cool and for gaseous fractions to condense and be controlled by another downstream device.

Electrostatic Precipitators
Electrostatic precipitators can treat large volumes of exhaust over a wide range of temperatures and are efficient for controlling even smaller particles. A dry ESP would be effective for controlling filterable $PM_{2.5}$, but would do little to control condensable particulate. For exhaust streams with condensable particulate, increased collection may be achieved through lowering the exhaust temperature; however, this may lead to condensation on the ESP collection plates, leading to corrosion. High resistivity particles may need to be conditioned prior to being treated by a dry ESP. Dry ESPs are also more sensitive to changes in particulate loading and characteristics than fabric filters.

Wet ESPs, however, are very effective at controlling both the filterable and condensable fractions of particulate. Collection efficiency may drop for particles in the range of 0.1 to 1 microns, however, for both dry and wet ESPs. Typically, wet ESPs cannot handle exhaust temperatures exceeding 170°F and may suffer clogging problems due to build up of fine particles on the high voltage and collection electrodes. Wet ESPs may be used as a polishing unit after another particulate control device for further $PM_{2.5}$ removal.

Fabric Filters
Fabric filters offer particulate control for a wide variety of particle sizes. The fabric itself is responsible for some filtration, but the filter cake that forms on the fabric acts as a highly efficient filter. Fabric filters can handle a variety of types of dusts and airflows, but are typically limited to dry exhaust streams, as moist or sticky conditions can cause clogging or blinding of the fabric. Blinding can also occur if large quantities of fine particles are present. Typical fabric filters are easily degraded at high temperatures, although there are special fabrics that can withstand higher temperatures. Fabric filters can be very efficient at collecting fine particles; however, fabric filters never really achieve a steady state of particle collection because when cleaning is necessary, part of the filter cake that helps to filter the fine particles is removed. In addition, if high air-to-cloth ratios are present, smaller particles may migrate through the filter cake and get re-entrained in the exhaust gas stream. Fabric filters are primarily used for controlling filterable particulate; however, some condensable particulate may be controlled. One study found that changing the material of the bag in a fabric filter system from a felt bag to a membrane bag did not change the overall particulate control, but changed the fraction of filterable and condensable particulate controlled[1]. The felt bag was much more effective at controlling the condensable portion of

particulate, whereas the membrane bag was more effective at controlling the filterable portion of particulate. It was theorized that this was due to the lack of cake retention on the membrane filter.

[1]McMenus, Michael, Robert E. Snyder and Kevin E. Redinger, "Impact of Fabric Filter Media and SDA Operations on Multi-Pollutant Emissions", *EPRI-DOE-EPA-AWMA Combined Power Plant Air Pollutant Control Mega Symposium*, Baltimore, MD, 2006

Wet Scrubbers

Wet scrubbers have many applications for particulate (and gaseous pollutant) control and can handle almost any kind of exhaust, including flammable, explosive, moist, or sticky dusts. Along with particulate, they can also handle mists or gases. Conventional scrubbers may not be suitable for particulate less than 1 micron in diameter; however, scrubbers such as venturi, condensation, and charged scrubbers are capable of removing fine particles at higher efficiencies. Higher control efficiencies of submicron particles require increased power consumption, however. Wet scrubbers can achieve higher levels of control for condensable PM than dry control technology because the scrubbers help to condense the condensable fraction during particulate removal.

Advanced Hybrid™ Filter Technology

Advanced Hybrid™ filter technology combines electrostatic precipitation with fabric filtration. The configuration of the control device involves alternating rows of ESP components and filter bags. Exhaust gas enters an ESP zone, which removes most of the particulate. A perforated collecting plate then allows the gas flow to pass to a filter bag zone. The ESP zones help to also capture filter dust cake when the filter bag is pulsed clean. The collecting plates and discharge electrodes are periodically cleaned by rapping methods. This type of technology has been applied to the coal-fired power plant industry with an overall particulate capture efficiency of 99.99%. While this may prove to be an effective control for $PM_{2.5}$, it has not been demonstrated in the iron ore pelletizing industry. Therefore, it will not be considered further in this evaluation.

Cloud Chamber System

This emergent technology involves multiple steps. The exhaust gas enters a pre-conditioning chamber, where coarse particles are removed by spray impaction and fine and ultra-fine particles are grown through agglomeration and coagulation. The gas then enters the first cloud generation vessel, where positively charged droplets are used to capture fine particles that are simultaneously scrubbed. The gas flow then continues to a second cloud generation vessel, where negatively charged droplets are used to capture a substantial portion of the remaining fine, ultra-fine, and condensable particulate. Captured particles are removed from the bottom of the system as a low-volume slurry.

This type of system can handle exhaust temperatures of up to 2500 °F, high particulates loadings, and changes in flow volume. Particle solubility, reactivity, and resistivity do not affect performance. This type of control has been used for controlling particulates from glass melting furnaces. One study indicated control of 95%+ for filterable particulate and 90%+ for total particulate (including condensable particulate). Other tests conducted by the manufacturer indicated removal of total particulates in excess of 99%. The manufacturer indicates that this type of control could be used for other applications such as large stationary diesel engines, fiber optic manufacturing, solar panel fabrication, syn-gas cleaning, asphalt shingle manufacturing, solid fuel industrial boilers, oil and gas fired boilers, waste incinerators, abrasive production, smelters and foundries, chemical manufacturing, curing ovens, dryers, rotary kilns, plastics manufacturing, sulfuric and nitric acid production, and more. While this may prove to be an effective control for $PM_{2.5}$, it has not been demonstrated in the iron ore pelletizing industry. Therefore, it will not be considered further in this evaluation.

The table below shows control efficiencies for $PM_{2.5}$ as found in the literature. When the fraction of $PM_{2.5}$ wasn't specified, it was assumed that the control efficiency was given for filterable $PM_{2.5}$.

$PM_{2.5}$ Control Efficiencies as Found in the Literature							
Control Device Description	PM2.5-FIL		PM-CON		PM2.5-PRI		Source
	Min	Max	Min	Max	Min	Max	
Single Cyclone		10%					[1]
Single Cyclone	60%	75%					[2] (assumed filterable)
Single Cyclone	20%	70%					[3]
Single Cyclone	5%	45%					[4]
Multiple Cyclones		80%					[1]
Multiple Cyclones	80%	90%					[2] (assumed filterable)
Multiple Cyclones	10%	65%					[4]
Wet Scrubber - High Efficiency, Venturi Scrubber	80%	90%	10%	40%	45%	68%	[5]
Wet Scrubber - High Efficiency, Venturi Scrubber		90%					[1]
Wet Scrubber - High Efficiency, Venturi Scrubber	80%	90%					[2] (assumed filterable)
Wet Scrubber - High Efficiency, Venturi Scrubber	50%	99%					[6]
Wet Scrubber - Gas Atomized Venturi Scrubber	90%	99.99%					[7] (assumed filterable)
Wet Scrubber - VenturiPak™		99.5%		99%			[8]
Wet Scrubber - Venturi Scrubber (100 in water pressure drop)	90%	99.9%					[4]
Wet Scrubber - Venturi Scrubber (20 in water pressure drop)	20%	99.0%					[4]
Wet Flue Gas Desulfurization		80.0%		80%			[4a]
Ionizing Venturi Scrubber	87%	99.0%					[4]
Electrostatic Scrubber	90%	98.0%					[4]
Dry Electrostatic Precipitator	80%	95%	10%	60%	24%	67%	[5]
Dry Electrostatic Precipitator		95%					[1]
Dry Electrostatic Precipitator	90%	99.2%					[2] (assumed filterable)
Dry Electrostatic Precipitator	96%	99.2%					[9] (assumed filterable)
Dry Electrostatic Precipitator					75%	90%	[10]
Dry Electrostatic Precipitator	96%	99.5%					[4]
Dry Electrostatic Precipitator		99.6%		0%			[4a]
Fabric Filter	30%	60%	10%	60%	14%	60%	[5]
Fabric Filter		99%					[1]
Fabric Filter	93.4%	99.3%					[2] (assumed filterable)
Fabric Filter	99.6%	99.9%					[6]
Fabric Filter	99.0%	99.8%					[4]
Fabric Filter					90%	94%	[10]
Fabric Filter with specialty filters		99.5%		30%			[4a]
Wet ESP				90%			[5] (sulfuric acid aerosol)
Wet ESP					80%	99%	[11]
Wet ESP	90.0%	99.2%					[12] (assumed filterable)

$PM_{2.5}$ Control Efficiencies as Found in the Literature							
Control Device Description	PM2.5-FIL		PM-CON		PM2.5-PRI		Source
	Min	Max	Min	Max	Min	Max	
Wet ESP	97.0%	99.0%					[4]
Wet ESP					86%	92%	[10]
Wet ESP		96.0%		90%			[4a]
Cloud Chamber System	95.0%				90%	99+%	[13]

[1] U.S. EPA, *AP-42, Fifth Edition, Compilation of Air Pollutant Emission Factors*, Appendix B.2, Table B.2-3, September 1996: http://www.epa.gov/ttn/chief/ap42/appendix/appb-2.pdf

[2] EC/R Incorporated, *Stationary Source Control Techniques Document for Fine Particulate Matter*, EPA Contract No. 68-D-98-026, Chapel Hill, NC, 1998: http://www.epa.gov/ttn/oarpg/t1/reports/pmctd.pdf

[3] EPA-452/F-03-005, EPA Air Pollution Control Technology Fact Sheet: Cyclones, 2003: http://www.epa.gov/ttn/catc/dir1/fcyclon.pdf

[4] Perry, Robert H. and Don W. Green, *Perry's Chemical Engineers' Handbook*, Seventh Edition, McGraw Hill, 1997.

[4a] Southern Montana Electric Generation and Transmission Cooperative Highwood Generating Station, Air Quality Permit #3423-01, Montana Department of Environmental Quality Permitting and Compliance Division, November 26, 2008.

[5] E.H. Pechan & Associates, Inc., "Evaluation of Potential PM2.5 Reductions by Improving Performance of Control Devices: PM2.5 Emission Estimates", Final Report, Springfield, VA, September 27, 2005: http://www.epa.gov/pm/measures/pm25_emission_estimates_2007.pdf

[6] U.S. EPA, *EPA Air Pollution Control Cost Manual*, Sixth Edition (EPA 452/B-02-001): http://epa.gov/ttn/catc/products.html#cccinfo

[7] Bionomic Industries Inc., Gas Atomized Venturi Scrubber: http://www.bionomicind.com/

[8] EnviroCare, VenturiPak™: http://www.envirocare.com/files/ENVIRO-J141_R8.pdf

[9] EPA-452/F-03-028, EPA Air Pollution Control Technology Fact Sheet: Dry Electrostatic Precipitator - Wire-Plate Type, 2003: http://www.epa.gov/ttn/catc/dir1/fdespwpl.pdf

[10] Louisville Gas & Electric Company Trimble County Generating Station, Final Revised Statement of Basis, Commonwealth of Kentucky Division for Air Quality, Permit No. V-08-001 R2, January 28, 2010: http://www.air.ky.gov/NR/rdonlyres/E363916B-AE4F-4824-A2B4-1C88D8C22C95/0/V08001R2Basis_12810.pdf

[11] Bologa, A., H.-R. Paur, H. Seifert, and K. Woletz, "Novel Wet Electrostatic Precipitator for Sub-Micron Particles": http://www.dustconf.com/CLIENT/DUSTCONF/UPLOAD/S11/BOLOGA_D.PDF

[12] EPA-452/F-03-030, EPA Air Pollution Control Technology Fact Sheet: Wet Electrostatic Precipitator - Wire-Plate Type, 2003: http://www.epa.gov/ttn/catc/dir1/fwespwpl.pdf

[13] Moss, Kevin, Tri-Mer Corp., Special Report/Glass Manufacturing: Capturing Particulate, *Ceramic Industry*, October 1, 2007: http://www.ceramicindustry.com/Articles/Glass/BNP_GUID_9-5-2006_A_10000000000000177501

(a) Material Handling Operations ($PM_{2.5}$)

The emissions from the material handling operations are in the form of particulate matter (PM, PM_{10}, and $PM_{2.5}$). Particulate matter emissions are primarily due to the attrition of particles (dust) from the feedstocks, iron oxide pellets, and by-products. This is caused by the abrasion of materials rubbing against each other and the process equipment as they move through the process.

The following new emission units associated with material handling operations are subject to $PM_{2.5}$ BACT requirements:

Particulate Matter Emission Units Associated with Material Handling Operations	
Emission Unit	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Unloading (Truck)	EU002a
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Unloading (Truck)	EU003a
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b
Coke Breeze Unloading (Truck)	EU004a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder	EU025a
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

Existing $PM_{2.5}$ BACT Determinations for Material Handling Operations

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for material handling operations at iron ore pelletizing plants. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations: EU001, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	$PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	$PM_{2.5}$: Fugitive Dust Control Plan 5% opacity (6-min avg) 1.07 E-03 lb/hr and 2.20 E-03 tpy	NI	BACT-PSD

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	$PM_{2.5}$: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.33 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU004a	$PM_{2.5}$: Fugitive Dust Control Plan 5% opacity (6-min avg) 1.02 E-04 lb/hr and 4.45 E-04 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU001b	$PM_{2.5}$: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 1.57 lb/hr and 6.88 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage EU002b	$PM_{2.5}$: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.02 lb/hr and 0.04 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU003b	$PM_{2.5}$: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.01 lb/hr and 0.02 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Transfer): EU025a	$PM_{2.5}$: Enclosed conveyor and grizzly, 5% opacity (6-min avg) 0.33 lb/hr and 0.70 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Iron Ore Wet Grinding and Filter Cake Production	$PM_{2.5}$: 5% opacity (6-min avg) 0.07 lb/hr and 0.31 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Greenball Production System	$PM_{2.5}$: 5% opacity (6-min avg) 0.07 lb/hr and 0.31 tpy	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations - Material Handling Operations					
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Oxide Pellet Stockpile Conveyor Gallery	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.77 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Bin	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 1.40 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Feed	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.12 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Discharge	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 3.30 lb/hr (3-hr rolling avg)	NI	BACT-PSD

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Screening and Handling	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 2.90 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Carbon Bin for Mercury Control	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Lime Bin for Scrubber	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Primary Grinding Mill Line 3	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.23 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Grizzly Transfer Tower	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.079 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Dozer Activity at Tailings Basin	$PM_{2.5}$: Fugitive Dust Control Plan	NI	BACT-PSD
		Grading at Tailings Basin	$PM_{2.5}$: Fugitive Dust Control Plan	NI	BACT-PSD
		120K Ton Concentrate Stockpile Loadout	$PM_{2.5}$: Fugitive Dust Control Plan	NI	BACT-PSD
		Oxide Product Loadout to Railcars	$PM_{2.5}$: Fugitive Dust Control Plan	NI	BACT-PSD
		These BACTs are listed under the pollutant Visible Emissions. The BACT determination (Table 1-12) states the limit is the use of the Fugitive Dust Control Plan.			
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Bentonite Bin	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.021 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	94%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Intermediate Dry Fuel Silo	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.11 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Prepared Dry Fuel Silo	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.07 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Final Transfer Conveyors and Loadout Conveyor	Filterable $PM_{2.5}$: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Reclaim Conveyor	Filterable $PM_{2.5}$: Baghouse with Leak Detection, 0.002 gr/dscf and 0.31 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Emergency Pellet Conveyor Transfer	Filterable $PM_{2.5}$: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Coal Bin 2	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.14 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Limestone Bin	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Mill Feeder 1	Filterable $PM_{2.5}$: Baghouse with Leak Detection, 0.002 gr/dscf and 0.51 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Lime Bin	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.02 lb/hr (3-hr rolling avg)	95%	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Direct Reduced Iron (DRI) Material Handling	Filterable $PM_{2.5}$: Enclosures/Baghouse, 0.47 lb/hr, 2.05 tons/yr	NI	LAER
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Coal and Iron Ore Unloading	Filterable $PM_{2.5}$: Enclosures/Baghouse, 0.0022 gr/dscf, 0.93 lb/hr, 4.07 tons/yr	NI	LAER
	A review of the permit shows that the process consists of a crane partially controlled by a three-sided enclosure transferring material to a hopper which is vented to the baghouse. The remaining emissions from the process are listed as fugitive emissions.				
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Alloy, Flux, Carbon, Limestone, & Coke Handling	Filterable $PM_{2.5}$: Enclosures/Baghouse, 0.0022 gr/dscf, 1.4 lb/hr, 6.13 tons/yr	NI	LAER
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Iron Ore Grinding (992 tons/yr)	Filterable $PM_{2.5}$: Baghouse with Cyclones, 0.0022 gr/dscf, 1.04 lb/hr, 4.56 tons/yr	99%	LAER
	A review of the permit shows that only Grinder 4A is controlled by the cyclones and baghouse. The remaining handling units (Grizzly Feeder 5A, Conveyor 6A, and Hopper 4A) are listed as fugitive emissions.				
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Conveyors, Hoppers, Screens to Rotary Hearth Furnace (227 tons/yr)	Filterable $PM_{2.5}$: Baghouse, 0.0022 gr/dscf, 1.4 lb/hr, 6.13 tons/yr	NI	LAER

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options - Material Handling Operations ($PM_{2.5}$)

Dry Material Handling
The air streams associated with dry material handling operations are characterized by air streams at or near ambient temperature and moisture content. Such streams would not be expected to contain materials that would be considered to be acidic or corrosive. As such, none of the listed particulate matter control devices were eliminated from consideration for the dry material handling operations because of technical infeasibility.

Raw Material Unloading and Storage Areas
Control devices draw pollutant laden air into themselves through ventilation hoods or other ducted enclosures, which must be close to the pollutant generation point in order to gather the air. The dumping of material from a truck is an irregular process, likely damaging or destroying any hoods near the truck's drop point. As such, stand-alone control devices were eliminated from consideration for the truck unloading areas because of technical infeasibility.

Similarly, when material is dropped from a conveyor onto a storage pile, the emission generation point is not at the conveyor but at the top of the storage pile itself. Since ventilation hoods or other ducted enclosures cannot be located close to the actual pollutant generation point, which is constantly changing in size, stand-alone control devices were eliminated from consideration for the storage piles and the loading of storage piles because of technical infeasibility.

Wet Material Handling Operations
The air streams associated with wet material handling operations are characterized by air streams at elevated moisture content. Such streams would be expected to clog and minimize the control efficiency of dry collection systems. As such, fabric filters and cyclones were eliminated from consideration for wet material handling operations because of technical infeasibility.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Material Handling Operations ($PM_{2.5}$)

The control technologies for dry material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 30% - 99.9%

(2) Wet scrubbers: 20% - 99.9%

(3) Electrostatic precipitators: 80% - 99.6%

(4) Cyclones: 5% - 90%

(5) Wet suppression: 50% - 90%

The control technologies for truck unloading areas are ranked as follows:

(1) Wet suppression: 50% - 90%

(2) Process enclosures: 50% - 90%

The control technologies for wet material handling operations are ranked as follows:

(1) Wet scrubbers: 20% - 99.9%

(2) Electrostatic precipitators: 80% - 99.6%

(3) Wet suppression: 50% - 90%

Step 4: Evaluate the Most Effective Controls and Document the Results - Material Handling Operations ($PM_{2.5}$)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for dry material handling operations at iron ore pelletizing plants is fabric filtration. A few operations are controlled by wet scrubbers or wet suppression. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of $PM_{2.5}$. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.002 gr/dscf to 0.005 gr/dscf, with most processes being limited at 0.002 gr/dscf, which was determined to be BACT for many types of material handling operations.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material truck unloading at iron ore pelletizing plants is the use of a fugitive dust control plan.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material storage at iron ore pelletizing plants is the use of an enclosure. Inclusion of raw material storage into a fugitive dust control plan can also be implemented.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material transfer at iron ore pelletizing plants is enclosures and fabric filtration that are appropriate to the material being handled and that are appropriate for the specific process. Since emission unit EU025a includes the dumping of material from a truck and the dropping of material from one conveyor to another, stand-alone control devices are not technical feasible as stated in Step 2. Therefore, emission unit EU025a (Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener) shall be controlled by the use of a site-specific fugitive dust control plan, enclosures for the Conveyor and Grizzly Feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Based on a review of the U.S. EPA RBLC and other Indiana permits, there is no primary control used for wet material handling operations (Iron Ore Wet Grinding and Filter Cake Production and Greenball Production) at iron ore pelletizing plants. In researching taconite ore processing (AP-42, Chapter 11.23.3), it specifically states that “because the ore remains wet, PM emissions are insignificant for the rest of the process until the dry stage of induration”. Additionally, these processes are generating less than ten tons per year each, and any type of control device for wet material (such as an electrostatic precipitator or wet scrubber) would be economically infeasible.

BACT Proposal

(a) Material Handling Group 1 Emission Units:

Group 1 Emission Units	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011

Group 1 Emission Units	
Description	Unit No.
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026

BACT for the Material Handling Group 1 emission units has been proposed to be the use of baghouses or bin vent filters with a grain loading of 0.002 gr/dscf and an appropriate pound per hour limitation.

(b) Material Handling Group 2 Emission Units (Raw Material Unloading):

Group 2 Emission Units	
Description	Unit No.
Limestone Unloading (Truck)	EU002a
Dolomite Unloading (Truck)	EU003a
Coke Breeze Unloading (Truck)	EU004a

BACT for the Material Handling Group 2 emission units has been proposed to be the use of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and an appropriate pound per hour and ton per year limitation.

(c) Material Handling Group 3 Emission Units (Raw Material Storage):

Group 3 Emission Units	
Description	Unit No.
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b

BACT for the Material Handling Group 3 emission units has been proposed to be the use of a site-specific fugitive dust control plan, the use of enclosures, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(d) Material Handling Group 4 Emission Units (Raw Material Transfer):

Group 4 Emission Units	
Description	Unit No.
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener	EU025a

BACT for the Material Handling Group 4 emission units has been proposed to be the use of a site-specific fugitive dust control plan, enclosed conveyor and grizzly feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(e) Material Handling Group 5 Emission Units:

Group 5 Emission Units	
Description	Unit No.
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

BACT for the Material Handling Group 5 emission units has been proposed to be that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Step 5: Select BACT - Material Handling Operations ($PM_{2.5}$)

The proposed BACT for $PM_{2.5}$ meets the most stringent BACT found in the RBLC for material handling operations. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed $PM_{2.5}$ BACT for the above Material Handling Operations is given in the BACT Conclusion for $PM_{2.5}$.

(b) <u>Induration Furnace ($PM_{2.5}$)</u>

Particulate matter emissions are primarily due to the attrition of particles (dust) from the iron oxide pellets. This is caused by the abrasion of pellets rubbing against each other and the process equipment as the pellets move through the induration furnace. Particulate matter is emitted from both the waste gas and hood exhaust vents.

The waste gas also contains a small amount of condensable particulate matter. The condensable particulates are primarily inorganic compounds like sulfates, acid gases, chlorides, and fluorides which are generated as a byproduct of pellet induration. The waste gas may also contain volatile organic compounds, which are products of incomplete natural gas combustion.

The following new emission units associated with the induration furnaces are subject to $PM_{2.5}$ BACT requirements:

Particulate Matter Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust (WBE)	EU014	SV013B

Existing $PM_{2.5}$ BACT Determinations for Induration Furnaces

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

$PM_{2.5}$ BACT Determinations – Induration Furnace					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 tons/hr pellets)	$PM_{2.5}$: Baghouse, 0.008 gr/dscf, 20.23 lb/hr	NI	BACT-PSD
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 tons/hr pellets)	$PM_{2.5}$: Baghouse, 0.008 gr/dscf, 24.25 lb/hr	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.008 gr/dscf and 54.00 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.008 gr/dscf and 37.00 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 1 (450 tons/hr pellets)	Filterable $PM_{2.5}$: Dry ESP, 0.012 gr/dscf and 21.00 lb/hr (3-hr rolling avg)	99%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 2 (450 tons/hr pellets)	Filterable $PM_{2.5}$: Dry ESP, 0.012 gr/dscf and 14.20 lb/hr (3-hr rolling avg)	95%	BACT-PSD

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces ($PM_{2.5}$)

Historically, baghouses have been deemed technically infeasible in iron induration furnaces due to the temperature limitations of the filter bag material. This is a concern primarily during malfunctions which result in high temperature excursions within the induration furnace. The straight grate induration furnace which Magnetation is proposing has features which can mitigate the effects of high temperature excursions which are not present in the grate/kiln design. The following is a description of those mitigating features that make a baghouse feasible on the Magnetation furnace:

- The traveling grate in a straight-grate furnace is not as susceptible to temperature swings as a grate/kiln. This is because a grate/kiln has one main burner while a traveling grate furnace has many individual gas burners. In Magnetation's case, multiple burners of varying size will be installed. This allows much more flexibility in temperature control within a straight grate furnace.

- A straight-grate furnace has the capability to divert gases from the hood exhaust stream into the firing zone for additional cooling via the tempering air stream to prevent high temperatures from damaging filter bags in waste gas service. The air in this stream is from the outlet of the second cooler and it has a much lower temperature than the firing zone gases. Additional cooling can be provided by drawing in ambient air via the air intake damper on the second cooler duct.

- A baghouse on the waste gas stream would receive exhaust gas after the proposed gas suspension absorber (see the SO_2 BACT determinations for furnace hood exhausts and furnace waste gas exhausts). Lime slurry and water are added in the absorber for SO_2 control. The evaporation of this water is a significant source of cooling, thus significantly reducing the potential for high temperature from reaching the waste gas baghouse.

- A baghouse on the hood exhaust would receive exhaust gas from the drying zone of the furnace where temperatures are low to begin with (<500°F) and the risk of temperature spiking very remote, and the risk of temperature spiking can be mitigated by adding the ability to introduce outside tempering air.

- Filter bags made with fiberglass and PTFE membrane coatings can withstand operating temperatures up to 500°F.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces ($PM_{2.5}$)

The control technologies for induration furnace operations are ranked as follows:

(1) Fabric filter dust collectors: 30% - 99.9%

(2) Wet scrubbers: 20% - 99.9%

(3) Electrostatic precipitators: 80% - 99.6%

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace ($PM_{2.5}$)

Based on a review of the U.S. EPA RBLC, the primary control used for induration furnaces is dry capture, either using fabric filtration or a dry ESP. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of $PM_{2.5}$. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.008 gr/dscf to 0.012 gr/dscf.

BACT Proposal – Induration Furnace ($PM_{2.5}$)

BACT for the $PM_{2.5}$ emissions from the induration furnace has been proposed to be controlled through the use of a baghouse with a maximum outlet concentration of 0.008 gr/dscf and an appropriate pound per hour limitation.

Step 5: Select BACT - Induration Furnace ($PM_{2.5}$)

The proposed BACT for $PM_{2.5}$ meets the most stringent BACT found in the RBLC for induration furnaces. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed $PM_{2.5}$ BACT for the Induration Furnace is given in the BACT Conclusion for $PM_{2.5}$.

(c) <u>Combustion Units ($PM_{2.5}$)</u>

The following emission units associated with combustion processes are subject to $PM_{2.5}$ BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator ($PM_{2.5}$)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators ($PM_{2.5}$)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for natural gas fired generators only used for emergency purposes.

$PM_{2.5}$ BACT Determinations - Emergency Generator					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations - Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	$TPM_{2.5}$: Certified to meet NSPS Subpart JJJJ, proper combustion design, 0.01 lb/MMBtu	NI	BACT-PSD
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	$TPM_{2.5}$: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	Filterable $PM_{2.5}$: Use of pipeline quality natural gas, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator ($PM_{2.5}$)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator ($PM_{2.5}$)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator ($PM_{2.5}$)

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the emergency generator.

The natural gas fired emergency generator (EU017) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of pounds per hour of $PM_{2.5}$. Grams per kilowatt-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

$PM_{2.5}$ BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency generator is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired generators in the same size category.

Step 5: Select BACT - Natural Gas Fired Emergency Generator ($PM_{2.5}$)

A detailed $PM_{2.5}$ BACT for the natural gas fired emergency generator is given in the BACT Conclusion for $PM_{2.5}$.

(2) Natural Gas Fired Fire Pump ($PM_{2.5}$)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps ($PM_{2.5}$)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

$PM_{2.5}$ BACT Determinations – Fire Pump					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations – Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	$TPM_{2.5}$: Certified to meet NSPS Subpart JJJJ, proper combustion design, 0.01 lb/MMBtu	NI	BACT-PSD
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	$TPM_{2.5}$: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	Filterable $PM_{2.5}$: Use of pipeline quality natural gas, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps ($PM_{2.5}$)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps ($PM_{2.5}$)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump ($PM_{2.5}$)

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the fire pump.

The natural gas fired fire pump (EU018) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission

limitations in terms of pounds per hour of $PM_{2.5}$. Grams per kilowatt-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

$PM_{2.5}$ BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency fire pump is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired fire pumps in the same size category.

Step 5: Select BACT - Natural Gas Fired Fire Pump ($PM_{2.5}$)

A detailed $PM_{2.5}$ BACT for the natural gas fired fire pump is given in the BACT Conclusion for $PM_{2.5}$.

(3) Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC. The search was limited to entries from January 2006 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

$PM_{2.5}$ BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	$PM_{2.5}$: Baghouse, use of natural gas, good combustion practices	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	$TPM_{2.5}$: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
City of Victorville: Victorville, CA	CA-1191/ SE 07-02 (3/11/2010)	Auxiliary Heater (40 MMBtu/hr)	$TPM_{2.5}$: 1000 hours/year, 0.20 gr/100 dscf	NI	BACT-PSD

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)

The control technologies for natural gas fired space heaters and air heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)

Based on a review of the RBLC, add-on control devices are generally not used for controlling particulate emissions from natural gas fired space heaters or air heaters. Most facilities express emission limitations in terms of pounds per hour of $PM_{2.5}$. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The only listed emission limit for $PM_{2.5}$ (when converted for comparison) is 0.0075 lb/MMBtu. Based on a review of the RBLC, emission limits for PM (when converted for comparison) varied from 0.0072 lb/MMBtu to 0.0075 lb/MMBtu.

$PM_{2.5}$ BACT for the natural gas fired heaters has been proposed to be the restricted use of only natural gas and the use of good combustion practices along with an emission limit, which is 0.0072 lb/MMBtu for each of the proposed heaters.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)

A detailed $PM_{2.5}$ BACT for natural gas fired heaters is given in the BACT Conclusion for $PM_{2.5}$.

(d) <u>Cooling Towers ($PM_{2.5}$)</u>

Particulate matter emissions are primarily due to the dissipation of heat loads from plant condensate to the atmosphere. Some of the liquid water may be entrained in the air stream and can be carried out of the tower as "drift" droplets. As the droplet evaporates in the atmosphere, any suspended or dissolved material will solidify as particulate matter.

The following new emission units associated with the cooling towers are subject to $PM_{2.5}$ BACT requirements:

Particulate Matter Emission Units Associated with the Cooling Tower		
Emission Unit		Associated Emission Point
Description	Unit No.	
Cooling Tower	EU024	SV022

Existing $PM_{2.5}$ BACT Determinations for Cooling Towers

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for cooling towers at iron ore pelletizing plants. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries), as well as various sources with cooling towers of comparable size, from January 2004 to January 2013.

$PM_{2.5}$ BACT Determinations – Cooling Tower					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Cooling Tower EU024 (4,600 gpm)	Filterable $PM_{2.5}$: Drift eliminator with a maximum drift rate of 0.001% of the circulating water flow rate, use of cooling water with less than 6,009 milligrams per liter TDS concentration, 0.138 lb/hr	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations – Cooling Towers					
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Melt Shop Spray Contact Cooling Tower (198,360 gpm)	$TPM_{2.5}$: 0.04 lb/hr, 0.15 tons/yr	NI	BACT-PSD
			Process Notes: Cooling Tower with 0.005% drift rate and a maximum TDS content of 2,650 mg/L		
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Rolling Mill Contact Cooling Tower (225,000 gpm)	$TPM_{2.5}$: 0.07 lb/hr, 0.32 tons/yr	NI	BACT-PSD
			Process Notes: Cooling Tower with 0.005% drift rate and a maximum TDS content of 2,650 mg/L		
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Cooling Towers (12) (1,440,000 gpm)	Filterable $PM_{2.5}$: Drift eliminators, 3.42 lb/hr and 14.99 tons/yr (combined)	NI	LAER

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options – Cooling Towers ($PM_{2.5}$)

No technologies were eliminated from consideration because of technical infeasibility for cooling towers.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Cooling Towers ($PM_{2.5}$)

The control technologies for cooling towers are ranked as follows:

(1) Drift eliminators.

(2) Minimization of total dissolved solids (TDS).

Step 4: Evaluate the Most Effective Controls and Document the Results – Cooling Tower ($PM_{2.5}$)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for cooling towers at iron ore pelletizing plants is drift eliminators. Most facilities express emission limitations in terms of maximum drift rate and an associated pound per hour limitation. However, all of the cooling towers listed in the RBLC for the pollutant $PM_{2.5}$ are not comparable to the one proposed by Magnetation due to size differences; therefore, a second review of the RBLC was performed for similarly sized cooling towers under the pollutant PM_{10}. The only cooling tower in the range of the proposed cooling tower with a listed drift rate is located at Entergy New Orleans, Inc. (Michoud Electric Plant). The drift rate is 0.001%.

BACT Proposal

BACT has been proposed to be the use of drift eliminators with a maximum drift rate of 0.001%, use of cooling water with less than 6,009 milligrams per liter TDS concentration, and an appropriate pound per hour limitation. The basis for the TDS concentration is documented in the RBLC PM_{10} BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

Step 5: Select BACT – Cooling Tower ($PM_{2.5}$)

The proposed BACT for PM meets the most stringent BACT found in the RBLC for cooling towers of comparable size. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed $PM_{2.5}$ BACT for the cooling tower is given in the BACT Conclusion for $PM_{2.5}$.

(e) <u>Fugitive Dust Emissions ($PM_{2.5}$) from Paved Roads</u>

Fugitive dust emissions will be generated from vehicles traveling over plant roads.

Existing BACT Determinations - Fugitive Dust Emissions ($PM_{2.5}$)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for fugitive dust emissions from paved roads at iron ore pelletizing plants. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2005 to January 2013.

$PM_{2.5}$ BACT Determinations: Fugitive Dust Emissions					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fugitive Dust Emissions from Paved Roads	$PM_{2.5}$: Vacuum sweeping and water flushing as necessary, speed reduction plan, in accordance with the required fugitive dust control plan	NI	BACT-PSD

$PM_{2.5}$ BACT Determinations: Fugitive Dust Emissions					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Existing $PM_{2.5}$ BACT Determinations: Fugitive Dust Emissions					
Sun Coke Energy, Inc.: Middletown, OH	OH-0332/ P0104768 (2/9/2010)	Roadways and Parking Areas	$PM_{2.5}$: Control measures, 0.05 tons/yr	NI	LAER
			Emission limit from Fugitive PM Pollutant Notes listing		
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Paved Roadways and Parking Areas	Filterable $PM_{2.5}$: Control measures (wet suppressants, watering, speed reduction, and vacuuming/sweeping), 29.90 tons/yr	NI	LAER
Suncoke (Gateway Energy & Coke): Granite City, IL	IL-0109/ 06070020 (3/13/2008)	Roads, Parking Areas, Other Open Areas	Filterable $PM_{2.5}$: Work practices (paving, fugitive dust control program)	NI	LAER

Step 2: Eliminate Technically Infeasible Options - Fugitive Dust Emissions ($PM_{2.5}$)

Fugitive dust emissions will be generated from vehicles traveling over plant roads. Typical particulate control devices such as fabric filtration, mechanical collectors, wet scrubbers, and ESPs are not technically feasible for the control of fugitive dust emissions because, by definition, fugitive emissions cannot be reasonable routed through a single point of exhaust. Therefore, these control devices will not be considered further for fugitive dust emissions.

Since the inclusions of opacity readings as limits were considered under LAER or other case-by-case basis and not as part of a BACT determination, the taking of opacity readings will not be considered further for fugitive dust emissions.

A review of the U.S. EPA RBLC shows that fugitive dust emissions from roads at other iron ore beneficiating plants, steel mills, and steel foundries are controlled through the paving of roads and then through the use of wetting agents or controlling the accumulation of dusty material on the roads. Removal of the accumulation of silt on the roadways can be accomplished by either sweeping or vacuuming the silt from the roads. Fugitive dust control plans are also typically implemented.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Fugitive Dust Emissions ($PM_{2.5}$)

The most effective control for fugitive dust emissions from roadways is paving of the roads and the implementation of a site-specific Fugitive Dust Control Plan.

Step 4: Evaluate the Most Effective Controls and Document the Results - Fugitive Dust Emissions ($PM_{2.5}$)

Based on a review of the RBLC, the most stringent BACT for fugitive dust control of roads is development, implementation and maintenance of a site specific Fugitive Dust Control Plan.

BACT Proposal

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Step 5: Select BACT - Fugitive Dust Emissions ($PM_{2.5}$)

BACT shall be the development, maintenance, and implementation of a site-specific fugitive dust control plan. Since the source is required to meet the most stringent BACT for fugitive emissions from paved roads, no further evaluation of these operations is required and an economic, energy, or environmental impact analysis is not required as part of the BACT evaluation for these operations.

A detailed $PM_{2.5}$ BACT for fugitive dust emissions is given in the BACT Conclusion for $PM_{2.5}$.

BACT Conclusion for $PM_{2.5}$

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for $PM_{2.5}$ emissions shall be as follows:

(a) Material Handling Operations

The material handling operations shall be limited as follows:

(1) $PM_{2.5}$ emissions from the following emission units (EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, and EU026) shall be controlled by fabric filter dust collectors and shall not exceed the associated emission limits listed in the following table:

Emission Unit		Control	$PM_{2.5}$ Limit (gr/dscf)	$PM_{2.5}$ Limit (lb/hr)
Description	(Unit ID)			
Iron Concentrate Unloading	EU001a	Baghouse CE001	0.002	0.95
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	Baghouse CE004	0.002	0.0429
Bentonite Unloading (Truck) & Storage Area	EU005	Bin Vent CE005	0.002	0.0429
Organic Binder Unloading & Storage Area	EU006	Bin Vent CE006	0.002	0.0429
Soda Ash Unloading & Storage Area	EU007	Bin Vent CE007	0.002	0.0429
Bentonite Additive System	EU008	Bin Vent CE008	0.002	0.0429
Coke Breeze Additive System	EU009	Baghouse CE009	0.002	0.09
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse CE023	0.002	0.22
Ground Limestone and Dolomite Additive System	EU010	Baghouse CE010	0.002	0.32
Mixing Area Material Handling System	EU011	Baghouse CE011	0.002	0.34
Hearth Layer Bin System	EU012	Baghouse CE012	0.002	0.15
Furnace Discharge System	EU015	Baghouse CE017	0.002	0.73
Hearth Layer Separation System	EU016	Baghouse CE017	0.002	0.79

Emission Unit		Control	$PM_{2.5}$ Limit (gr/dscf)	$PM_{2.5}$ Limit (lb/hr)
Description	(Unit ID)			
Oxide Pellet Storage & Unloading System	EU019	Baghouse CE019	0.002	0.63
WBE Lime Storage Area	EU020	Bin Vent CE020	0.002	0.02
WBE Residual Product Loading Area	EU022	Bin Vent CE021	0.002	0.02
Recycled Dust Storage Area	EU026	Baghouse CE024	0.002	0.16

*$PM_{2.5}$ includes both filterable and condensible $PM_{2.5}$.

(2) $PM_{2.5}$ emissions from the following emission units (EU002a, EU003a, and EU004a) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	$PM_{2.5}$*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	$PM_{2.5}$*	5.33 E-04	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	$PM_{2.5}$*	1.02 E-04	4.45 E-04

(3) $PM_{2.5}$ emissions from the following emission units (EU001b, EU002b, and EU003b) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, by enclosures, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Iron Concentrate Transfer and Storage Area	EU001b	$PM_{2.5}$*	1.57	6.88
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	$PM_{2.5}$*	0.02	0.04
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	$PM_{2.5}$*	0.01	0.02

*$PM_{2.5}$ includes both filterable and condensible $PM_{2.5}$.

(4) $PM_{2.5}$ emissions from the following emission unit (EU025a) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, by enclosures, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Limestone/Dolomite Hopper, Belt Feeder & Grizzly Feeder/Screener	$PM_{2.5}$*	0.33	0.70

*$PM_{2.5}$ includes both filterable and condensible $PM_{2.5}$.

(5) The Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System opacity shall not exceed five percent (5%) on a six (6) minute average and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Iron Ore Wet Grinding and Filter Cake Production	$PM_{2.5}$*	0.07	0.31
Greenball Production System	$PM_{2.5}$*	0.07	0.31

(b) Induration Furnace

The induration furnace operations shall be limited as follows:

$PM_{2.5}$ emissions from the Furnace Hood Exhaust (EU013) and the Furnace Windbox Exhaust (EU014) shall be controlled by fabric filter dust collectors and shall not exceed the emission limits listed in the following table:

Emission Unit		Control	$PM_{2.5}$ Limit (gr/dscf)	$PM_{2.5}$ Limit (lb/hr)	Opacity (6-min avg)
Description	Unit No.				
Furnace Hood Exhaust	EU013	Baghouse CE013	0.008	20.23*	5%
Furnace Windbox Exhaust	EU014	Baghouse CE016	0.008	24.25*	5%

*The PM2.5 limits include process emissions and combustion emissions.

(c) Combustion Units

The combustion units shall be limited as follows:

(1) $PM_{2.5}$ emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(2) $PM_{2.5}$ emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(3) $PM_{2.5}$ emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 0.0072 lb/MMBtu.

(d) Cooling Tower

The cooling tower emissions shall be controlled through the use of drift eliminators with a maximum drift rate of 0.001%, the use of cooling water with less than 6,009 milligrams per liter TDS concentration, and a 0.138 pound per hour limitation. The basis for the TDS concentration is documented in the RBLC PM_{10} BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

(e) Fugitive Dust Emissions from Paved Roads

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (PSD BACT) with regards to $PM_{2.5}$.

Sulfur Dioxide (SO_2) BACT

The SO_2 BACT analysis is divided into two categories: induration furnace and combustion units.

Step 1 of the BACT process is shown below for this SO_2 BACT analysis to describe general sulfur dioxide control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific SO_2 control devices may be discussed in individual BACT analyses. A summary of the SO_2 BACT determinations is provided at the end of this section.

Step 1: Identify Potential Control Technologies (SO_2)

Sulfur dioxide and fluoride emissions are concurrently generated from certain sources at Magnetation. SO_2 is formed when sulfur in raw materials and/or fuels is oxidized by either process conditions or by combustion.

The primary methods of controlling SO_2 emissions are through the use of flue gas desulfurization (FGD) technologies. There are many FGD systems available including wet scrubbing, spray dryer absorption, circulating fluidized bed absorption (also known as a Gas Suspension Absorber), and dry sorbent injection. The FGD systems currently in use to control SO_2 emissions can be classified as either wet or dry systems. In addition, a number of calcium and sodium based SO_2 control reagents may be considered. In most cases, reagent selection will not affect the overall SO_2 control efficiency. This analysis will focus on lime and limestone since they are the most common reagents used in wet scrubbing.

SO_2 emissions from a combustion process are typically controlled through one of the following mechanisms:

(1) Clean fuels.

(2) Good combustion practices.

(3) Usage limitation.

Wet Scrubber

A wet scrubber involves scrubbing the exhaust gas stream with a reagent in slurry form comprised of lime (CaO), limestone ($CaCO_3$), caustic, or soda ash in suspension. The process takes place in a wet scrubbing tower. In some cases, the scrubbing tower is located downstream of a PM control device to reduce the plugging of spray nozzles and other problems caused by the presence of particulates in the scrubber. The SO_2 in the gas stream reacts with the slurry to form calcium sulfite ($CaSO_3$) and calcium sulfate ($CaSO_4$). Wet scrubbing absorption control efficiency is typically in the 90% to 98% range.

In order to meet the SO_2 and particulate levels associated with various requirements two scrubber scenarios are considered. The first is a single high pressure wet scrubber. The advantage of a single high pressure wet scrubber is that it has lower capital cost but the operating

costs are higher. To achieve the level of particulate removal necessary with a single scrubber, a very high pressure drop is required. The high pressure drop requires a larger fan which in turn uses more electricity. The second option is to have a lower pressure wet scrubber for SO_2 removal followed by a wet ESP for particulate removal. The wet scrubber with a wet ESP option has a higher capital cost but lower operating cost.

Other materials could be used for scrubbing. Mono-ethanolamine (MEA) is a sorbent which may be used for CO_2 absorption in GHG capture system. The capture of CO_2 is accomplished by an acid base reaction between CO_2 and MEA. This bond may be broken relatively easily with low pressure steam heat. In CO_2 capture systems for GHG control, an MEA solution circulates through an absorption column to capture the CO_2 in an exhaust gas steam and a regeneration column where the CO_2 is released from the MEA solution using low pressure steam as a heat source. The CO_2 from the regeneration is compressed to a liquid for transport and sequestration. The MEA is continuously circulated between the absorption and regeneration columns, and very little MEA is lost in the process.

MEA also reacts with other acidic gases such as H_2S, SO_2, and NO_x. The reaction between MEA and SO_2 and the reaction of MEA with NO_x is irreversible, and the chemical bonds cannot be broken in a regeneration column. In a CO_2 capture systems, MEA reacting with SO_2 and NO_x is consumed and fresh MEA must be added to replace the MEA consumed by SO_2 and NO_x. There are also operating costs for removing the MEA salts from the MEA sorbent solution and disposal of the waste material. SO_2 and NO_x removal by MEA is considered an unwanted collateral reaction within a CO_2 capture system. Therefore, SO_2 and NO_x concentrations in coal-fired boiler applications must be reduced to a minimum in an MEA sorbent based CO_2 capture system to control operating costs.

If an MEA solution would be used to capture the remaining SO_2 and NO_x in the post emission control Hood and Waste Gas exhaust streams, it would result in the consumption of 950 tons per year of MEA assuming all SO_2 and NO_x is captured.

MEA is not considered to be an economically viable option as compared to other reagents for SO_2 control. The current bulk price of MEA is approximately $2,100 per ton. In contrast, hydrated lime costs around $290 per ton, and about the same amount of lime would be used per ton SO_2 controlled as MEA.

Circulating Fluidized Bed (CFB) Dry Scrubber

Circulating fluidized bed (CFB) absorption is a semi-dry system with lime slurry injection. The flue gas enters the reactor through a venturi, which increases the velocity to ensure that solid material can be transported by the flue gas to create a fluidized bed. The slurry and water are injected into the gas stream at the venturi. The lime reacts with the acids in the flue gas and neutralizes them. The SO_2 in the gas stream reacts with the slurry to form calcium sulfite ($CaSO_3$). The fluidized bed allows for a greater surface for the reaction to take place, thus making the process very efficient. The water is injected to cool down the flue gas. The temperature must be as low as possible because decreased temperatures increase the ability of the slurry to absorb the acids. However, if the temperature is too low, the re-circulating material tends to cake more. A cyclone off the top of the reactor captures particles to be recirculated to the reactor. CFB scrubbing (absorption) control efficiency is typically in the 90% to 98% range depending upon inlet concentrations and conditions.

Spray Dryer Absorption (SDA) Dry Scrubber

Spray dryer absorption (SDA) is a dry scrubbing system that sprays a fine mist of slurried lime into an absorption tower where SO_2 is absorbed by the droplets. The absorption of the SO_2 leads to the formation of calcium sulfite (CaSO3●2H2O) within the droplets. The liquid-to-gas ratio is such that the heat from the exhaust gas causes the water to evaporate before the droplets

reach the bottom of the tower. This leads to the formation of a dry powder which is carried out with the gas and collected with a particulate control device. Spray dryer absorption control efficiency is typically in the 70% to 95% range depending upon inlet concentrations and conditions.

Dry Sorbent Injection (DSI) Dry Scrubber

Dry sorbent injection (DSI) involves the injection of a lime or limestone powder into the exhaust gas stream. The process was developed as a lower cost FGD option because the mixing occurs directly in the exhaust gas stream instead of in a separate tower. Sorbent injection control efficiency is typically in the 50% range.

Clean Fuels

The proposed induration furnace is designed to fire only natural gas in its burners. Natural gas does not contain any fuel bound sulfur compounds and therefore is considered to be a clean fuel for SO_2. However, Magnetation is proposing to add coke breeze to the iron ore as it is being processed. The amount of coke breeze will be limited to less than 1.5%. Coke breeze does contain fuel bound sulfur compounds.

It is technically infeasible to burn solid or liquid fuels (e.g., coal and/or fuel oil) in burner systems of a straight grate furnace such as the one designed for the proposed modifications at Magnetation.

Good Design Methods and Operating Practices

Good design includes process and mechanical equipment designs which are either inherently lower polluting or are designed to minimize emissions. Good operating practices include operating methods, procedures, and selection of raw materials to minimize emissions. Since these methods are generally source specific (e.g., good operating practices for SO_2 control), they will be addressed for each process when such measures are available.

(a) <u>Induration Furnace (SO_2)</u>

The majority of sulfur dioxide (SO_2) emissions originate from the sulfur present in the iron concentrate and coke breeze. There is also a small amount of SO_2 emitted from natural gas combustion. The SO_2 emission rate was determined based on a mass balance. The mass balance is based on the sulfur content of the ore concentrate, the concentrate production rate, the sulfur content of the finished iron oxide pellets, and the iron oxide pellet production rate.

The hood exhaust contains a small amount of SO_2 due to leakage between induration furnace zones and the diversion of up to 30% of waste gas for pressure control.

Most of the SO_2 emissions emanate from the windboxes that are routed to the waste gas stack as these are the regions of the induration furnace where sufficient temperature exists to liberate sulfur compounds from the iron oxide pellets.

The following new emission units associated with the induration furnace are subject to SO_2 BACT requirements:

SO_2 Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A

SO_2 Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Windbox Exhaust	EU014	SV013B

Existing SO_2 BACT Determinations for Induration Furnaces

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these SO_2 BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2002 to January 2013.

SO_2 BACT Determinations – Induration Furnace					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 st/hr pellets)	SO_2: No control, 7.1 ppmv wet @ 20% O_2 and 21.68 lb/hr	NI	BACT-PSD
		Note: 0.089 lb SO_2/ton pellets * 450 tons/hr = 40.1 lb/hr SO_2 This meets most stringent BACT.			
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 st/hr pellets)	SO_2: GSA dry scrubber and baghouse, 5.0 ppmv wet @ 15% O_2 and 19.61 lb/hr	NI	BACT-PSD
		Note: 0.048 lb SO_2/ton pellets * 450 tons/hr = 21.6 lb/hr SO_2 This meets most stringent BACT.			
Existing SO_2 BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**SO_2: No control, 6.8 ppmv wet @ 15% O_2 and 55.70 lb/hr (1-hr rolling avg)**	**NI**	**BACT-PSD**
	Note: 55.70 lb/hr ÷ 624 tons/hr = 0.089 lb SO_2/ton pellets				
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**SO_2: GSA dry scrubber, 5 ppmv wet @ 15% O_2 and 29.90 lb/hr (1-hr rolling avg)**	**NI**	**BACT-PSD**
	Note: 29.90 lb/hr ÷ 624 tons/hr = 0.048 lb SO_2/ton pellets				
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Tempered Preheat (450 t/hr pellets)	SO_2: GSA dry scrubber and dry ESP, 5 ppmv wet and 18.40 lb/hr (30-day rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 1 (450 t/hr pellets)	SO_2: GSA dry scrubber and dry ESP, 5 ppmv wet (30-day rolling avg), 18.40 lb/hr (3-hr avg)	95%	BACT-PSD
Michigan Iron Nugget LLC: Ishpeming, MI	MI-0392/ 88-10 (12/7/2010)	Rotary Hearth Furnace (75.73 tons/hr nuggets, 663396 tons/yr nuggets)	SO_2: Spray dryer absorption and fabric filter, 1.20 lb/st nugget (24-hr avg), 93.7 lb/hr (1-hr avg)	90%	BACT-PSD
Cleveland – Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace 5 Hood Exhaust (Waste Gas #501, #502, #503) (160 LT/hr pellets)	SO_2: High efficiency wet ESP, 0.130 lb/MMBtu, 0.0720 lb/MMBtu (only natural gas)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (SO_2)

The proposed indurating furnace is designed to operate on natural gas (as an external fuel) and coke breeze (which is added to the raw materials). Therefore, use of natural gas as a clean fuel as well as good design methods and operating practices will be implemented regardless of the SO_2 control system selected.

Induration Furnace Hood Exhaust
Wet scrubbing and spray dryer absorption have been eliminated as control technologies for the Furnace Hood Exhaust (EU013) because the control technologies can feasibly achieve outlet concentrations of 10 and 25 ppmv, respectively. Since the uncontrolled concentration from the hood exhaust is 7.1 ppmv, these technologies will not be able to remove any further SO_2 from the air stream. No other technologies were eliminated from consideration because of technical infeasibility for the induration furnaces with regards to the Furnace Hood Exhaust (EU013).

Induration Furnace Windbox Exhaust
No technologies were eliminated from consideration because of technical infeasibility for the Furnace Windbox Exhaust (EU014).

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (SO_2)

Induration Furnace Hood Exhaust
The control technologies for the induration furnace hood exhaust are ranked as follows:

(1) Gas suspension absorber (GSA): 95%

(2) Dry sorbent injection (DSI) dry scrubber: 40%

Induration Furnace Windbox Exhaust
The control technologies for the induration furnace windbox exhaust are ranked as follows:

(1) Gas suspension absorber (GSA): 95%

(2) High pressure wet scrubber: 80%

(3) Low pressure wet scrubber followed with wet electrostatic precipitator (ESP): 80%

(4) Spray dryer absorption (SDA): 60-70%

(5) Dry sorbent injection (DSI) dry scrubber: 40%

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (SO_2)

Induration Furnace Hood Exhaust
Uncontrolled SO_2 concentrations in the hood exhaust stream are very low; the calculated hood exhaust SO_2 concentration is 7.1 ppmv. Since this concentration is at or near the lowest controlled SO_2 concentration achievable by these control devices (5 ppm), a control cost analysis was performed to determine whether or not add-on SO_2 controls were economically feasible. For the GSA and DSI dry scrubbing options, baghouses are needed to capture the spent sorbent. In GSA applications, a portion of the recovered sorbent is recycled back to the dry scrubber to minimize sorbent use. Therefore, the baghouses are considered as an integral part of the SO_2 control system and are included in the control cost analysis. Control costs for GSA and DSI options were also evaluated without baghouse costs. All of these control costs are provided in Appendix C and are summarized in Appendix C - Table A-1 and in the following table.

Hood Exhaust – SO_2 Controls

Hood Exhaust – SO_2 Controls		
Technology	**SO_2 Control Cost ($/ton)**	**Corresponding Appendix C Cost Tables**
Dry Sorbent Injection (DSI)	$55,943	A-4-2a
Gas Suspension Absorber (GSA)	$82,606	A-3-2a
Dry Sorbent Injection (DSI) with Baghouse	$109,262	A-4-1a
Gas Suspension Absorber (GSA) with Baghouse	$151,663	A-3-1a

From the above table, the implementation of SO_2 controls on the hood exhaust would be economically infeasible whether or not particulate controls are included in the cost analysis.

Based on a review of the U.S. EPA RBLC, the primary control used for furnace hood exhausts at iron ore pelletizing plants is an appropriate pound per hour limitation, based on the process being uncontrolled. Most facilities express emission limitations in terms of exhaust concentration and/or pounds per hour of SO_2. Exhaust concentration is the most effective way of comparing emission limits because it is a relative measure rather than control efficiency limitations which are process-specific measures. The exhaust concentrations given in the review range from 6.8 ppmv wet to 7.8 ppmv wet.

The furnace design at Magnetation differs from the furnace design at Essar. Both furnaces combust natural gas in the windbox to dry pellets then direct residual heat to the hood. This heat recirculation process at the Essar furnace incorporates 26% of the combustion gases in the heated air stream. This can be documented as follows:

> NO_x emissions in the furnace are generated exclusively from the combustion of natural gas. Essar does not utilize coke breeze in its processes. Therefore, the SO_2 emissions at Essar from in the furnace are generated exclusively from the combustion of natural gas.
>
> | | NO_x (tpy) | SO_2 (tpy) |
> |---|---|---|
> | Hood | 197 | 200 |
> | Windbox | 562 | 570 |
> | Ratio of Hood / (Hood + Windbox) | 26% | 26% |
>
> This redirection of oxygen depleted combustion gas to the hood allows Essar to operate the hood at a lower oxygen level than the ambient air oxygen content of twenty percent (20%).

As documented in the furnace calculations for Magnetation, the amount of combustion gas redirected to its hood will be 7.5%. Therefore, Magnetation cannot operate its furnace hood at 15% oxygen, and it is designed to operate at ambient air oxygen concentrations of twenty percent (20%).

BACT Proposal – Induration Furnace Hood Exhaust (SO_2)

BACT for the SO_2 emissions from the induration furnace hood exhaust has been proposed to be uncontrolled with a maximum outlet concentration of 7.1 ppmv wet corrected to 20% O_2 and a corresponding 21.68 lb/hr limit.

<u>Induration Furnace Windbox Exhaust</u>

Based on a review of the U.S. EPA RBLC, the primary control used for furnace waste gas/windbox exhausts at iron ore pelletizing plants is a gas suspension absorber (GSA). Most facilities express emission limitations in terms of exhaust concentration and/or pounds per hour of SO_2. Exhaust concentration is the most effective way of comparing emission limits because it is a relative measure rather than control efficiency limitations which are process-specific measures. The exhaust concentrations given in the review range from 3.3 ppmv wet to 5.0 ppmv wet, with most processes being limited at 5.0 ppmv wet, which was determined to be BACT for most furnace waste gas/windbox exhausts.

BACT Proposal – Induration Furnace Windbox Exhaust (SO_2)

BACT for the SO_2 emissions from the induration furnace windbox exhaust has been proposed to be controlled through the use of a GSA dry scrubber combined with a baghouse for sorbent capture and particulate control, in conjunction with a maximum outlet concentration of 5.0 ppmv wet corrected to 15% O_2 and a corresponding 19.61 lb/hr limit.

The proposed BACT for SO_2 meets the most stringent BACT found in the RBLC for induration furnace waste gas exhausts. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

Step 5: Select BACT - Induration Furnace (SO_2)

A detailed SO_2 BACT for the induration furnace is given in the BACT Conclusion for SO_2.

(b) <u>Combustion Units (SO_2)</u>

The following emission units associated with combustion processes are subject to SO_2 BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated SO_2 Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (SO_2)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (SO_2)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these SO_2 BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for natural gas fired generators only used for emergency purposes.

SO_2 BACT Determinations - Emergency Generator					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	SO_2: Use of natural gas, good combustion practices, 0.0015 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing SO_2 BACT Determinations - Emergency Generators					
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	SO_2: Use of pipeline quality natural gas, 0.03 lb/hr, 0.003 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	SO_2: Use of pipeline quality natural gas, 0.02 lb/hr, 0.002 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	SO_2: 0.002 g/bhp-hr, 200 hours/year	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (SO_2)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (SO_2)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (SO_2)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of pounds per hour of SO_2. Grams per kilowatt-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The converted emission standards given in the review range between 0.0015 g/kw-hr and 0.14 g/kw-hr.

SO_2 BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 0.0015 g/kw-hr for the proposed generator.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (SO_2)

A detailed SO_2 BACT for the natural gas fired emergency generator is given in the BACT Conclusion for SO_2.

(2) Natural Gas Fired Fire Pump (SO_2)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (SO_2)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these PM BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

SO_2 BACT Determinations – Fire Pump					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	SO_2: Use of natural gas, good combustion practices, 0.0015 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing SO_2 BACT Determinations – Emergency Generators					
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	SO_2: Use of pipeline quality natural gas, 0.03 lb/hr, 0.003 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	SO_2: Use of pipeline quality natural gas, 0.02 lb/hr, 0.002 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	SO_2: 0.002 g/bhp-hr, 200 hours/year	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (SO_2)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (SO_2)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (SO_2)

There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of pounds per hour of SO_2. Grams per kilowatt-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The converted emission standards given in the review range between 0.0015 g/kw-hr and 0.14 g/kw-hr.

SO_2 BACT for the natural gas fired fire pump has been determined to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 0.0015 g/kw-hr for the proposed fire pump.

Step 5: Select BACT - Natural Gas Fired Fire Pump (SO_2)

A detailed SO_2 BACT for the natural gas fired fire pump is given in the BACT Conclusion for SO_2.

(3) Natural Gas Fired Space Heaters and Air Heaters (SO_2)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (SO_2)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these SO_2 BACT determinations as provided by the RBLC. The search was limited to entries from January 2006 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

SO_2 BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	SO_2: Use of natural gas, good combustion practices, 0.00048 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	SO_2: Use of natural gas, good combustion practices, 0.00048 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	SO_2: Use of natural gas, good combustion practices, 0.00048 lb/MMBtu	NI	BACT-PSD
Existing SO_2 BACT Determinations - Heaters Firing Natural Gas					
Lake Charles Cogeneration, LLC: Sulphur, LA	LA-0231/ PSD-LA-742 (6/22/2009)	Shift Reactor Startup Heater (34.20 MMBtu/hr)	SO_2: Use of natural gas, 0.02 lb/hr	NI	BACT-PSD
Lake Charles Cogeneration, LLC: Sulphur, LA	LA-0231/ PSD-LA-742 (6/22/2009)	Gasifier Startup Preheater Burners (5) (35 MMBtu/hr)	SO_2: Use of natural gas, 0.02 lb/hr	NI	BACT-PSD
Pryor Plant Chemical : Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	SO_2: Use of natural gas, 0.03 lb/hr	NI	BACT-PSD

SO_2 BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	SO_2: 0.01 lb/hr, 0.05 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	SO_2: 0.01 lb/hr, 0.05 tons/yr	NI	BACT-PSD
Florida Power & Light: Loxahatchee, FL	FL-0303/ 0990646-002-AC (PSD-FL-396) (7/30/2008)	Natural Gas Fired Process Heaters (2) (10 MMBtu/hr)	SO_2: 2 gr/100 scf	NI	BACT-PSD
Florida Power & Light: Loxahatchee, FL	FL-0286/ 0990646-001-AC (PSD-FL-354) (1/10/2007)	Natural Gas Fired Process Heaters (2) (10 MMBtu/hr)	SO_2: 2 gr/100 scf	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (SO_2)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (SO_2)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (SO_2)

Based on a review of the RBLC, add-on control devices are generally not used for controlling SO_2 emissions from natural gas fired space heaters or air heaters. Most facilities express emission limitations in terms of pounds per hour of SO_2. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. Emission limits for SO_2 (when converted for comparison) varied from 0.00048 lb/MMBtu to 0.0015 lb/MMBtu.

SO_2 BACT for the natural gas fired heaters has been proposed to be the restricted use of only natural gas and the use of good combustion practices along with an emission limit, which is 0.00048 lb/MMBtu for each of the proposed heaters.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (SO_2)

A detailed SO_2 BACT for natural gas fired heaters is given in the BACT Conclusion for SO_2.

BACT Conclusion for SO_2

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for SO_2 emissions shall be as follows:

(a) Induration Furnace

The induration furnace operations shall be limited as follows:

(1) SO_2 emissions from the induration furnace hood exhaust be uncontrolled with a maximum outlet concentration of 7.1 ppmv wet corrected to 20% O_2 and a corresponding 21.68 lb/hr limit.

(2) SO_2 emissions from the induration furnace windbox exhaust be controlled through the use of a GSA dry scrubber combined with a baghouse for sorbent capture and particulate control as well as a maximum outlet concentration of 5.0 ppmv wet corrected to 15% O_2 and a corresponding 19.61 lb/hr limit.

(b) Combustion Units

The combustion units shall be limited as follows:

(1) SO_2 emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.0015 g/kw-hr.

(2) SO_2 emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.0015 g/kw-hr.

(3) SO_2 emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 0.00048 lb/MMBtu.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (BACT) with regards to SO_2.

Nitrogen Oxide (NO_x) BACT

The NO_x BACT analysis is divided into three categories: induration furnace hood exhausts, induration furnace waste gas exhausts, and combustion units.

Step 1 of the BACT process is shown below for this NO_x BACT analysis to describe general NO_x control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific NO_x control devices may be discussed in individual BACT analyses. A summary of the NO_x BACT determinations is provided at the end of this section.

Step 1: Identify Potential Control Technologies (NO_x)

There are three mechanisms by which NO_x production occurs. They are thermal, fuel, and prompt NO_x formation.

In the case of natural gas combustion, the primary mechanism of NO_x production is through thermal NO_x formation. This mechanism arises from the thermal dissociation of nitrogen and oxygen molecules in combustion air to nitric oxide (NO). The thermal oxidation reaction is as follows:

$N_2 + O_2 \rightarrow 2NO$ (1)

Downstream of the flame, significant amounts of NO_2 can be formed when NO is mixed with air. The reaction is as follows:

$2NO + O_2 \rightarrow 2NO_2$ (2)

Thermal oxidation is a function of the residence time, free oxygen, and peak reaction temperature.

Prompt NO_x is a form of thermal NO_x which is generated at the flame boundary. It is the result of reactions between nitrogen and hydrocarbon radicals generated during combustion. Only minor amounts of NO_x are emitted as prompt NO_x.

Fuel bound NO_x is primarily a concern with solid and liquid fuel combustion sources; it is formed as nitrogen compounds in the fuel are oxidized in the combustion process. Natural gas has minimal fuel bound nitrogen which eliminates fuel bound NO_x as a major concern.

Various combustion controls exist for NO_x reduction from combustion units. These technologies are summarized below.

New Natural Gas Combustion Chamber Design with Low Emission (LE) Burners

Magnetation is proposing to build the new induration furnace with a new natural gas combustion chamber design. The new design has inherently lower NO_x emissions than standard straight grate furnace designs.

Controlling NO_x emissions in induration furnaces is due, in part, to the way the furnace's recuperative heat recovery system works. To minimize energy use, induration furnaces are designed with recuperative heat recovery systems to use heat recovered from pellet cooling to preheat and fire the green pellets. Magnetation's induration furnace is being designed to maximize energy efficiency by recovering as much heat via recuperative heat recovery systems as is practicable. Preheated air from the first pellet cooling zone is routed to the pellet firing zones so that the hottest air from the pellet coolers is routed to the hottest part of the furnace.

Traditionally, firing zone burners were designed to fire directly into the preheated air stream from the pellet cooler. This conserved energy by reducing the energy needed to heat the firing zone air up to the proper temperature, and use of preheated air for combustion air improved the thermal efficiency of the burner. Unfortunately, this arrangement also produces high NO_x emissions because:

- The preheated air increases burner flame temperatures. Higher flame temperatures increase NO_x emissions. Preheated combustion air in an induration furnace is approximately 2,000 °F. Preheated combustion air in a gas fired package boiler would range from 400 °F to 600 °F.

- Oxygen levels in the combustion zone cannot be controlled when a direct fired burner is used. To effectively control NO_x emissions, O_2 levels need to be in the 2% to 3% range. When O_2 levels are higher (>3%), more nitrogen is oxidized to form NO_x in the combustion zone. Oxygen levels in the firing zone of an induration furnace are typically 15% to 20% O_2.

Magnetation is proposing a new natural gas combustion chamber and burner design which generates substantially less NO_x than the standard design. The new design does this in the following ways:

- The gas combustion chamber design includes a separate chamber for natural gas combustion where conditions are favorable to low NO_x combustion techniques. Hot gases from the combustion chamber then mix with hot air from the pellet cooler in the air duct so that the air stream flowing into the pellet firing zone is at the proper temperature. The air stream flowing into the pellet firing zone is at temperatures where NO_x formation is minimal.

- The new combustion chamber design facilitates the use of pre-mix ultra low NO_x burners and allows control of oxygen levels in the 2% to 3% O_2 range in the combustion zone to optimize performance of the ultra low NO_x burners.

- The Fives Low Emissions (LE) burner is designed to pre-mix the air and fuel prior to combustion. This produces the optimal air-fuel mixture for minimal NO_x formation.

- The combustion chamber is designed in a manner which allows use of combustion air which is at a lower temperature than combustion air supplied directly from the pellet cooler. This further reduces flame temperatures and lowers NO_x emissions. However, this also reduces the thermal efficiency of the burner. Consequently, the final natural gas burner design must strike a balance between energy use and NO_x control.

The premix ultra low NO_x burners used in the new combustion chamber design are Fives North America Low Emissions (LE) lean-premix burners. These burners use a fuel staged, partial premix combustion system. Prior to the primary combustion zone of this burner, fuel and air are intimately mixed in a series of elements internal to the burner body. These mixing elements are integrated into the stabilizer design resulting in a highly uniform, lean burning flame front.

Since the primary zone operates fuel lean, a burner centerline secondary fuel injector supplies fuel to the secondary combustion stage, bringing the overall fuel/air ratio close to stoichiometric conditions. The secondary fuel is injected at high velocity into the Products of Combustion (POC) in the primary combustion zone via a centerline fuel injector. Since the lean premix POC are lower in oxygen than the air in the furnace downcomer, the tendency to form NO_x is reduced. The high velocity injection also provides rapid mixing, a compact secondary fuel flame envelope, and reduced in-flame residence time before combustion is complete. Injecting the secondary fuel at the centerline of the burner prevents interferences from the downcomer air. The reduced residence time also reduces the potential for NO_x emissions because the NO_x reaction does not have time to proceed farther toward equilibrium.

In summary, the new natural gas combustion chamber design is comprised of two parts:

(1) A combustion chamber specifically designed to provide the proper combustion conditions for LE ultra low NO_x burners. The combustion chamber allows the combustion to take place at low oxygen levels and reduced combustion air temperatures.

(2) LE ultra low NO_x burners pre-mix air and fuel to achieve optimal air-fuel mixtures prior to combustion. Pre-mix burners have lower NO_x emission rates than staged burners that inject air and fuel in the combustion zone of the burner. The LE ultra low NO_x burners could not achieve the proposed level of NO_x control if installed directly in the induration furnace or in the recoup air duct feeding the furnace because the oxygen concentrations and combustion air temperature at these locations cannot be controlled at the levels needed for ultra low NO_x burners to effectively minimize NO_x emissions.

Low NO_x Burners (LNB) and Ultra Low NO_x Burners (ULNB)

LNB technology utilizes advanced burner design to reduce NO_x formation through the restriction of oxygen, flame temperature, and/or residence time. LNB technology is a staged combustion process that is designed to split fuel combustion into two zones. In the primary zone, NO_x formation is limited by either one of two conditions; rich or lean fuel. Under a rich (high fuel) condition, oxygen levels and flame temperatures are low resulting in less NO_x formation. The primary zone is then followed by a secondary zone in which the incomplete combustion products formed in the primary zone act as reducing agents.

LNB technology reduces the formation of NO_x during fuel combustion, rather than remove it after formation as do other control devices. LNB are more reliable than other control devices because there are no added pieces of equipment to operate, maintain, or malfunction. LNB do not use additional electricity nor do they generate any wastewater or solid waste streams. They do have the disadvantage that they are not as thermally efficient as standard burners when considering only the thermal requirements and not considering the overall energy (thermal and electrical) as compared to a standard burner technology and the electricity used by a control device and the treatment of wastewater and solid waste disposal.

Second generation low NO_x burners are called Ultra Low NO_x Burners (ULNB). These burners achieve further NO_x reductions by the following techniques:

- Recirculating firebox flue gas within the burner to accomplish the same effect as external flue gas recirculation. Recirculation can be convectively induced or mechanically induced via fuel pressure.

- Tertiary fuel staging to improve upon staged combustion techniques used in standard low NO_x burners

Low Temperature Oxidation (LoTOx)

BOC Gases' LoTOx is a low temperature oxidation NO_x control system. LoTOx technology is an add-on NO_x control system, which uses ozone to oxidize NO to NO_2 and NO_2 to N_2O_5 prior to removal in a wet scrubber (absorber). The N_2O_5 is converted to HNO_3 in the scrubber and may be treated with lime or caustic. The same scrubber may also be used for particulate and/or SO_2 removal. Ozone for LoTOx is generated onsite with an electrically powered ozone generator. The ozone generation rate is controlled to match the amount needed for NO_x control. Ozone is generated from pure oxygen. In order for LoTOx to be economically feasible, a source of low cost oxygen must be available from a pipeline or onsite generation.

The LoTOx chemical reactions are as follows:

$NO + O_3 \rightarrow NO_2 + O_2$ (1)

$NO_2 + O_3 \rightarrow NO_3 + O_2$ (2)

$NO_3 + NO_2 \rightarrow N_2O_5$ (3)

$N_2O_5 + H_2O \rightarrow 2HNO_3$ (4)

$HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$ (5)

The normal NO_x control efficiency range for LoTOx is 80 to 95 percent with outlet NO_x concentrations limited to no lower than 15 ppm to 25 ppm range due to chemical reaction constraints. When LoTOx is in use, scrubber water blowdown contains high levels of nitrates which typically require treatment before the water can be reused or discharged.

Selective Catalytic Reduction (SCR)

SCR is a post combustion NO_x control technology in which ammonia (NH_3) is injected into the flue gas stream in the presence of a catalyst. SCR control efficiency is typically 70 to 90 percent. NO_x is removed through the following chemical reaction:

$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$ (1)

$2NO_2 + 4NH_3 + O_2 \rightarrow 3N_2 + 6H_2O$ (2)

The catalyst bed lowers the activation energy required for NO_x decomposition. The SCR catalyst typically contains vanadium pentoxide as the catalytic agent. However, other metallic compounds may be used in special circumstances. These materials are used for their ability to lower the activation energy required for NO_x decomposition reaction. SCR requires an optimum temperature range of 570°F to 850°F.

Regenerative Selective Catalytic Reduction (RSCR)

RSCR is an energy efficient control technology that uses a catalytic reduction process similar to SCR to remove NO_x from the flue gas. RSCR has a NO_x control efficiency of approximately 75 percent. The goal of the RSCR system is to combine the heat recovery, temperature control, and catalyst elements of the SCR process into a single unit so that SCR technology can be used in low temperature applications. Similar to the SCR technology, RSCR uses a reagent and catalyst to reduce NO_x to N_2 and H_2O through the following chemical reaction:

$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$ (1)

$2NO_2 + 4NH_3 + O_2 \rightarrow 3N_2 + 6H_2O$ (2)

RSCR is a “tail end” SCR that is located after the particulate control device, where temperatures are between 100°F and 200°F. Because this temperature is below the required temperature for SCR catalyst operation, the flue gas temperature must be re-heated to reach catalyst operating temperatures. Tail end SCR systems typically employ special SCR catalysts which operate at temperatures between 400°F and 540°F (Johnson Matthey Catalysts, April 2, 2011 McIlvaine webinar presentation). The Babcock Power RSCR system is designed to operate at 465°F. Temperature elevation takes place in the RSCR, where a regenerative heater (RH) is used. The RH uses beds of ceramic media to achieve thermal efficiencies of >95 percent. Because the ceramic heat recovery beds are critical to RSCR operation, high efficiency particulate controls must be used upstream of the RSCR system. Otherwise, PM in the off-gas could foul or plug up the ceramic heat recovery bed or poison the RSCR catalyst.

Due to the nature of the regenerative heat recovery system, a fraction of the uncontrolled NO_x bypasses the catalyst when the RSCR system switches beds as part of the regenerative heat recovery process. The preheat bed on the inlet side of the RSCR cools off as cold gas passes through it. Once the preheat bed temperatures are reduced below temperatures needed for effective NO_x control; the preheat bed must be switched to a position where it can be reheated. When the RSCR system switches this bed from gas preheat to heat recovery, gas flow in the bed is reversed and NO_x in the bed which has not reached the SCR catalyst is flushed out of the bed as uncontrolled NO_x emissions. This effectively creates a bypass of the catalyst which would not occur in a standard SCR system under normal operating conditions.

Catalyst temperatures in an RSCR will vary as the bed temperatures cycle with the regenerative heat recovery process. Some of the catalyst particles in the bed may be outside of optimal catalyst operating temperature range at the beginning and end of the regenerative heat recovery cycles, diminishing effectiveness.

RSCR is supplementally heated to maintain operating temperatures by a direct fired gas burner. NO_x emissions from the gas burner add to the total NO_x which must be controlled within the RSCR system to meet the overall NO_x control efficiency of the RSCR controls. In other words, the RSCR catalyst must control more NO_x than a standard SCR reactor system to achieve the same control efficiency. These emissions would not be present in a standard SCR reactor system because no direct fired burners are used in a standard SCR system.

Selective Non-Catalytic Reduction (SNCR)

In the SNCR process, urea or ammonia-based chemicals are injected into the flue gas stream to convert NO to molecular nitrogen (N_2) and water. SNCR control efficiency is typically 25 to 50 percent. Without the participation of a catalyst, the reaction requires a high temperature range to obtain activation energy. The relevant reactions are as follows:

$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$ (1)

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ (2)

At temperature ranges of 1,470°F to 1,830°F, reaction (1) dominates, and NO_x emissions are controlled. At temperatures above 2,000°F, reaction (2) will dominate, and the ammonia will decompose and increase NO_x emissions. Therefore, it is critical to inject the ammonia or urea reagent into a furnace or boiler in the 1,470°F to 1,830°F temperature range to ensure that NO_x emissions will be controlled.

Non-Selective Catalytic Reduction (NSCR)

NSCR system is a post combustion add-on exhaust gas treatment system. NSCR catalyst is very sensitive to poisoning by sulfur compounds. NSCR is usually applied primarily in natural gas combustion applications. NSCR is often referred to as “three-way conversion” catalyst because it simultaneously reduces NO_x, unburned hydrocarbons, and CO. Typically, NSCR can achieve NO_x emission reductions of 90 percent. In order to operate properly, the combustion process must be near stoichiometric conditions. Under this condition and in the presence of a catalyst, NO_x is reduced by CO, resulting in N_2 and CO_2. The most important reactions for NO_x removal are:

$2CO + 2NO \rightarrow 2CO_2 + N_2$ (1)

$[UBH] + NO \rightarrow N_2 + CO_2 + H_2O$ (2)

Induced Flue Gas Recirculation (IFGR)

Induced flue gas recirculation burners are low NO_x burners which are designed to draw flue gas into the burner to dilute the fuel. This further reduces flame temperature and NO_x formation over levels that can be achieved in a standard low NO_x burner.

External Flue Gas Recirculation (EFGR)

EFGR uses flue gas as an inert material to reduce flame temperatures. In an EFGR system, flue gas is collected from the heater or stack and returned to the burner via a duct and blower. The flue gas is mixed with the combustion air, and this mixture is introduced into the burner. The addition of flue gas reduces the oxygen content of the “combustion air” (air + flue gas) in the burner. The lower oxygen level in the combustion zone reduces flame temperatures, which in turn reduces NO_x emissions.

Low Excess Air (LEA)

LEA is a good combustion practice (GCP) for minimizing NO_x emissions. LEA is implemented by limiting the amount of air used in fuel combustion and by preventing air leaks into the furnace/boiler combustion zone. LEA reduces NO_x emissions by limiting the amount of oxygen in the combustion zone which can react with nitrogen to form NO_x.

Oxyfuel Combustion

Oxyfuel combustion is the use of pure oxygen instead of air for combustion. Using pure oxygen for combustion eliminates the presence of atmospheric nitrogen from the combustion process. Atmospheric nitrogen is the primary source of nitrogen for thermal NO_x formation. Use of pure oxygen in the combustion process leads to very high combustion temperatures, so oxyfuel combustion is limited to very high temperature applications like electric arc furnaces.

Combustion Design Controls

NO_X emissions are caused by oxidation of nitrogen gas in the combustion air during fuel combustion. This occurs due to high combustion temperatures and insufficiently mixed air and fuel in the cylinder where pockets of excess oxygen occur. These effects can be minimized through air-to-fuel ratio control, ignition timing reduction, and exhaust gas recirculation.

(a) <u>Induration Furnace (NO_x)</u>

Nitrogen oxides (NO_x) are formed by both the thermal oxidation of nitrogen in the combustion air and the reduction and subsequent oxidation of fuel bound nitrogen. Since the indurating furnace will be fired with natural gas, NO_x emissions due to fuel-bound nitrogen are negligible. Thermal oxidation is a function of the residence time, free oxygen, and peak temperature. The majority of NO_x emissions from a pellet plant are from thermal NO_x formation.

The majority of combustion zone gases, including NO_x, are emitted through the waste gas stack. The hood exhaust contains up to thirty percent of the NO_x due to leakage between induration furnace zones and the diversion of waste gas for temperature control.

The following new emission units associated with the induration furnace are subject to NO_x BACT requirements:

NO_x Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust	EU014	SV013B

Existing NO_x BACT Determinations for Induration Furnaces
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these NO_x BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2002 to January 2013.

NO_x BACT Determinations – Induration Furnace					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 and Furnace Windbox Exhaust EU014 (combined)	NO_x: Low NO_x LE natural gas burners, 0.25 lb NO_x/MMBtu and 109 lb/hr	NI	BACT-PSD
		Note: 0.249 lb NO_x/MMBtu * 436 MMBtu/hr = 109 lb/hr NO_x This meets the most stringent BACT.			
Existing NO_x BACT Determinations – Induration Furnaces					

NO_x BACT Determinations – Induration Furnace					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Essar Steel Minnesota LLC: Nashwauk, MN	**Permit # 06100067-004 (5/10/2012)**	**Indurating Furnace - Hood and Waste Gas (combined) (624 st/hr pellets)**	**NO_x: Low NO_x burners, 0.25 lb/MMBtu, 135 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
	Note: 135 lb/hr ÷ 542 MMBtu/hr = 0.249 lb NO_x/MMBtu				
U.S. Steel Corp - Keetac: Keewatin, MN	Permit # 13700063-004 (12/6/2011)	Grate Kiln – Indurator Waste Gas (450 t/hr pellets)	NO_x: High-efficiency wet scrubbers, 1975 lb/hr (1-hr avg), 1726 tons (180-day rolling sum)	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace 5 Hood Exhaust (Waste Gas #501, #502, #503) (160 LT/hr pellets)	NO_x: High-efficiency wet ESP, 0.13 lb/MMBtu, 0.072 lb/MMBtu (natural gas only)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (NO_x)

Low and Ultra Low NO_x Burners

In order for low and ultra low NO_x burners to function properly, the oxygen content in the combustion zone must be limited to 2% to 3% oxygen. In straight grate induration furnaces, burners are typically mounted in the duct work which transfers preheated air from the pellet cooler to the pellet firing zone of the furnace. Under these conditions, the oxygen concentrations at the burner are at 15% to 20% oxygen. This is far too high for a low NO_x burner to operate properly. In addition, the combustion air is very hot (1,500°F to 1,600°F). This further degrades low and ultra low NO_x burner performance. For all practical purposes, low and ultra low NO_x burners are infeasible in this application unless the gas combustion system is completely re-designed. The issues that make low NO_x burners infeasible in standard installation have been addressed in the proposed burner design, which is why they are considered to be feasible as part of the "New Natural Gas Combustion Chamber Design", as discussed in Step 4 of this BACT determination.

Low Temperature Oxidation (LoTOx)

LoTOx is considered to be a technically feasible control option if the concentration in the stream to be treated is greater than 15 – 25 ppm which is the lowest concentration that LoTOx can reach. The NO_x concentration at the hood exhaust is 18 ppm, which is near the bottom of the range for the minimum achievable outlet concentration for LoTOx. For this reason, LoTOx is considered technically infeasible at the hood exhaust.

Selective Catalytic Reduction (SCR)

In evaluating the technical feasibility of SCR, two potential locations were evaluated in the pelletizing furnace where SCR could potentially be installed to control NO_x emissions in the waste gas stream:

(1) In the recuperative heat recovery system duct between the pellet firing zone and drying/preheating zones, and

(2) Downstream of particulate emission controls.

<u>SCR Installation In Heat Recovery System Duct</u>

Waste gases exiting the bottom of the grate in the combustion zone of the induration furnace are below the temperatures needed to operate an SCR reactor. The normal SCR operating temperature window is 600ºF – 800ºF and the minimum temperature that the newer low

temperature catalysts can operate at is 400ºF – 600ºF. The operating temperature of SCR is 1,500ºF – 2,000ºF. Therefore, the gas would need to be re-heated before SCR would work. In addition only a portion of the waste gas exhaust could be treated, thus reducing the overall effectiveness. Reheating the exhaust would require additional natural gas combustion that would generate additional NO_x and GHG emissions.

During previous permitting exercises, one pelletizing furnace vendor developed a conceptual design for application of SCR downstream of the combustion zone. The conceptual design balances treatment of NO_x emissions with the additional amount of fuel required. This is accomplished by applying SCR to only portions of the waste gas exhaust from windboxes that are at higher temperatures. In addition, the flows from the firing and post-firing windbox sections of the pelletizer would be rearranged in a manner that would recover part of this energy and thereby minimizes the amount of additional fuel that would be needed by recovering part of this energy. However, a duct burner would still be required to bring the waste gas temperature up to SCR operating conditions. The NO_x generated by the duct burner would also have to be treated by the SCR unit. The waste gas exhaust from the cooler windboxes, which would normally be routed with the waste gas exhaust, would not be treated for NO_x. This reduces the overall efficiency of SCR compared to other technologies that are able to treat the entire waste gas exhaust stream.

Regardless of whether the temperature requirements for SCR can be met, there are additional technical unknowns associated with its application to an iron oxide pellet plant indurating furnace. SCR requires the use of a catalyst. There is the potential for catalyst deactivation by catalyst poisons in the iron oxide pellet dust and corrosion/plugging problems in the pellet drying and preheat zones of the furnace caused by ammonium sulfate salts. Ammonia slip (un-reacted ammonia) would react with sulfur dioxide to form ammonium sulfate salts. These compounds are gummy and corrosive. If present in sufficient quantities, sulfur oxides and excess ammonia from the SCR system may react to form enough ammonium sulfate compounds to have an adverse effect on the pellet drying and preheat sections of the indurating furnace. Therefore, use of SCR in the recuperative heat recovery system duct between the pellet firing zone and the pellet drying/ preheating zone is not technically feasible.

<u>SCR Installation Downstream of Other Air Pollution Control Equipment</u>

The second potential alternative for application of SCR is to install it downstream of the other pollution control equipment for the pellet plant. To do this, the waste gas stream would require re-heating the gas to SCR catalyst operating temperatures. Re-heating the waste gas pollution control exhaust for SCR would require an excessive amount of energy.

For purposes of this BACT report, a SCR system that includes a stand-alone reheat system will be considered technically feasible for the hood exhaust. However, there are drawbacks to installation of this type of reheat system. Due to the re-heating requirement, natural gas must be supplied to the system. As with any combustion source, there will be some collateral air emissions (NO_x and GHG) that occur due to natural gas combustion. Additionally, this type of system significantly increases the control cost.

Selective Non-Catalytic Reduction (SNCR)

SNCR is not a feasible option for the pellet plant as there is no location in the flue gas circuit where the temperatures are suitable for the installation of reagent injection nozzles. SNCR injection points must be at 1,600ºF - 2,000ºF to achieve NO_x control. The combustion zone temperature of the indurating furnace is 2,400ºF. Gases leaving the pellet firing zone grates are only 258ºF - 320ºF, well below the SNCR temperature window. In addition, ammonia slip would react with sulfur dioxide to form ammonium sulfate salts. These compounds are gummy and corrosive. If present, they would have an adverse effect on the pellet drying and preheat sections of the indurating furnace.

A potential alternative for application of SNCR is to install it downstream of the other pollution control equipment for the pellet plant. To do this, the waste gas stream would require re-heating up to SNCR catalyst operating temperatures. Reheating the waste gas for SNCR would require an inordinate amount of energy.

Non Selective Catalytic Reduction (NSCR)

NSCR is not feasible in this application due to the concentrations of sulfur dioxide in the hood exhaust. EMx™ is an NSCR catalytic NO_x control system used in industrial applications such as natural gas fired combustion turbines. The EMx™ NSCR catalyst is coated with potassium carbonate. NO_x is captured on the catalyst when the NO_x reacts with the potassium carbonate to form potassium nitrites. When the catalyst is regenerated, the NO_x captured in the potassium nitrates and nitrites is converted to N_2, and the potassium nitrates and nitrites are converted back to potassium carbonate. If SO_2 is present in the gas stream, it reacts with the potassium carbonate to form potassium sulfate. Potassium sulfate cannot be removed from the catalyst during catalyst regeneration, and catalyst activity is reduced over time.

Although the GSA SO_2 control system is expected to reduce SO_2 concentration to 5 ppm or less, this amount of SO_2 is still too high to be considered for successful application of NSCR. NSCR was rejected as technically infeasible for several projects with similar levels of SO_2:

(1) NSPS Subpart Ja limits the SO_2 concentration in new gas fired heaters and boilers at petroleum refineries to 8 ppm on an annual basis. Even at this level of SO_2 control, NSCR was determined to be technically infeasible for NO_x control in February 2009 for the Conoco Phillips refinery in Ponca City, Oklahoma; in March 2009 for the Hyperion Refinery in Union County, South Dakota; and in March 2009 for the Los Angeles Tesoro refinery.

(2) NSCR was determined to be technically infeasible for the Grays Harbor Energy LLC Statsop Combustion Turbine Project in August 2005 because of the high levels of sulfur in the natural gas available to the facility in Elma, Washington.

(3) In June 2008, NSCR was determine to be technically infeasible for the Medicine Bow Fuel and Power coal gasification and liquefaction plant because NSCR has not been demonstrated to be successful at combustion turbines firing treated syngas.

Induced and External Flue Gas Recirculation (FGR)

In the induration process, it would be unacceptable to reroute the flue gas to the combustion zone since this would lower the optimal temperature range needed for pellet induration. Pellets must be held at an optimum temperature (2400°F - 2450°F), in the presence of excess oxygen, for a sufficient time to allow oxidation to reach the pellet center and allow realignment of the iron oxide molecules in the microstructure of the pellet to form a strong pellet that meets product specifications.

Another factor affecting the feasibility of FGR is the high levels of oxygen in the pelletizer furnace. Normally flue gas is inert and has low levels of oxygen (2% - 3%). At these levels, flue gas injected into the combustion zone of a burner effectively dilutes the combustion reactants (fuel and air) so the flame temperature can be lowered for NO_x control. Pelletizer flue gas has approximately 12% - 15% oxygen. At these levels, injection of flue gas into the burner combustion zone would be more like adding combustion air into the flame instead of an inert gas. Therefore, flame temperatures cannot be effectively controlled using pelletizer flue gas in FGR.

Low Excess Air (LEA)

Low excess air operation is not feasible in the indurating furnace because the pelletizer must be operated with high oxygen levels in order to achieve complete pellet oxidation. These oxygen levels are much higher than LEA controls would permit.

Oxyfuel Combustion

Oxyfuel combustion is not feasible in this application due to the high temperatures associated with oxyfuel combustion. Oxyfuel combustion produces flame temperatures which are similar to temperatures in oxy-acetylene torches (~6000°F) used for cutting metal. These temperatures would exceed the maximum allowable temperatures of the steel and refractory materials normally used to construct induration furnaces.

Clean Fuels

NO_x is the only pollutant that would potentially benefit from the combustion of solid fuel in the indurating furnace. Solid fuels have resulted in lower NO_x emission in existing iron ore furnaces. However, NO_x emissions from the Magnetation furnace with the new natural gas combustion chamber and LE burners is expected to result in lower emissions than has been achieved in existing iron ore furnaces using solid fuel burner designs. Solid fuels have been determined to be technically infeasible for burner fuel for the proposed Magnetation straight-grate furnace; in order to accommodate solid fuels as burner fuel in the indurating furnace, a complete redesign of the furnace would be required.

Good Design Methods and Operating Practices

It is feasible to design, operate, and maintain the induration furnace in a manner which minimizes waste gas bypasses to the hood exhaust within product quality and production constraints. The proposed induration furnace for Magnetation includes a newly designed natural gas combustion chamber equipped with premix ultra-low NO_x burners (LE burners). The new combustion chamber and low NO_x LE burners are estimated to emit 90% less NO_x than the current direct fired burner systems used in straight grate furnaces. Standard burners typically emit NO_x at a rate of 4 lb NO_x/MMBtu. The LE burners are expected to emit NO_x at a rate of 0.25 lb NO_x/MMBtu. The new design includes a separation combustion chamber for the burner which facilitates controlled combustion conditions, premix ultra-low NO_x burners, and a system for controlling combustion air temperatures.

Additionally, the design of the induration furnace include a number of heat recovery aspects. Pellet drying and preheating are accomplished using waste heat from other sections of the induration furnace. Air and induration furnace flue gas flows through the furnace have been designed to recover as much heat as possible via recuperative heat exchange. Using heat recovery techniques allows the facility to minimize fuel usage, and because NO_x emissions are directly related to fuel combustion, improvements in heat recovery design can also reduce the generation of NO_x emissions.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (NO_x)

The proposed indurating furnace is designed to operate on natural gas as an external fuel and coke breeze, which is added to the raw materials. Therefore, use of natural gas as a clean fuel as well as good design methods and operating practices will be implemented regardless of the NO_x control system selected.

<u>Induration Furnace Hood Exhaust</u>
The control technologies for the induration furnace hood exhaust are ranked as follows:

(1) Selective Catalytic Reduction (SCR) with Reheat: 2-3 ppm

(2) Regenerative Selective Catalytic Reduction (RSCR): 2-3 ppm

Although RSCR is being considered as technically feasible for the hood exhaust, there are a number of concerns associated with this control option. Installation of RSCR would require pilot testing at the Magnetation facility. This technology has not been installed at this type of facility. Installation of this technology would be a first time occurrence and therefore would be considered a technology transfer.

The control effectiveness for RSCR listed above represents the expected control efficiency based on incorporation of the new natural gas combustion chamber design with LE burners in the induration furnace at an emission rate of 0.25 lb NO_x/MMBtu. It was assumed that an RSCR could achieve an outlet concentration of 2-3 ppm NO_x on the hood exhaust; actual outlet concentrations may be higher.

Induration Furnace Windbox Exhaust
The control technologies for the induration furnace windbox exhaust are ranked as follows:

(1) Selective Catalytic Reduction (SCR) with Reheat: 4 ppm

(2) Regenerative Selective Catalytic Reduction (RSCR): 6 ppm (75% control efficiency)

(3) LoTOx: 15 – 25 ppm

Although LoTOx and RSCR are being considered as technically feasible for the windbox exhaust, there are a number of concerns associated with each of these control options. Installation of LoTOx and/or RSCR would require pilot testing at the Magnetation facility. Neither of these technologies have been installed at this type of facility. Installation of these technologies would be a first time occurrence and therefore would be considered technology transfers.

The control effectiveness for LoTOx and RSCR listed above represents the expected control efficiency based on incorporation of the new natural gas combustion chamber design with LE burners in the induration furnace at an emission rate of 0.25 lb NO_x/MMBtu. For example, LoTOx has an estimated minimum achievable outlet concentration of 15 ppm – 25 ppm, so when the uncontrolled NO_x emission rate gets close to that level, the control effectiveness is reduced. It was assumed that an RSCR could achieve an outlet concentration of 6 ppm NO_x, a 75% control efficiency was utilized for the control cost calculations. Actual outlet concentrations may be higher.

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (NO_x)

The emissions control effectiveness of the NO_x control technologies were evaluated for consideration as BACT. The control cost analyses for the control options are summarized in Appendix C of this TSD. Note that control costs represented are calculated assuming an inherent 0.25 lb NO_x/MMBtu control due to the design of the natural gas combustion chamber and low NO_x LE natural gas burners for the proposed furnace.

Hood Exhaust – NOx Controls		
Technology	**NO_x Control Cost ($/ton)**	**Corresponding Appendix C Cost Tables**
Regenerative Selective Catalytic Reduction (RSCR)	$298,097	A-5a
Selective Catalytic Reduction (SCR) with Reheat	$327,123	A-6a

Windbox Exhaust – NO_x Controls		
Technology	**NO_x Control Cost ($/ton)**	**Corresponding Appendix C Cost Tables**
Regenerative Selective Catalytic Reduction (RSCR)	$18,088	A-9a
Selective Catalytic Reduction (SCR) with Reheat	$24,299	A-10a
LoTOx	$28,257	A-8a

LoTOx, SCR plus reheat and RSCR are considered to be economically infeasible for NO_x control from the windbox exhaust. In addition to the high control cost of SCR plus reheat, there are collateral NO_x and GHG emissions from the natural gas combustion that is required to re-heat the exhaust streams. The required natural gas usage for re-heating the windbox stream is 34.44 million cubic feet of natural gas per year. This additional natural gas combustion results in an additional 1.62 tpy of NO_x and 2,055 tpy of GHG from the windbox exhaust. Although the regenerative heat recovery system in RSCR is a relatively efficient way to employ SCR NO_x controls, it still requires additional natural gas to operate. The estimated annual natural gas consumption rate for the waste gas stream is 78.15 million cubic feet of natural gas per year. This additional gas combustion will also lead to additional GHG emissions.

The only remaining technically feasible NO_x control technology is good design methods and operating practices including the new natural gas combustion chamber design with LE burners. Because this control option is inherent to the proposed process, there are no adverse operational impacts associated with implementation of this control option. There may be a slight energy penalty associated with use of the low LE NO_x burner system. The LE burners do not use 100% preheated combustion air. This is done to minimize flame temperatures for NO_x control.

BACT Proposal – Induration Furnace Hood Exhaust and Windbox Exhaust (NO_x)

BACT for the NO_x emissions from the induration furnace hood exhaust and windbox exhaust has been proposed to be as follows:

(1) The proposed BACT NO_x emission control system is good design methods and operating practices including the new natural gas combustor design with LE burners for NO_x emitted from the hood exhaust stream. The induration furnace design will include use of low NO_x natural gas combustors (i.e., LE burners).

(2) The proposed NO_x BACT limits for the induration furnace are 0.25 lb NO_x/MMBtu and 109 lb/hr for the combined NO_x emissions from the hood exhaust and windbox exhaust. The BACT performance standard of 0.25 lb NO_x/MMBtu is the expected level of performance achievable based on BACT reports from other similar induration furnaces. NO_x BACT limits for the combined emissions from the hood exhaust and windbox exhaust streams are proposed because all NO_x emissions are from natural gas combustion in the firing section of induration furnace.

Step 5: Select BACT - Induration Furnace (NO_x)

A detailed NO_x BACT for the induration furnace is given in the BACT Conclusion for NO_x.

(b) <u>Combustion Units (NO_x)</u>

The following emission units associated with combustion processes are subject to NO_x BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated NO_x Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (NO_x)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (NO_x)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these NO_x BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for natural gas fired generators only used for emergency purposes.

NO_x BACT Determinations - Emergency Generator					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	NO_x: Use of natural gas, good combustion practices, 0.50 g/hp-hr, 500 hours/year	NI	BACT-PSD
Existing NO_x BACT Determinations - Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	NO_x: Certified to meet NSPS Subpart JJJJ, 0.50 g/hp-hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (722 hp)	NO_x: SCR/oxidation catalyst system, 0.21 g/hp-hr, 50 hours/yr	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	NO_x: Use of pipeline quality natural gas, 9.2 g/kw-hr, 200 hours/yr	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	NO_x: Use of pipeline quality natural gas, 6.4 g/kw-hr, 200 hours/yr	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
Consumers Energy (White Pigeon): White Pigeon, MI	MI-0390/ 137-08 (11/24/2008)	Emergency Generator 1,383 kw (1,818 hp)	NO_x: 0.50 g/bhp-hr	NI	BACT-PSD
Gulf Crossing Pipeline: Sterlington, LA	LA-0232/ PSD-LA-729 (6/24/2008)	Emergency Backup Generator 637 kw (838 hp)	NO_x: Use of natural gas, good combustion practices, 4.80 lb/hr, 1.20 tons/yr	NI	BACT-PSD
Dominion Point Cove: Lusby, MD	MD-0036/ CPCN 9055 (3/10/2006)	Emergency Generator 637 kw (838 hp)	NO_x: Use of natural gas, good combustion practices, 2.00 g/bhp-hr, 200 hours/year	NI	BACT-PSD

NO_x BACT Determinations - Emergency Generator					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	NO_x: Three way catalyst, 2.13 g/bhp-hr, 200 hours/year	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (NO_x)

Selective Catalytic Reduction (SCR) process involves the mixing of anhydrous or aqueous ammonia vapor with flue gas and passing the mixture through a catalytic reactor to reduce NO_X to water and N_2. Under optimal conditions, SCR has a removal efficiency up to 90% when used on steady state processes. The efficiency of removal will be reduced for processes that are not stable or require frequent changes in the mode of operation. The most important factor affecting SCR efficiency is temperature. SCR can operate in a flue gas window ranging from 480°F to 800°F, although the optimum temperature range depends on the type of catalyst and the flue gas composition. In this particular service, the minimum target temperature is approximately 750°F. Temperatures below the optimum decrease catalyst activity and allow NH_3 to slip through; above the optimum range, ammonia will oxidize to form additional NO_x. SCR efficiency is also largely dependent on the stoichiometric molar ratio of NH_3:NO_x; variation of the ideal 1:1 ratio to 0.5:1 ratio can reduce the removal efficiency to 50%. Unreacted reagent may form ammonium sulfates which may plug or corrode downstream equipment. Particulate-laden streams may blind the catalyst and may necessitate the application of a sootblower. Therefore, while catalyst reduction control systems are technically feasible (see RBLC ID# CA-1192 and CA-1132), they are not optimally technically feasible as shown by the majority of the RBLC determinations above and can be eliminated as part of this review.

With selective non-catalytic reduction (SNCR), NO_x is selectively removed by the injection of ammonia or urea into the flue gas at an appropriate temperature window of 1600°F to 2100°F and without employing a catalyst. Similar to SCR without a catalyst bed, the injected chemicals selectively reduce the NO_x to molecular nitrogen and water. This approach avoids the problem related to catalyst fouling, but the temperature window and reagent mixing residence time is critical for conducting the necessary chemical reaction. At the proper temperature, urea decomposes to produce ammonia which is responsible for NO_x reduction. At a higher temperature, the rate of a competing reaction for the direct oxidation of ammonia that actually forms NO_x becomes significant. At a lower temperature, the rates of NO_x reduction reactions become too slow resulting in urea slip (i.e. emissions of unreacted urea). Optimal implementation of SNCR requires the employment of an injection system that can accomplish thorough reagent/gas mixing within the temperature window while accommodating spatial and production rate temperature variability in the gas stream. The attainment of maximum NO_x control performance therefore requires that the source exhibit a favorable opportunity for the application of this technology relative to the location of the reaction temperature range.

Also, U.S. EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (NO_x)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Combustion design controls

(2) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (NO_x)

The natural gas fired emergency generator (EU017) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour, grams per horsepower-hour, and/or pounds per hour of NO_x. Grams per power-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 6.4 g/kw-hr and 9.2 g/kw-hr, which correspond to the NO_x standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Table 1) beginning in model year 2007. The emission standards given in the review also listed 0.50 g/hp-hr, which correspond to the NO_x standards for compression ignition engines in 40 CFR 60, Subpart JJJJ.

NO_x BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 0.50 g/hp-hr for the proposed generator. This is consistent with other recent BACT determinations for emergency natural gas fired generators in the same size category.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (NO_x)

A detailed NO_x BACT for the natural gas fired emergency generator is given in the BACT Conclusion for NO_x.

(2) Natural Gas Fired Fire Pump (NO_x)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (NO_x)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these NO_x BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

NO_x BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	NO_x: Use of natural gas, good combustion practices, 0.50 g/hp-hr, 500 hours/year	NI	BACT-PSD
Existing NO_x BACT Determinations – Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	NO_x: Certified to meet NSPS Subpart JJJJ, 0.50 g/hp-hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (722 hp)	NO_x: SCR/oxidation catalyst system, 0.21 g/hp-hr, 50 hours/yr	NI	BACT-PSD

NO_x BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	NO_x: Use of pipeline quality natural gas, 9.2 g/kw-hr, 200 hours/yr	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	NO_x: Use of pipeline quality natural gas, 6.4 g/kw-hr, 200 hours/yr	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
Consumers Energy (White Pigeon): White Pigeon, MI	MI-0390/ 137-08 (11/24/2008)	Emergency Generator 1,383 kw (1,818 hp)	NO_x: 0.50 g/bhp-hr	NI	BACT-PSD
Gulf Crossing Pipeline: Sterlington, LA	LA-0232/ PSD-LA-729 (6/24/2008)	Emergency Backup Generator 637 kw (838 hp)	NO_x: Use of natural gas, good combustion practices, 4.80 lb/hr, 1.20 tons/yr	NI	BACT-PSD
Dominion Point Cove: Lusby, MD	MD-0036/ CPCN 9055 (3/10/2006)	Emergency Generator 637 kw (838 hp)	NO_x: Use of natural gas, good combustion practices, 2.00 g/bhp-hr, 200 hours/year	NI	BACT-PSD
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	NO_x: Three way catalyst, 2.13 g/bhp-hr, 200 hours/year	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (NO_x)

Selective Catalytic Reduction (SCR) process involves the mixing of anhydrous or aqueous ammonia vapor with flue gas and passing the mixture through a catalytic reactor to reduce NO_X to water and N_2. Under optimal conditions, SCR has a removal efficiency up to 90% when used on steady state processes. The efficiency of removal will be reduced for processes that are not stable or require frequent changes in the mode of operation. The most important factor affecting SCR efficiency is temperature. SCR can operate in a flue gas window ranging from 480°F to 800°F, although the optimum temperature range depends on the type of catalyst and the flue gas composition. In this particular service, the minimum target temperature is approximately 750°F. Temperatures below the optimum decrease catalyst activity and allow NH_3 to slip through; above the optimum range, ammonia will oxidize to form additional NO_x. SCR efficiency is also largely dependent on the stoichiometric molar ratio of NH_3:NO_x; variation of the ideal 1:1 ratio to 0.5:1 ratio can reduce the removal efficiency to 50%. Unreacted reagent may form ammonium sulfates which may plug or corrode downstream equipment. Particulate-laden streams may blind the catalyst and may necessitate the application of a sootblower. Therefore, while catalyst reduction control systems are technically feasible (see RBLC ID# CA-1192 and CA-1132), they are not optimally technically feasible as shown by the majority of the RBLC determinations above and can be eliminated as part of this review.

With selective non-catalytic reduction (SNCR), NO_x is selectively removed by the injection of ammonia or urea into the flue gas at an appropriate temperature window of 1600°F to 2100°F and without employing a catalyst. Similar to SCR without a catalyst bed, the injected chemicals selectively reduce the NO_x to molecular nitrogen and water. This approach avoids the problem related to catalyst fouling, but the temperature window and reagent mixing residence time is critical for conducting the necessary chemical reaction. At the proper temperature, urea decomposes to produce ammonia which is responsible for NO_x reduction. At a higher temperature, the rate of a competing reaction for the direct oxidation of ammonia that actually forms NO_x becomes significant. At a lower temperature, the rates of NO_x reduction reactions become too slow resulting in urea slip (i.e. emissions of unreacted urea). Optimal implementation of SNCR requires the employment of an injection system that can accomplish thorough

reagent/gas mixing within the temperature window while accommodating spatial and production rate temperature variability in the gas stream. The attainment of maximum NO_x control performance therefore requires that the source exhibit a favorable opportunity for the application of this technology relative to the location of the reaction temperature range.

Also, U.S. EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (NO_x)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Combustion design controls

(2) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (NO_x)

The natural gas fired fire pump (EU018) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour, grams per horsepower-hour, and/or pounds per hour of NO_x. Grams per power-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 6.4 g/kw-hr and 9.2 g/kw-hr, which correspond to the NO_x standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Table 1) beginning in model year 2007. The emission standards given in the review also listed 0.50 g/hp-hr, which correspond to the NO_x standards for compression ignition engines in 40 CFR 60, Subpart JJJJ.

NO_x BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 0.50 g/hp-hr for the proposed fire pump.

Step 5: Select BACT - Natural Gas Fired Fire Pump (NO_x)

A detailed NO_x BACT for the natural gas fired fire pump is given in the BACT Conclusion for NO_x.

(3) Natural Gas Fired Space Heaters and Air Heaters (NO_x)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (NO_x)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these NO_x BACT determinations as provided by the RBLC. The search was limited to entries from January 2007 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

NO_x BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	NO_x: Low-NO_x burners, good combustion practices, 0.05 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	NO_x: Low-NO_x burners, good combustion practices, 0.012 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	NO_x: Low-NO_x burners, good combustion practices, 0.05 lb/MMBtu	NI	BACT-PSD
Existing NO_x BACT Determinations - Heaters Firing Natural Gas					
Black Hills Power: Cheyenne, WY	WY-0070/ CT-12636 (8/28/2012)	Inlet Air Heater (EP06) (16.10 MMBtu/hr)	NO_x: Ultra low-NO_x burners, 4380 hours/yr, 0.012 lb/MMBtu and 0.20 lb/hr (3-hr avg), 0.40 tons/yr	NI	BACT-PSD
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	NO_x: 9.00 ppmvd @ 3% O_2 (3-hr avg)	NI	BACT-PSD
City of Victorville: Victorville, CA	CA-1191/ SE 07-02 (3/11/2010)	Auxiliary Heater (40 MMBtu/hr)	NO_x: 9.00 ppmvd @ 3% O_2 (3-hr avg)	NI	BACT-PSD
Lake Charles Cogeneration, LLC: Sulphur, LA	LA-0231/ PSD-LA-742 (6/22/2009)	Shift Reactor Startup Heater (34.20 MMBtu/hr)	NO_x: Good design and proper operation, 3.35 lb/hr	NI	BACT-PSD
Lake Charles Cogeneration, LLC: Sulphur, LA	LA-0231/ PSD-LA-742 (6/22/2009)	Gasifier Startup Preheater Burners (5) (35 MMBtu/hr)	NO_x: Good design and proper operation, 3.85 lb/hr	NI	BACT-PSD
Medicine Bow Fuel & Power: Medicine Bow, WY	WY-0066/ CT-5873 (3/4/2009)	Gasification Preheater 1 (21 MMBtu/hr)	NO_x: Low-NO_x burners, 500 hours/yr, 0.05 lb/MMBtu, 1.00 lb/hr, 0.30 tons/yr	NI	BACT-PSD
Pryor Plant Chemical: Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	NO_x: Low-NO_x burners, good combustion practices, 0.98 lb/hr (168-hr rolling cumulative)	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P-2008.0066 (2/10/2009)	ASU Regen Heater (0.1 MMBtu/hr)	NO_x: Good combustion practices	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P-2008.0066 (2/10/2009)	Gasifier Heaters (2) (25 MMBtu/hr)	NO_x: Good combustion practices	NI	BACT-PSD
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	NO_x: 1.99 lb/hr, 8.71 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	NO_x: 1.99 lb/hr, 8.71 tons/yr	NI	BACT-PSD
Consumers Energy: White Pigeon, MI	MI-0390/ 137-08 (11/24/2008)	Heater (3 MMBtu/hr)	NO_x: Low-NO_x burners, 0.025 lb/MMBtu	NI	BACT-PSD
Competitive Power Ventures: St. Charles, MD	MD-0040/ CPCN Case No. 9129 (11/12/2008)	Heater (1.7 MMBtu/hr)	NO_x: 0.10 lb/MMBtu	NI	BACT-PSD

NO_x BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Florida Power & Light: Loxahatchee, FL	FL-0303/ 0990646-002-AC (PSD-FL-396) (7/30/2008)	Natural Gas Fired Process Heaters (2) (10 MMBtu/hr)	NO_x: Good combustion practices, 0.095 lb/MMBtu	NI	BACT-PSD
Louisiana-Pacific Corporation: Sagola, MI	MI-0387/ 41-03F (1/31/2008)	Natural Gas Thermal Oil Heater (24 MMBtu/hr)	NO_x: Good combustion practices, 2.83 lb/hr	NI	BACT-PSD
Basin Electric Power Cooperative: Gillette, WY	WY-0064/ CT-4631 (10/15/2007)	Inlet Gas Heater (8.36 MMBtu/hr)	NO_x: Good combustion practices, 2000 hours/yr, 0.10 lb/MMBtu, 0.80 lb/hr, 1.00 tons/yr	NI	BACT-PSD
Celite: Vandenberg Village, CA	CA-1146/ ATC 12105A (6/11/2007)	Heater – Other Process (35 MMBtu/hr)	NO_x: 20.0 ppmvd @ 3% O_2 (6-min avg)	NI	BACT-PSD
Florida Power & Light: Loxahatchee, FL	FL-0286/ 0990646-001-AC (PSD-FL-354) (1/10/2007)	Natural Gas Fired Process Heaters (2) (10 MMBtu/hr)	NO_x: 0.095 lb/MMBtu	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (NO_x)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (NO_x)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Low NO_x burners

(2) Clean fuels

(3) Good combustion practices

(4) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (NO_x)

Based on a review of the RBLC, the primary control used for controlling NO_x emissions from natural gas fired space heaters or air heaters is low NO_x burners. Most facilities express emission limitations in terms of pounds per MMBtu and/or pounds per hour of NO_x. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. Emission limits for PM (when converted for comparison) varied from 0.012 lb/MMBtu to 0.11 lb/MMBtu.

NO_x BACT for the space heaters and coke breeze additive system air heater (EU009) has been proposed to be the use of low NO_x burners along with the restricted use of only natural gas, the use of good combustion practices, and an emission limit of 0.05 lb/MMBtu for each of the proposed heaters.

NO_x BACT for the ground limestone/dolomite additive system air heater (EU010) has been proposed to be the use of low NO_x burners along with the restricted use of only natural gas, the use of good combustion practices, and an emission limit of 0.012 lb/MMBtu.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (NO_x*)*

A detailed NO_x BACT for natural gas fired heaters is given in the BACT Conclusion for NO_x.

BACT Conclusion for NO_x

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for NO_x emissions shall be as follows:

(a) Induration Furnace

The induration furnace operations shall be limited as follows:

(1) The NO_x emission control system is good design methods and operating practices including the new natural gas combustor design with LE burners for NO_x emitted from the hood exhaust and windbox exhaust streams. The induration furnace design will include use of low NO_x natural gas combustors (i.e., LE burners).

(2) The NO_x BACT limits for the induration furnace are 0.25 lb NO_x/MMBtu and 109 lb/hr for the combined NO_x emissions from the hood exhaust and windbox exhaust.

(b) Combustion Units

The combustion units shall be limited as follows:

(1) NO_x emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.50 g/hp-hr.

(2) NO_x emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.50 g/hp-hr.

(3) NO_x emissions from the space heaters (EU021 and coke breeze additive system air heater (EU009) shall each be controlled with the use of low NO_x burners along with the restricted use of only natural gas, the use of good combustion practices, and an emission limit of 0.05 lb/MMBtu.

(4) NO_x emissions from the ground limestone/dolomite additive system air heater (EU010) shall be controlled with the use of low NO_x burners along with the restricted use of only natural gas, the use of good combustion practices, and an emission limit of 0.012 lb/MMBtu.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (BACT) with regards to NO_x.

Fluoride (F) BACT

The fluoride BACT analysis is divided into three categories: material handling, induration furnaces, and combustion units.

Step 1 of the BACT process is shown below for this fluorides BACT analysis to describe general fluoride control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific fluoride control devices may be discussed in individual BACT analyses. A summary of the fluoride BACT determinations is provided at the end of this section.

Step 1a: Identify Potential Control Technologies (Particulate Fluorides)

Fluoride emissions will be controlled with particulate matter emission controls on sources where fluorides are emitted as dust. Fluoride salts are present in trace quantities in iron concentrate. These salts are emitted as particulate matter along with ore dust during ore processing such as conveying. These salts can be controlled with the same piece of pollution control equipment as the particulate (PM) emissions.

Emissions of particulate matter (PM) are generally controlled with add-on control equipment designed to capture the emissions prior to the time they are exhausted to the atmosphere. In cases where the material being emitted is organic, particulate matter may be controlled through a combustion process. Generally, PM emissions are controlled through one of the following mechanisms:

(1) Mechanical collectors (such as cyclones or multiclones);

(2) Wet scrubbers;

(3) Electrostatic precipitators (ESP); or

(4) Fabric filter dust collectors (baghouses).

The choice of which technology is most appropriate for a specific application depends upon several factors, including particle size to be collected, particle loading, stack gas flow rate, stack gas physical characteristics (e.g., temperature, moisture content, presence of reactive materials), and desired collection efficiency. These control mechanisms are discussed further below:

Mechanical Collectors (such as Cyclones or Multiclones)

Mechanical collectors use the inertia of the particles for collection. The particulate-laden gas stream enters the control device and is forced to move in a cyclonic manner, which causes the particles to move toward the outside of the vortex. Most of the large-diameter particles enter a hopper below the cyclonic tubes while the gas stream turns and exits the device.

Cyclones are typically used to remove relatively large particles from gas streams. Conventional single cyclones are estimated to control PM at 70-90%, PM_{10} at 30-90% and $PM_{2.5}$ at 0-40%. High efficiency single cyclones are designed to achieve higher control of smaller particles and multiclones may also achieve higher control of smaller particles. Collection efficiency generally increases with particle size and/or density, inlet duct velocity, cyclone body length, number of gas revolutions in the cyclone, ratio of cyclone body diameter to gas exit diameter, dust loading, and smoothness of the cyclone inner wall. Cyclone efficiency will decrease with increases in gas viscosity, body diameter, gas exit diameter, gas inlet duct area, and gas density.

Cyclones are often used for recovery and recycling of material or as precleaners for more expensive final control devices such as fabric filters or electrostatic precipitators. Cyclones are used for applications such as after spray drying operations in the food and chemical industries; after crushing/grinding/calcining operations in the mineral and chemical industries to collect salable or useful material; for first stage control of PM from sinter plants, roasters, kilns, and furnaces in the metallurgical industries; for catalyst recycling in the fluid-cracking process; and for precleaning fossil-fuel and wood-waste fired industrial and commercial fuel combustion units.

The typical gas flow rates for a single cyclone are 1,060 to 25,400 scfm. Flows that are higher use multiple cyclones in parallel. Inlet gas temperatures are only limited by the material of construction of the cyclone. Cyclones perform more efficiently with higher pollutant loadings, with loadings typically ranging from 1.0 to 100 gr/scf). Cyclones are unable to handle sticky or tacky materials.

Wet Scrubbers

A wet scrubber is an air pollution control device that removes PM from waste gas streams primarily through the impaction, diffusion, interception and/or absorption of the pollutant onto droplets of liquid. The liquid containing the pollutant is then collected for disposal. There are numerous types of wet scrubbers that remove PM, including venturi, impingement and sieve plate, spray towers, mechanically aided, condensation growth, packed beds, ejector, mobile bed, caternary grid, froth tower, oriented fiber pad, and wetted mist eliminators. Collection efficiencies for wet scrubbers vary with the particle size distribution of the waste gas stream. In general, collection efficiency decreases as the PM size decreases. Collection efficiencies also vary with scrubber type. Collection efficiencies range from greater than 99% for venturi scrubbers to 40-60% (or lower) for simple spray towers. Wet scrubbers are smaller and more compact than baghouses or ESPs. They have lower capital costs and comparable operation and maintenance (O&M) costs. Wet scrubbers are particularly useful in the removal of PM with the following characteristics:

(1) Sticky and/or hygroscopic materials (materials that readily absorb water);

(2) Combustible, corrosive and explosive materials;

(3) Particles which are difficult to remove in their dry form;

(4) PM in the presence of soluble gases; and

(5) PM in waste gas streams with high moisture content.

Some applications of wet scrubbers include the following:

- Condensation scrubbers: for controlling fine PM-containing waste-gas streams.
- Fiber-bed scrubbers (wetted-fiber scrubbers or mist eliminators): for controlling aerosol emissions from chemical, plastics, asphalt, sulfuric acid, and surface coating industries; for controlling lubricant mist emission from rotating machinery and storage tanks; and for eliminating visible plume downstream of other control devices.
- Impingement-plate/tray-tower scrubbers: for the food and agriculture industry and at gray and iron foundries. These types of scrubbers may be used to control other pollutants such as SO_2, VOC, and HAPs in other settings.
- Mechanically-aided scrubbers: for food processing paper, pharmaceuticals, chemicals, plastics, tobacco, fiberglass, ceramics, and fertilizer. Processes controlled include dryers, cookers, crushing and grinding operations, spraying, ventilation, and material handling.
- Orifice scrubbers: for food processing and packaging; pharmaceutical processing and packaging; manufacture of chemicals, rubber and plastics, ceramics, and fertilizer. Processes controlled include dryers, cookers, crushing and grinding operations, spraying, ventilation, and material handling.

- Packed-bed/packed-tower wet scrubbers: for the chemical, aluminum, coke and ferroalloy, food and agriculture, and chromium electroplating industries.

- Spray-chamber/spray-tower wet scrubbers: often used as part of a flue gas desulfurization systems, where they are used to control emissions from coal and oil combustion from electric utilities and industrial sources.

- Venturi scrubbers: for controlling PM emissions from utility, industrial, commercial, and institutional boilers fired with coal, oil, wood, and liquid waste; for sources in the chemical, mineral products, wood, pulp and paper, rock products, and asphalt manufacturing industries; for lead, aluminum, iron and steel, and gray iron production industries; for municipal solid waste incinerators. They are typically used where it is necessary to obtain high collection efficiencies for fine PM.

The primary disadvantage of wet scrubbers is that increased collection efficiency comes at the cost of increased pressure drop across the control system. Another disadvantage is that they are limited to lower waste gas flow rates and temperatures than ESPs or baghouses. Current wet scrubber designs accommodate air flow rates over 100,000 actual cubic feet per minute and temperatures of up to 750°F. Another disadvantage is that they generate waste in the form of a sludge which requires treatment and/or disposal. Lastly, downstream corrosion or plume visibility problems can result unless the added moisture is removed from the gas stream.

Electrostatic Precipitators

An electrostatic precipitator (ESP) is a particle control device that uses electrical forces to move the particles out of the flowing gas stream and onto collector plates. The particles are given an electrical charge by forcing them to pass through a corona, a region in which gaseous ions flow. The electrical field that forces the charged particles to the walls comes from electrodes maintained at high voltage in the center of the flow lane.

Once the particles are collected on the plates, they must be removed from the plates without re-entraining them into the gas stream. This is usually accomplished by knocking them loose from the plates, allowing the collected layer of particles to slide down into a hopper from which they are evacuated. Some precipitators remove the particles by intermittent or continuous washing with water.

Dry-type ESPs are primarily used in the electric utility industry and may also be used by the textile industry, pulp and paper facilities, the metallurgical industry, cement and mineral industry, sulfuric acid manufacturing plants, as well as for coke ovens and hazardous waste incinerators. Dust characteristics are a limiting factor for dry-type ESPs. Sticky, moist, high resistivity, flammable, or explosive dusts and particles are not well-suited for dry-type ESPs. Wet ESPs are used in situations for which dry ESPs are not suited, such as when the material to be collected is wet, sticky, flammable, explosive, or has a high resistivity. Wet ESPs are commonly used by the textile industry, pulp and paper facilities, the metallurgical industry, and sulfuric acid manufacturing plants. The limiting factor for wet ESPs is temperature; typically wet ESPs cannot handle operating temperatures exceeding 170 °F.

ESP control efficiencies are very high and can range from 95% to 99.9% due to the strong electrical forces applied to small particles and can handle high temperatures (dry ESPs), pressures, and gas flow rates. The composition of the particulate matter is very important because it influences the conductivity within the dust layers on the collection plate. Wet ESPs are effective at collecting sticky particles and mist, help to cool and condition gas streams, and may provide for control of other aerosolized pollutants in the gas stream. ESPs in general are not suited for use in processes which are highly variable because they are very sensitive to fluctuations in gas stream conditions (flow rates, temperatures, particulate and gas composition, and particulate loadings). They have high capital costs and require large installation space. Dry

ESPs are not recommended for removing sticky or moist particles. Wet ESPs can have potential problems with corrosion and they generate a wastewater slurry that must be handled.

Fabric Filtration

A fabric filter unit consists of one or more isolated compartments containing rows of fabric bags in the form of round, flat, or shaped tubes, or pleated cartridges. Particle laden gas passes up (usually) along the surface of the bags then radially through the fabric. Particles are retained on the upstream face of the bags, and the cleaned gas stream is vented to the atmosphere. The filter is operated cyclically, alternating between relatively long periods of filtering and short periods of cleaning. During cleaning, dust that has accumulated on the bags is removed from the fabric surface and deposited in a hopper for subsequent disposal.

Fabric filters collect particles with sizes ranging from submicron to several hundred microns in diameter at efficiencies generally in excess of 99 or 99.9%. The layer of dust, or dust cake, collected on the fabric is primarily responsible for such high efficiency. The cake is a barrier with tortuous pores that trap particles as they travel through the cake. Gas temperatures up to about 500°F, with surges to about 550°F, can be accommodated routinely in some configurations. Most of the energy used to operate the system appears as pressure drop across the bags and associated hardware and ducting. Typical values of system pressure drop range from about 5 to 20 inches of water.

Fabric filters are used where high efficiency particle collection is required and can be used in most any process where dust is generated and can be collected and ducted to a central location. Limitations are imposed by gas characteristics (temperature and corrosivity) and particle characteristics (primarily stickiness) that affect the fabric or its operation and that cannot be economically accommodated. Important process variables include particle characteristics, gas characteristics, and fabric properties. The most important design parameter is the air- or gas-to-cloth ratio (the amount of gas in ft^3/min that penetrates one ft^2 of fabric) and the usual operating parameter of interest is pressure drop across the filter system. The major operating feature of fabric filters that distinguishes them from other gas filters is the ability to renew the filtering surface periodically by cleaning. Common furnace filters, high efficiency particulate air (HEPA) filters, high efficiency air filters (HEAFs), and automotive induction air filters are examples of filters that must be discarded after a significant layer of dust accumulates on the surface. These filters are typically made of matted fibers, mounted in supporting frames, and used where dust concentrations are relatively low. Fabric filters are usually made of woven or (more commonly) needle-punched felts sewn to the desired shape, mounted in a plenum with special hardware, and used across a wide range of dust concentrations.

Fabric filters provide high collection efficiency for both coarse and fine particles and are relatively insensitive to fluctuations in gas stream conditions. Operation is simple and fabric filters are useful for collecting particles with resistivities either too low or too high for collection with ESPs. Fabric filters have relatively high maintenance requirements, such as periodic bag replacement, and have limited application for high temperatures and corrosive or moist exhaust.

Step 1b: Identify Potential Control Technologies (Gaseous Fluorides)

Fluoride emissions are also emitted in a gaseous state from iron ore at induration temperatures. These gases can be controlled with the same piece of pollution control equipment as the sulfur dioxide (SO_2) emissions.

The primary methods of controlling SO_2 and fluoride emissions are through the use of flue gas desulfurization (FGD) technologies. There are many FGD systems available including wet scrubbing, spray dryer absorption, circulating fluidized bed absorption (also known as a gas suspension absorber), and dry sorbent injection. The FGD systems currently in use to control SO_2 emissions can be classified as either wet or dry systems. In addition, a number of calcium

and sodium based SO_2 control reagents may be considered. In most cases, reagent selection will not affect the overall SO_2 control efficiency. This analysis will focus on lime and limestone since they are the most common reagents used in wet scrubbing.

Wet Scrubber

A wet scrubber involves scrubbing the exhaust gas stream with a reagent in slurry form comprised of lime (CaO), limestone ($CaCO_3$), caustic, or soda ash in suspension. The process takes place in a wet scrubbing tower. In some cases, the scrubbing tower is located downstream of a PM control device to reduce the plugging of spray nozzles and other problems caused by the presence of particulates in the scrubber. The SO_2 in the gas stream reacts with the slurry to form calcium sulfite ($CaSO_3$) and calcium sulfate ($CaSO_4$). Wet scrubbing absorption control efficiency is typically in the 90% to 98% range.

In order to meet the SO_2 and particulate levels associated with various requirements two scrubber scenarios are considered. The first is a single high pressure wet scrubber. The advantage of a single high pressure wet scrubber is that it has lower capital cost but the operating costs are higher. To achieve the level of particulate removal necessary with a single scrubber, a very high pressure drop is required. The high pressure drop requires a larger fan which in turn uses more electricity. The second option is to have a lower pressure wet scrubber for SO_2 removal followed by a wet ESP for particulate removal. The wet scrubber with a wet ESP option has a higher capital cost but lower operating cost.

Other materials could be used for scrubbing. MEA is a sorbent which may be used for CO_2 absorption in GHG capture system. The capture of CO_2 is accomplished by an acid base reaction between CO_2 and MEA. This bond may be broken relatively easily with low pressure steam heat. In CO_2 capture systems for GHG control, an MEA solution circulates through an absorption column to capture the CO_2 in an exhaust gas steam and a regeneration column where the CO_2 is released from the MEA solution using low pressure steam as a heat source. The CO_2 from the regeneration is compressed to a liquid for transport and sequestration. The MEA is continuously circulated between the absorption and regeneration columns, and very little MEA is lost in the process.

MEA also reacts with other acid gas such as H_2S, SO_2, and NO_x. The reaction between MEA and SO_2 and the reaction of MEA with NO_x is irreversible, and the chemical bonds cannot be broken in a regeneration column. In a CO_2 capture systems, MEA reacting with SO_2 and NO_x is consumed and fresh MEA must be added to replace the MEA consumed by SO_2 and NO_x. There are also operating costs for removing the MEA salts from the MEA sorbent solution and disposal of the waste material. SO_2 and NO_x removal by MEA is considered an unwanted collateral reaction within a CO_2 capture system. Therefore, SO_2 and NO_x concentrations in coal-fired boiler applications must be reduced to a minimum in an MEA sorbent based CO_2 capture system to control operating costs.

If an MEA solution would be used to capture the remaining SO_2 and NO_x in the post emission control Hood and Waste Gas exhaust streams, it would result in the consumption of 950 tons per year of MEA assuming all SO_2 and NO_x is captured.

MEA is not considered to be an economically viable option as compared to other reagents for SO_2 and NO_x control. The current bulk price of MEA is approximately $2,100 per ton. In contrast, hydrated lime costs around $290 per ton, and about the same amount of lime would be used per ton SO_2 controlled as MEA.

Circulating Fluidized Bed (CFB) Dry Scrubber

Circulating fluidized bed (CFB) absorption is a semi-dry system with lime slurry injection. The flue gas enters the reactor through a venturi, which increases the velocity to ensure that solid material

can be transported by the flue gas to create a fluidized bed. The slurry and water are injected into the gas stream at the venturi. The lime reacts with the acids in the flue gas and neutralizes them. The SO_2 in the gas stream reacts with the slurry to form calcium sulfite ($CaSO_3$). The fluidized bed allows for a greater surface for the reaction to take place, thus making the process very efficient. The water is injected to cool down the flue gas. The temperature must be as low as possible because decreased temperatures increase the ability of the slurry to absorb the acids. However, if the temperature is too low, the re-circulating material tends to cake more. A cyclone off the top of the reactor captures particles to be recirculated to the reactor. CFB scrubbing (absorption) control efficiency is typically in the 90% to 98% range depending upon inlet concentrations and conditions.

Spray Dryer Absorption (SDA) Dry Scrubber

Spray dryer absorption (SDA) is a dry scrubbing system that sprays a fine mist of slurried lime into an absorption tower where SO_2 is absorbed by the droplets. The absorption of the SO_2 leads to the formation of calcium sulfite (CaSO3●2H2O) within the droplets. The liquid-to-gas ratio is such that the heat from the exhaust gas causes the water to evaporate before the droplets reach the bottom of the tower. This leads to the formation of a dry powder which is carried out with the gas and collected with a particulate control device. Spray dryer absorption control efficiency is typically in the 70% to 95% range depending upon inlet concentrations and conditions.

Dry Sorbent Injection (DSI) Dry Scrubber

Dry sorbent injection (DSI) involves the injection of a lime or limestone powder into the exhaust gas stream. The process was developed as a lower cost FGD option because the mixing occurs directly in the exhaust gas stream instead of in a separate tower. Sorbent injection control efficiency is typically in the 50% range.

Clean Fuels

The proposed induration furnace is designed to fire only natural gas in its burners. Natural gas does not contain any fuel bound sulfur compounds and therefore is considered to be a clean fuel for SO_2. However, Magnetation is proposing to add coke breeze to the iron ore as it is being processed. The amount of coke breeze will be limited to less than 1.5%. Coke breeze does contain fuel bound sulfur compounds.

It is technically infeasible to burn solid or liquid fuels (e.g., coal and/or fuel oil) in burner systems of a straight grate furnace such as the one designed for the proposed modifications at Magnetation.

Good Design Methods and Operating Practices

Good design includes process and mechanical equipment designs which are either inherently lower polluting or are designed to minimize emissions. Good operating practices include operating methods, procedures, and selection of raw materials to minimize emissions. Since these methods are generally source specific (e.g., good operating practices for SO_2 control), they will be addressed for each process when such measures are available.

(a) Material Handling Operations (Fluorides)

The emissions from the material handling operations are in the form of particulate matter (PM, PM_{10}, and $PM_{2.5}$). Particulate matter emissions are primarily due to the attrition of particles (dust) from the feedstocks, iron oxide pellets, and by-products. This is caused by the abrasion of materials rubbing against each other and the process equipment as they move through the process.

Fluoride emissions will be controlled with particulate matter emission controls on sources where fluorides are emitted as dust. Fluoride salts are present in trace quantities in iron concentrate. These salts are emitted as particulate matter along with ore dust during ore processing such as conveying. These salts can be controlled with the same piece of pollution control equipment as the particulate (PM) emissions.

The following new emission units associated with material handling operations are subject to fluoride BACT requirements:

Fluoride Emission Units Associated with Material Handling Operations	
Emission Unit	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
Recycled Dust Storage Area	EU026
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

Existing Fluoride BACT Determinations for Material Handling Operations
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for material handling operations at iron ore pelletizing plants. The table below summarizes these fluoride BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

Fluorides BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations: EU001a, EU011, EU012, EU015, EU016, EU019, EU026	F: Baghouse, concentration limits, lb/hr limitations	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Iron Ore Wet Grinding and Filter Cake Production, Greenball Production System	F: concentration limit, 5% opacity (6-min avg)	NI	BACT-PSD
Existing Fluorides BACT Determinations - Material Handling Operations					
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Oxide Pellet Stockpile Conveyor Gallery	F: 50 mg/kg (3-hr avg) of oxide pellets handled	NI	BACT-PSD

Fluorides BACT - Material Handling Operations					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
		Hearth Layer Bin	F: 50 mg/kg and 0.0001 lb/hr (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Hearth Layer Feed	F: 50 mg/kg (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Pellet Discharge	F: 50 mg/kg and 0.0002 lb/hr (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Pellet Screening and Handling	F: 50 mg/kg and 0.0001 lb/hr (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Pellet Screenings to Regrind Conveyors	F: 50 mg/kg (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Primary Grinding Mill Line 3	F: 1.00 mg/kg (3-hr avg) of crude ore handled	NI	BACT-PSD
		Grizzly Transfer Tower	F: 1.00 mg/kg (3-hr avg) of crude ore handled	NI	BACT-PSD
		Non-magnetic Cobber Rejects Transfer Tower	F: 1.00 mg/kg (3-hr avg) of crude ore handled	NI	BACT-PSD
		Secondary Screening Crusher/Cobber Line 1	F: 1.00 mg/kg (3-hr avg) of crude ore handled	NI	BACT-PSD
		While the RBLC doesn't list a baghouse as control for fluorides, a baghouse is required for this process for the control of PM, PM_{10} (filterable), $PM_{2.5}$ (filterable), and lead.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Ore Crushing and Handling	F: Baghouse, 1.00 mg/kg (12-month rolling avg) of crude ore handled	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Oxide Pellet Handling	F: Wet Scrubber, 50 mg/kg (12-month rolling avg) of oxide pellets handled	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Silos	F: Baghouse, 50 mg/kg (12-month rolling avg) of DRI pellets handled	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Handling	F: Wet Scrubber, 50 mg/kg (12-month rolling avg) of DRI pellets handled	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Material Handling Operations (Fluorides)

The air streams associated with dry material handling operations are characterized by air streams at or near ambient temperature and moisture content. Such streams would not be expected to contain materials that would be considered to be acidic or corrosive. As such, none of the listed particulate matter control devices were eliminated from consideration because of technical infeasibility.

The air streams associated with wet material handling operations are characterized by air streams at elevated moisture content. Such streams would be expected to clog and minimize the

control efficiency of dry collection systems. As such, fabric filters and cyclones were eliminated from consideration because of technical infeasibility.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Material Handling Operations (Fluorides)

For the following types of material handling operations, all fluoride emissions are emitted as a percentage of the particulate emissions. Therefore, the control effectiveness of the control technologies for fluorides should be comparable to the control effectiveness of the control technologies for PM.

The control technologies for dry material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 90%

(4) Cyclones: 70% - 90%

(5) Wet suppression: 50% - 90%

The control technologies for wet material handling operations are ranked as follows:

(1) Electrostatic precipitators: 95% - 99.9%+

(2) Wet scrubbers: 70% - 90%

(3) Wet suppression: 50% - 90%

Step 4: Evaluate the Most Effective Controls and Document the Results - Material Handling Operations (Fluorides)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for dry material handling operations at iron ore pelletizing plants is fabric filtration. A few operations are controlled by wet scrubbers or wet suppression. Most facilities express emission limitations in terms of the fluoride concentration of the processed materials and/or pounds per hour fluorides. Fluoride concentration is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The fluoride concentrations given in the review range from 1.0 mg/kg to 50.0 mg/kg, which was determined to be BACT for many types of material handling operations.

Based on a review of the U.S. EPA RBLC and other Indiana permits, there is no primary control used for wet material handling operations (Iron Ore Wet Grinding and Filter Cake Production and Greenball Production) at iron ore pelletizing plants. In researching taconite ore processing (AP-42, Chapter 11.23.3), it specifically states that “because the ore remains wet, PM emissions are insignificant for the rest of the process until the dry stage of induration”. Additionally, these processes are generating less than ten tons per year each, and any type of control device for wet material (such as an electrostatic precipitator or wet scrubber) would be economically infeasible.

BACT Proposal

(a) Material Handling Group 1 Emission Units:

Group 1 Emission Units	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
Recycled Dust Storage Area	EU026

BACT shall be the use of baghouses with an appropriate fluoride concentration and pound per hour limitation.

(b) Material Handling Group 2 Emission Units:

Group 2 Emission Units	
Description	Unit No.
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

BACT shall be an appropriate fluoride concentration and that the opacity shall not exceed five percent (5%) on a six (6) minute average.

Step 5: Select BACT - Material Handling Operations (Fluorides)

The proposed BACT for fluorides meets the most stringent BACT found in the RBLC for material handling operations. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed fluoride BACT for the above Material Handling Operations is given in the BACT Conclusion for fluorides.

(b) <u>Induration Furnaces (Fluorides)</u>

The majority of fluoride emissions originate from the fluoride salts present in the iron oxide concentrate. These fluorides are released in gaseous form as a result of the high operating temperature of the induration furnace. Most of the fluoride emissions emanate from the waste gas stack, which vents the regions of the induration furnace where sufficient temperature exist to liberate fluoride compounds from the iron ore concentrate. The hood exhaust contains a small amount of fluoride due to leakage between induration furnace compartments and the diversion of a small amount of waste gas for temperature control.

There is also a small amount of fluoride emission from natural gas combustion.

The following new emission units associated with the induration furnace are subject to fluorides BACT requirements:

Fluorides Emission Units Associated with Induration Furnaces		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust	EU014	SV013B

Existing Fluorides BACT Determinations for Induration Furnaces

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these fluoride BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

Fluorides BACT Determinations – Induration Furnace					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 st/hr pellets)	F: No Control, 2.1 ppmv wet @ 20% O_2 and 1.98 lb/hr	NI	BACT-PSD
		Note: 0.00705 lb F/ton pellets * 450 tons/hr = 3.2 lb/hr F This meets most stringent BACT.			
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 st/hr pellets)	F: GSA Dry Scrubber, 11.4 ppmv wet @ 15% O_2 and 12.34 lb/hr	NI	BACT-PSD
		Note: 0.03205 lb F/ton pellets * 450 tons/hr = 14.4 lb/hr F This meets most stringent BACT.			
Existing Fluorides BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**F: No control, 1.8 ppmv wet @ 15% O_2 and 4.40 lb/hr (3-hr avg)**	**NI**	**BACT-PSD**
	Note: 4.40 lb/hr ÷ 624 tons/hr = 0.00705 lb F/ton pellets				
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**F: GSA dry scrubber, 11.5 ppmv wet @ 15% O_2 and 20.0 lb/hr (3-hr avg)**	**NI**	**BACT-PSD**
	Note: 20.0 lb/hr ÷ 624 tons/hr = 0.03205 lb F/ton pellets				
United States Steel Corp.: Parkville, MN	MN-0077/ 13700005-005 (12/22/2008)	Agglomerator Line 3	F: Wet scrubber (for PM), 1.04 lb/hr (3-hr avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Indurating Furnace - Hood Exhaust (624 st/hr pellets)	F: Wet scrubber, 0.13 lb/hr of greenballs handled	93%	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Indurating Furnace - Waste Gas (624 st/hr pellets)	F: Wet scrubber, 0.25 lb/hr of greenballs handled	95%	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (Fluorides)

The proposed indurating furnace is designed to operate on natural gas (as an external fuel) and coke breeze (which is added to the raw materials). Therefore, use of natural gas as a clean fuel as well as good design methods and operating practices will be implemented regardless of the fluorides control system selected.

Induration Furnace Hood Exhaust
SO2 control efficiencies have been used as a general indicator of the emission control effectiveness on fluoride compounds in the exhaust streams.

Wet scrubbing and spray dryer absorption have been eliminated as control technologies for the Furnace Hood Exhaust (EU013) because the control technologies can feasibly achieve outlet concentrations of 10 and 25 ppmv, respectively. Since the uncontrolled concentration from the hood exhaust is 7.1 ppmv, these technologies will not be able to remove any further SO_2 from the air stream. No other technologies were eliminated from consideration because of technical infeasibility for the induration furnaces with regards to the Furnace Hood Exhaust (EU013).

Induration Furnace Windbox Exhaust
No technologies were eliminated from consideration because of technical infeasibility for the Furnace Windbox Exhaust (EU014).

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (Fluorides)

SO_2 control efficiencies have been used as a general indicator of the emission control effectiveness on fluoride compounds in the exhaust streams. Fluorides are present only in trace quantities in the iron oxide and are released as acid gases due to the temperatures of the indurating process. Since SO_2 gases are acidic, SO_2 control efficiencies are a good indicator of control effectiveness for fluoride emissions because fluorides are also acidic. Due to the inherent low concentrations of fluorides, fluoride control efficiency may vary from the overall SO_2 control efficiency.

Induration Furnace Hood Exhaust
The control technologies for the induration furnace hood exhaust are ranked as follows:

(1) Gas suspension absorber (GSA): 95%

(2) Dry sorbent injection (DSI) dry scrubber: 40%

Induration Furnace Windbox Exhaust
The control technologies for the induration furnace windbox exhaust are ranked as follows:

(1) Gas suspension absorber (GSA): 95%

(2) High pressure wet scrubber: 80%

(3) Low pressure wet scrubber followed with wet electrostatic precipitator (ESP): 80%

(4) Spray dryer absorption (SDA): 60-70%

(5) Dry sorbent injection (DSI) dry scrubber: 40%

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (Fluorides)

Since SO_2 gases are acidic, SO_2 control efficiencies are a good indicator of control effectiveness for fluoride emissions because fluorides are also acidic.

Induration Furnace Hood Exhaust
Uncontrolled SO_2 concentrations in the hood exhaust stream are very low; the calculated hood exhaust SO_2 concentration is 7.1 ppmv. Since this concentration is at or near the lowest controlled SO_2 concentration achievable by these control devices (5 ppm), a control cost analysis

was performed to determine whether or not add-on SO_2 controls were economically feasible. For the GSA and DSI dry scrubbing options, baghouses are needed to capture the spent sorbent. In GSA applications, a portion of the recovered sorbent is recycled back to the dry scrubber to minimize sorbent use. Therefore, the baghouses are considered as an integral part of the SO_2 control system and are included in the control cost analysis. Control costs for GSA and DSI options were also evaluated without baghouse costs. All of these control costs are provided in Appendix C and are summarized in Appendix C - Table A-1 and in the following table.

Hood Exhaust – SO_2 Controls		
Technology	**SO_2 Control Cost ($/ton)**	**Corresponding Appendix C Cost Tables**
Dry Sorbent Injection (DSI)	$55,943	A-4-2a
Gas Suspension Absorber (GSA)	$82,606	A-3-2a
Dry Sorbent Injection (DSI) with Baghouse	$109,262	A-4-1a
Gas Suspension Absorber (GSA) with Baghouse	$151,663	A-3-1a

From the above table, the implementation of SO_2 controls on the hood exhaust would be economically infeasible whether or not particulate controls are included in the cost analysis. Due to the inherent low concentrations of fluorides, costs for fluoride control is significantly greater than the above listed costs.

Based on a review of the U.S. EPA RBLC, the primary control used for furnace hood exhausts at iron ore pelletizing plants is an appropriate pound per hour limitation, based on the process being uncontrolled. Most facilities express emission limitations in terms of exhaust concentration and/or pounds per hour of fluorides. Exhaust concentration is the most effective way of comparing emission limits because it is a relative measure rather than control efficiency limitations which are process-specific measures. The exhaust concentration given in the review is 1.8 ppmv wet.

The furnace design at Magnetation differs from the furnace design at Essar. Both furnaces combust natural gas in the windbox to dry pellets then direct residual heat to the hood. This heat recirculation process at the Essar furnace incorporates 26% of the combustion gases in the heated air stream. This can be documented as follows:

> NO_x emissions in the furnace are generated exclusively from the combustion of natural gas. Essar does not utilize coke breeze in its processes. Therefore, the SO_2 emissions at Essar from in the furnace are generated exclusively from the combustion of natural gas.
>
> | | NO_x (tpy) | SO_2 (tpy) |
> |---|---|---|
> | Hood | 197 | 200 |
> | Windbox | 562 | 570 |
> | Ratio of Hood / (Hood + Windbox) | 26% | 26% |
>
> This redirection of oxygen depleted combustion gas to the hood allows Essar to operate the hood at a lower oxygen level than the ambient air oxygen content of twenty percent (20%).

As documented in the furnace calculations for Magnetation, the amount of combustion gas redirected to its hood will be 7.5%. Therefore, Magnetation cannot operate its furnace hood at 15% oxygen, and it is designed to operate at ambient air oxygen concentrations of twenty percent (20%).

BACT Proposal – Induration Furnace Hood Exhaust (Fluorides)

BACT for the fluorides emissions from the induration furnace hood exhaust has been proposed to be uncontrolled with a maximum outlet concentration of 2.1 ppmv wet corrected to 20% O_2 and a corresponding 1.98 lb/hr limit.

Induration Furnace Windbox Exhaust
Based on a review of the U.S. EPA RBLC, the primary control used for furnace waste gas/windbox exhausts at iron ore pelletizing plants is a gas suspension absorber (GSA). Most facilities express emission limitations in terms of exhaust concentration and/or pounds per hour of fluorides. Exhaust concentration is the most effective way of comparing emission limits because it is a relative measure rather than control efficiency limitations which are process-specific measures. The exhaust concentration given in the review is 11.5 ppmv wet.

BACT Proposal – Induration Furnace Windbox Exhaust (Fluorides)

BACT for the fluorides emissions from the induration furnace windbox exhaust has been proposed to be controlled through the use of a GSA dry scrubber combined with a baghouse for sorbent capture and particulate control and a maximum outlet concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit.

The proposed BACT for fluorides meets the most stringent BACT found in the RBLC for induration furnace waste gas exhausts. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

Step 5: Select BACT - Induration Furnace (Fluorides)

A detailed fluorides BACT for the induration furnace is given in the BACT Conclusion for fluorides.

(c) Combustion Units (Fluorides)

The following emission units associated with combustion processes are subject to Fluoride BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Fluoride Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (Fluorides)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (Fluorides)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas

fired emergency generators. There are no current listings in the RBLC for fluorides for natural gas fired emergency generators or other comparable combustion units.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (Fluorides)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (Fluorides)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (Fluorides)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. The only facility expresses its exhaust emission limitation in terms of pounds per hour of fluorides. Pound per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures.

Magnetation did not propose a fluorides BACT for the natural gas fired emergency generator. IDEM has determined that BACT shall be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 6.95×10^{-6} lb/MMBtu for the proposed generator. This is equivalent to the total of the emission factors for the fluoride containing pollutants (benzo(b)fluoranthene, fluoranthene, and fluorene) in the natural gas as listed in AP-42, Table 3.2-2 for 4-stroke lean-burn reciprocating engines.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (Fluorides)

A detailed fluorides BACT for the natural gas fired emergency generator is given in the BACT Conclusion for fluorides.

(2) Natural Gas Fired Fire Pump (Fluorides)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (Fluorides)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. There are no current listings in the RBLC for fluorides for natural gas fired fire pumps or other comparable combustion units.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (Fluorides)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (Fluorides)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (Fluorides)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired fire pumps is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. The only facility expresses its exhaust emission limitation in terms of pounds per hour of fluorides. Pound per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures.

Fluorides BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 6.95×10^{-6} lb/MMBtu for the proposed fire pump. This is equivalent to the total of the emission factors for the fluoride containing pollutants (benzo(b)fluoranthene, fluoranthene, and fluorene) in the natural gas as listed in AP-42, Table 3.2-2 for 4-stroke lean-burn reciprocating engines.

Step 5: Select BACT - Natural Gas Fired Fire Pump (Fluorides)

A detailed fluorides BACT for the natural gas fired fire pump is given in the BACT Conclusion for fluorides.

(3) Natural Gas Fired Space Heaters and Air Heaters (Fluorides)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these fluorides BACT determinations as provided by the RBLC. Since there are so few entries in the RBLC for total fluorides, the search was only limited to natural gas fired combustion sources, excluding boilers.

Fluoride BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	F: Use of natural gas, good combustion practices, 9.40E-06 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	F: Use of natural gas, good combustion practices, 9.40E-06 lb/MMBtu	NI	BACT-PSD

Fluoride BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	F: Use of natural gas, good combustion practices, 9.40E-06 lb/MMBtu	NI	BACT-PSD
Existing NO_x BACT Determinations - Heaters Firing Natural Gas					
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Process Heaters (606 MMBtu/hr)	F: 0.0004 lb/hr (3-hr avg)	NI	BACT-PSD
		Compliance is demonstrated through a limit on fluorides in the raw material (oxide pellets) of 1.0 mg/kg.			

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired heaters is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. The only facility expresses its exhaust emission limitation in terms of pounds per hour of fluorides. Pound per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures.

The RBLC listing for the process heaters at Minnesota Steel were not considered as part of this BACT determination because the limit is based on the fluoride concentration of the raw material being heated and not on the combustion of the natural gas itself.

Magnetation did not propose a fluorides BACT for the natural gas fired fire pump. IDEM has determined that BACT shall be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 9.40 x 10^{-6} lb/MMBtu for the proposed heaters. This is equivalent to the total of the emission factors for the fluoride containing pollutants (benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthene, and fluorene) in the natural gas as listed in AP-42, Table 1.4-3 for general natural gas combustion.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)

A detailed fluorides BACT for natural gas fired heaters is given in the BACT Conclusion for fluorides.

BACT Conclusion for Fluorides

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for fluorides emissions shall be as follows:

(a) Material Handling Operations

The material handling operations shall be limited as follows:

Fluorides emissions from the following emission units (EU001a, EU011, EU012, EU015, EU016, and EU019) shall be controlled by fabric filter dust collectors and shall not exceed the emission limits listed in the following table:

Emission Unit		Control	Fluoride Concentration of Oxide Pellets Handled (mg/kg)	Fluoride Concentration of Oxide Pellets Handled (lb/hr)
Description	Unit No.			
Iron Concentrate Unloading	EU001a	Baghouse CE001	50.0	4.73×10^{-5}
Mixing Area Material Handling System	EU011	Baghouse CE011	50.0	1.71×10^{-5}
Hearth Layer Bin System	EU012	Baghouse CE012	50.0	7.55×10^{-6}
Furnace Discharge System	EU015	Baghouse CE017	50.0	3.65×10^{-5}
Hearth Layer Separation System	EU016	Baghouse CE018	50.0	3.94×10^{-5}
Oxide Pellet Storage & Unloading System	EU019	Baghouse CE019	50.0	3.15×10^{-5}
Recycled Dust Storage Area	EU026	Baghouse CE024	50.0	7.88×10^{-6}

Fluorides emissions from the Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System shall be controlled by using process material with a maximum fluoride concentration of 50.0 mg/kg and that the opacity shall not exceed five percent (5%) on a six (6) minute average.

(b) Induration Furnace

The induration furnace operations shall be limited as follows:

(1) Fluorides emissions from the induration furnace hood exhaust is uncontrolled with a maximum outlet concentration of 2.1 ppmv wet corrected to 20% O_2 and a corresponding 1.98 lb/hr limit.

(2) Fluorides emissions from the induration furnace windbox exhaust is controlled through the use of a GSA dry scrubber combined with a baghouse for sorbent capture and particulate control as well as a maximum outlet concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit.

(c) Combustion Processes

The combustion processes shall be limited as follows:

(1) Fluorides emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 6.95 x 10^{-6} lb/MMBtu.

(2) Fluorides emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 6.95 x 10^{-6} lb/MMBtu.

(3) Fluorides emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 9.40 x 10^{-6} lb/MMBtu.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (PSD BACT) with regards to fluorides.

Greenhouse Gases (GHG) BACT

The GHG BACT analysis is divided into two categories: induration furnaces and combustion units.

Step 1 of the BACT process is shown below for this GHG BACT analysis to describe general GHG control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific GHG control devices may be discussed in individual BACT analyses. A summary of the GHG BACT determinations is provided at the end of this section.

Step 1: Identify Potential Control Technologies (GHG)

The list of potential control technologies considered for the GHG BACT analysis, and detailed descriptions of each control technology are included in this section. The emission control technologies evaluated include add-on controls, evaluation of fuel alternatives, and inherently lower pollution from process equipment where applicable. The majority of GHGs that will be emitted from the Magnetation project are due to combustion activities; CO_2 is a product of combustion. A smaller amount of GHG emissions will occur as a result of physical or chemical processes at the facility. The CO_2 from both of these generation mechanisms is in a gaseous phase in the exhaust streams at the Magnetation facility. The majority of the add-on CO_2 control technologies involve the absorption of the CO_2 gas into a solution. If simply left in the solution, the CO_2 would disassociate and would be emitted back into the atmosphere because CO_2 is a gas at ambient temperatures and pressures. In addition, vast quantities of the absorbing solution would be required, and these would require proper disposal. Therefore, these technologies also involve the removal of the CO_2 gas from the absorbing solution, forming a concentrated CO_2 gas stream. In order for the CO_2 to be permanently removed from the atmosphere, this gas stream must be compressed using high pressure until the CO_2 gas forms a liquid. The pressure must be maintained, or the CO_2 will convert back to a gas. In order to keep the CO_2 in liquid form for essentially eternity, it must be stored in a manner where the pressure can be maintained. One method being evaluated for this by DOE and others is to pump the CO_2 into underground geological units. There are some developing technologies that remove the CO_2 from the exhaust stream through a mineralization reaction where a solid such as calcium carbonate is formed but these are in the early stages of development. These are discussed in more detail later in this section.

Based on the physical characteristic of CO_2, a successful control technology that accomplishes the goal of permanently removing CO_2 from the atmosphere must include:

- a technology for removing it from the exhaust stream, also referred to as a carbon capture technology,
- a viable place for permanent storage of the CO_2 given the physical form that it is in after removal (i.e., gas, liquid, or solid), this is typically referred to as carbon sequestration, and
- a feasible means of transporting the quantities of material generated to the storage location (i.e. pressurized gas pipeline).

Having a feasible carbon capture technology that is based on removing CO_2 in the gaseous form but no viable storage will not accomplish the goal of removing CO_2 from the atmosphere because it would have nowhere to go but back into the atmosphere.

The remainder of this section discusses identified control technologies in the following categories:

- Carbon capture technologies (gas based or mineralization based).
- Geological formation types that can be used for carbon sequestration.
- Pressurized CO_2 transportation options.
- Fuel alternatives.
- Energy efficiency measures.

Carbon Capture

There are currently two general classes of CO_2 capture technologies, those that remove CO_2 as a gas and those that involve a chemical reaction to form a mineral. As discussed above, technologies that remove CO_2 in a gaseous form also require a permanent storage location in order to accomplish the goal of removing the CO_2 from the atmosphere.

Before CO_2 can be sequestered, it must be captured as a relatively concentrated gas in order to minimize the pressure necessary to liquefy it for transportation and to minimize the storage volume. The CO_2 that is coming off of the indurating furnace as a component of the flue gas is usually at relatively low concentrations and low pressure. For comparison, coal-fired power plants have CO_2 concentrations in the 10 to 15 percent range, while the estimated CO_2 concentration from an indurating furnace is 2 to 3 percent. In order for CO_2 to be successfully transported for sequestration, the recovered gas stream must be concentrated to 90 percent or greater CO_2[1] and must also be compressed to 100 atm or greater[2]. For this reason, gas based carbon capture systems must produce a concentrated and pressurized stream of CO_2 in order to be effective. Post-combustion, pre-combustion, and oxy-fuel combustion are three technologies currently being developed that create a way to capture CO_2 gas from the flue gas. Also discussed in this section are a couple of developing mineralization processes that were identified.

[1] U.S. Climate Change Technology Program, "Capturing and Sequestering Carbon Dioxide" http://www.climatetechnology.gov/stratplan/final/CCTP-StratPlan-Ch06-Sept2006.pdf, September 2006.
[2] Herzog, Howard, Meldon, Jerry, Hatton, Alan, "Advanced Post-Combustion CO_2 Capture", http://web.mit.edu/mitei/docs/reports/herzog-meldon-hatton.pdf, April, 2009.

Post-Combustion CO_2 Capture

Post-combustion CO_2 capture involves separating the CO_2 from the flue gas after combustion so that it can be transported and/or stored in one of the ways discussed above instead of emitted to the air. Currently, commercial post-combustion CO_2 capture plants have only used chemical absorption processes with ammonia (NH_3) and mono-ethanolamine (MEA)-based solvents.[3]

Amine-based sorbents undergo a reversible chemical reaction with CO_2. The amine solvent is injected in an absorber column at low temperatures where the amine comes into contact with the flue gas. At low temperatures, CO_2 physically dissolves in water and then reacts with the amine in an exothermic process. The CO_2 rich amine sorbent is sent to a stripper column for CO_2 recovery. Prior to entering the stripper, 'CO_2-rich' solution is preheated in a heat exchanger using waste heat from a hot stream of 'CO_2-lean' regenerated solvent. The heat added to the CO_2-rich solution breaks the CO_2-amine bond releasing the CO_2 as the amine solution flows through the stripper. CO_2 gas and water vapor are released from top of the stripper. The concentrated CO_2 stream is first condensed to remove the water and is then compressed to be prepared for transportation and/or sequestration. The regenerated amine is recirculated back to the absorber and the process starts over.

Note that when the flue gas enters the absorber column, any SO_3, SO_2, and NO_2 present in the stream will also react irreversibly with amines. Therefore, concentrations of SO_3, SO_2, and NO_2 must be ideally removed to less than 10 ppm to prevent excessive amine consumption. This is beyond the current demonstrated capability of most flue gas desulfurization (FGD) and de-NO_x emission control systems. Given the current state of FGD and de-NOx emission control technologies, CO_2 capture technologies that use amine sorbents will require significant quantities of amine solution.

[3] Herzog, Howard, Meldon, Jerry, Hatton, Alan, "Advanced Post-Combustion CO_2 Capture", http://web.mit.edu/mitei/docs/reports/herzog-meldon-hatton.pdf, April, 2009.

Oxyfuel Combustion with CO_2 Capture

Oxyfuel combustion uses a high purity oxygen (O_2) stream for combustion instead of air. Use of pure oxygen for combustion minimizes nitrogen from the combustion process. Since air contains 79 percent nitrogen and 21 percent oxygen this also significantly reduces the volume of the exhaust stream. Therefore, minimal nitrogen is available for NO_x formation or to dilute the combustion products. Oxyfuel combustion results in an exhaust stream of almost pure CO_2 and water vapor. The water vapor can easily be removed by condensation, and CO_2 recovery and compression costs are reduced because of the lower flow rates associated with nitrogen free combustion.

For existing facilities, a portion of the CO_2 can be recycled in the combustion unit so that the flow rate and thermodynamic properties of the oxyfuel flue gas are similar to air-based combustion. This allows oxyfuel combustion to be installed without significant modifications to the boiler.

The O_2 for oxyfuel combustion is produced by separating the oxygen from the air. The most common way to do this is to use cryogenic separation which requires a very large (3 GJ/tonne CO_2) amount of energy.

Gasification and Pre-Combustion CO_2 Capture

Pre-combustion CO_2 capture refers to the capture of CO_2 prior to combustion to produce hydrogen. Hydrogen combustion does not produce CO_2 emissions. The capture process typically consists of three steps. First, a hydrocarbon fuel (i.e., methane or gasified coal) is converted into hydrogen and carbon monoxide (CO) to form a synthetic gas or syngas. Second, the CO is used to generate additional H_2 by reacting CO and H_2O catalytically to form H_2 and CO_2. Lastly, the CO_2 is separated from the hydrogen. The hydrogen is then used for clean

combustion, and the concentrated CO_2 is ready for compression and then transportation and/or storage. Note that this process requires a hydrocarbon fuel source; if coal or biomass is to be used as a fuel source, the solid fuel must first go through the gasification process. Gasification converts a carbonaceous material (i.e., coal or biomass) into carbon monoxide and hydrogen. The raw carbonaceous material is reacted at high temperatures with a controlled amount of oxygen and/or steam. This gas moisture that is created from this process is syngas. The syngas can then be used as described above.

Because CO_2 is present at much higher concentrations in syngas than in post-combustion flue gas, CO_2 capture should be less expensive for pre-combustion capture than for post-combustion capture. Currently, there are few gasification plants in full-scale operation, and capital costs are higher than for conventional pulverized coal plants. Of the gasification plants currently in operation, there are no units that are currently generating additional H_2 by reacting CO and H_2O and then separating and capturing the concentrated CO_2 stream for sequestration.

Use of this technology will increase energy use and water use over direct fuel combustion. Energy is released in the pre-combustion of fuel to generate carbon monoxide and hydrogen. Not all of the energy released in this process can be recovered through waste heat recovery systems such as heat exchangers. The generation of hydrogen from the water gas shift reaction to convert CO to H_2 and CO_2 consumes energy because this is an endothermic reaction. Lastly, additional energy will be needed to separate hydrogen from the exhaust gas stream containing CO, CO_2, water, and residual fuel which was not oxidized in the pre-combustion process.

CO_2 Mineralization

Carbon dioxide mineralization is the process of reacting CO_2 to form a solid by-product, such as silicate or carbonate minerals. The solid by-product is considered stable and could be stored for very long periods of time.[4] In the case of carbonates (such as sodium bicarbonate), the product can be sold for beneficial use. This process is very kinetically slow (>24 hours to reach 50% capture[5]) and therefore in order to make this a relevant control option for captured carbon, heat, energy and or pressure must be supplied to speed up the reaction. There are, however, commercial processes that are under development. Two examples that are discussed in more detail below are alkalinity driven processes that produce carbonate minerals and an electrochemical process that produces sodium bicarbonate. The alkalinity driven process uses an aqueous precipitation process to produce carbonates from CO_2. This technology requires an aqueous source of calcium and magnesium cations and a source of alkalinity to precipitate calcium and magnesium carbonates from reaction with carbon dioxide.[6] The process produces carbonate minerals and salt water. An add-on electrochemical process can use the salt water to produce the alkalinity needed for the precipitation process, and also produces hydrochloric acid as a byproduct.[7]

The second process under development uses an electrochemical cell to produce carbonates from CO_2.[8] Carbon dioxide is combined with salt water and produces sodium bicarbonate, which may be precipitated out in solid form.[9] This process also produces electrolytic-grade hydrogen and electrolytic-grade chlorine along with saleable bicarbonate as well as a way to recover the electricity required for the process.[10]

[4] BiofuelsWatch.com, "Carbon Sequestration Technology", January 4, 2010.
[5] NETL, "CO_2 Mineral Sequestration Studies in U.S.", 2001.
[6] Calera, "Notes on Sustainability and Potential Market", 2010.
[7] Ibid.
[8] Angelo, David, Skyonic, "SkyMine Commercialization Update", Webinar Presentation, September 9, 2010.
[9] Layton, Julia, "Can baking soda save the environment?", March 12, 2008, HowStuffWorks.com http://science.howstuffworks.com/environmental/green-science/baking-soda-save-environment.htm, November 29, 2010.
[10] Angelo, David, Skyonic, "SkyMine Commercialization Update", Webinar Presentation, September 9, 2010.

Carbon Transportation and Sequestration

Carbon sequestration involves taking CO_2 that has been captured from the flue gas, compressing, and then transporting the pressurized CO_2 to a suitable site for pressurized

injection and storage. The CO_2 is stored deep underground in geological formations in such a way that the CO_2 will be permanently stored.

The majority of geologic formations considered for CO_2 storage are deep saline formations or depleted oil and gas reservoirs. These formations consist of multiple underground layers of porous rock that are underneath a layer or multiple layers of non-porous rock. The sequestration process starts with drilling a well down into the porous rock and then injected pressurized CO_2 into the porous rock. Under high pressure, the injected CO_2 turns to liquid and can move through a formation as a fluid, the liquid CO_2 tends to flow upward until it encounters the non-porous rock, which traps the CO_2 to prevent further upward migration.[11]

Coal seams are another formation considered a viable option for geologic storage. When CO_2 is injected into the coal seam formation, it is adsorbed onto the coal surfaces, and methane gas is released and produced in adjacent wells.[12]

[11] NETL, Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/core_rd/storage.html.
[12] NETL, Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/core_rd/storage.html.

Deep Saline Aquifers

Deep saline aquifers are layers of porous rock that are saturated with brine. CO_2 can be injected into these formations and stored beneath a layer of nonporous rock.

Saline aquifers are very widespread in many parts of the world and therefore represent an enormous potential for CO_2 storage. The EPA classifies any aquifers with greater than 10,000 mg/l salinity unfit as sources of drinking water.[13] Aquifers such as these serve as a resource for CO_2 storage. CO_2 will eventually dissolve into solution and react to form solid carbonates in the reservoir. These carbonates can increase the permanence of the CO_2 storage, but they may also block the injection well.

Additionally, little is known about saline formations. Research is just beginning on how CO_2 injection into a saline aquifer might affect the environment over a longer period of time. There is some uncertainty around the suitability of saline formations for CO_2 storage.

One potential risk from carbon injection into a saline aquifer is the consequence of unintended leakage of CO_2 from the storage formation into overlying aquifers. If these other aquifers are sources of drinking water, there is a possibility that the CO_2 will affect water quality characteristics, possibly posing a threat to water resources.[14]

[13] Van Essendelft, Dirk J, Fitzgerald, Taron, M, Abdel-Hafez A., Sakti, A., Achimugu, O., Faoro, I., "CO_2 Sequestration through Deep Saline Injection and Photosynthetic Biological Fixation: System Design for Two Plausible CO_2 Sequestration Strategies", http://www.ems.psu.edu/~elsworth/courses/egee580/Sequestration_final_report.pdf.
[14] Carbon Capture Journal, "Potential Impact of GCS to Underground Sources of Drinking Water", http://www.carboncapturejournal.com/displaynews.php?NewsID=513, February 12, 2010.

Oil and Gas Reserves

Both active and depleted oil and gas reserves are potential formations for underground storage of CO_2. As discussed above, these formations consist of layers of porous rock with a layer of nonporous rock above. Oil and gas reserves have held crude oil and natural gas for centuries; the same geologic characteristics that trap the oil and gas are the characteristics that make these reservoirs good locations for CO_2 sequestration.

When CO_2 is injected into an active mature oil reserve, it has the potential to produce additional oil. This process is referred to as enhanced oil recovery (EOR). EOR begins with the injection of CO_2 into an oil reserve. The injected CO_2 dissolves in the oil, which increases the volume and decreases the viscosity of the liquid; this improves the mobility of the remaining oil and extends

the production life of the oil reserve. CO_2 injection can result in recovery of an additional 10 to 15 percent of the oil.[15]

[15] NETL, Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/core_rd/storage.html.

Un-mineable Coal Seams

Coal seams that are too deep or too thin to be mined economically are considered to be un-mineable. CO_2 can be injected into these un-mineable coal seams to potentially increase coal bed methane recovery, referred to as enhanced coal bed methane (ECBM) recovery. ECBM recovery can be achieved by sweeping the coal bed with CO_2. All coal types have a variable amount of methane absorbed onto pore surfaces.[16] So, depending on the type of coal, a variable amount of methane is released, at the same time providing a storage location for CO_2.

A potential problem with sequestering of CO_2 into un-mineable coal seams and ECBM recovery is coal swelling. When coal adsorbs CO_2, it increases or 'swells' in volume. The swelling can cause a significant decrease in permeability, which in turn restricts the flow of CO_2 into the formation and also may prevent the recovery of coal bed methane. Angled drilling techniques and fracturing are being researched as possibilities reducing the effects of coal swelling.

[16] NETL, Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/core_rd/storage.html.

Fuels

This fuels analysis is based on pollutant emissions directly associated with the combustion of the fuel. Emissions from a specific fuel may be related to the inherent properties of the fuel (e.g., sulfur content) or by the nature of the combustion process and is assessed on the uncontrolled CO_2 pollutant emission factors for each fuel.

Historically EPA policy has held that a facility need not consider emission control options which would fundamentally "re-define" the proposed project. For example, a coal-fired power plant would not need to consider installation of a natural gas-fired turbine as BACT for emissions control as an alternative to the proposed coal-fired plant. However, recent court decisions have held that clean fuels must be considered in a BACT review. So, for example, natural gas must be considered as an alternative fuel for a coal-fired boiler application (a turbine option is still excluded).

Magnetation is proposing the use of a straight-grate furnace designed to burn natural gas and to utilize coke breeze. No provisions for the combustion of solid fuels have been made in the design of the furnace burner system. Magnetation is proposing to add coke breeze to the iron ore as it is being processed. The coke breeze provides heat input from the conversion of carbon to carbon dioxide in an endothermic reaction and improve the energy balance for the process. Natural gas has the lowest GHG emissions of the fuels when the biogenic nature of biomass is not considered. The straight-grate furnace is not technically feasible of burning biomass, and no provisions in the project for the use of biomass have been included in the definition of the project.

Energy Efficiency

Energy efficiency focuses on reducing the amount of energy/fuel used in the process. Reducing energy is considered a key solution to reducing GHG emissions. Energy efficiency will be strongly influenced by ore type, pellet type, maintenance practices, process control, and pellet throughput. Combined heat and power alternatives will not be addressed as an energy efficiency measure in this report. There are no boilers currently included in the proposed project and therefore, these alternatives are considered to be out of scope for this GHG BACT evaluation.

Recuperative Heat Recovery

The recuperative heat recovery system proposed for the Magnetation furnace utilizes hot air from the pellet cooler to dry and preheat the pellets. A portion of the cooling air is also used as

combustion air to minimize fuel use. Because the combustion air is hot, less fuel is necessary to heat the combustion air.

Minimization of Heat Loss (Insulation)

Insulation can be used as a way to reduce heat loss from the process and the indurating furnace. Heat naturally transfers from a warmer to cooler area. Therefore, the heat generated during combustion has a natural tendency to transfer away from the furnace. Insulation is a means of minimizing the heat transfer.

Good Design Practices / Good Operating Practices
Good design includes process and mechanical equipment designs which are either inherently lower polluting or are designed to minimize emissions. Good operating practices include operating methods, procedures, and selection of raw materials (i.e., additives and control reagents) to minimize emissions.

Lower Emitting Processes
In addition to add-on controls and energy efficiency measures, an evaluation of process changes to lower GHG emissions is also considered part of a BACT determination. Most of the process-related GHG emissions from the iron oxide process are the result of the inherent nature of the raw materials and their carbon content.

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (GHG)

Carbon Capture
Carbon capture is proven on a limited scale in some operations including enhanced oil recovery (EOR) and food-grade applications. Research is currently being completed on pilot or demonstration scales for a number of larger-scale power generation applications. However, sequestration is an integral part of any GHG control technology option. Therefore the feasibility of gas-based carbon capture technology is limited by the feasibility and availability of carbon transport capabilities and sequestration sites.

Post-Combustion CO_2 Capture

To date, there are a number of projects that are using or planning on using post combustion capture technology for capture of CO_2 from a flue gas stream. Below are a few examples of existing facilities or planned demonstration projects.

- *First Energy*
  The Berger Powerplant Project in Shadyside, OH finished a 1 MW pilot project using Powerspan's EC02 post combustion CO_2 capture technology. The inlet CO_2 concentration was approximately 11-12%, and 20 tons of CO_2 were captured (and released) per day. An outside evaluation by Worley Parsons indicated that the technology would be effective on 200MW or greater coal plants. The vendor indicated that this technology would be effective for use in an iron ore plant application.[17] However, no transportation or sequestration solution was identified.

  [17] Powerspan, "Powerspan Carbon Capture Technology", March, 2011.

- *Northeast Energy Associates*
  The Northeast Energy facility in Bellingham, MA captures 320 tons per day of CO_2 from a gas turbine using the Fluor Daniel ecoamine process.[18] The captured CO_2 is used onsite for food grade applications. CO_2 concentrations from the turbine treated by the process are similar to those seen in indurating furnace discharges (3.5% CO_2 and 13-14% O_2). Although the concentration of CO_2 and O_2 are similar, no information could be obtained

regarding the size of the turbine or the flowrate of this application. Given that it is a food grade application, it was assumed to be a small grade system.

[18] Reddy, Satosh, et al., "Fluor's Ecoamine FG Plus Technology", Second National Conference on Carbon Sequestration, DOE/NETL, May, 2003.

- *Carbon Dioxide Technology*
  The Lubbock, TX project captures CO_2 from a gas boiler for EOR use in nearby oil and gas production using the Dow MEA process.[19] Attempts to contact Dow were unsuccessful, but Cansolv was contacted to discuss potential application of their amine process to an iron ore project. They indicated that while technically feasible to capture CO_2, they declined on providing additional information because they thought it would be too expensive and not a very good fit with their process.[20]

[19] Chapel, Dan, Mariz, Carl, "Recovery of CO_2 from Flue Gases: Commercial Trends", Canadian Society of Chemical Engineers Annual Meeting, October, 1999.
[20] Personal communications, Devon Shaw, CanSolv, March 1, 2011.

- *American Electric Power*
  The Mountaineer project is currently using post combustion CO_2 capture technology during "Phase 1" of the testing of the facility, capturing and sequestering 0.1 million tons per year of CO_2. However, the commercial scale demonstration of post combustion CO_2 capture ("Phase 2") will not begin until 2015.[21]

[21] Massachusetts Institute of Technology (MIT), "Carbon Capture and Sequestration Technologies", September, 7, 2010.

- *NRG Energy*
  NRG Energy in Thomson, Texas intends to capture 0.5 million tons per year of CO_2 from a power plant using post combustion capture techniques starting in 2015.[22]

[22] U.S. DOE, "DOE/NETL Advanced Carbon Dioxide Capture R&D Program: Technology Update", http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/CO2%20Capture%20Tech%20Update%20Final.pdf, September, 2010.

- *Basin Electric*
  The Antelope Valley Station project will use post combustion CO_2 capture techniques. The project will capture 1 million tons per year of CO_2 starting in 2014.[23]

[23] U.S. DOE, "DOE/NETL Advanced Carbon Dioxide Capture R&D Program: Technology Update", http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/CO2%20Capture%20Tech%20Update%20Final.pdf, September, 2010.

As shown in the above project descriptions, post combustion carbon capture cannot yet be considered as a commercially available technology.

Additionally, post combustion carbon capture requires a large amount of energy for operation. The energy demand can be attributed to the following:

- Extraction of steam from the electric generating turbine to the stripper reboiler. The steam provides energy to break the chemical bonds between the CO_2 and the amine and provides heat required to raise the temperature of the amine to the operating temperature of the stripper.

- Electricity is required to run the CO_2 compressors. The CO_2 stream must be compressed to 100 psi or greater for transportation and/or storage.

- Electricity is required to drive the blowers to push the flue gas through the absorber/stripper system.[24]

[24] Herzog, Howard, Meldon, Jerry, Hatton, Alan, "Advanced Post-Combustion CO_2 Capture", April, 2009.

Because of the large energy demand, a key goal of the research around post combustion capture of CO_2 is reducing the energy requirements. For these reasons, post combustion CO_2 capture is not considered economically feasible or commercially available at this time.

Oxyfuel Combustion with CO_2 Capture

Oxyfuel combustion is not a technically feasible control option due to the design of the induration furnace. The recuperative heat recovery system uses air to cool pellets, and energy captured by the air in the pellet cooling process is used in the preheat section of the furnace. Therefore, it is not possible to eliminate air from the process without changing the design of the furnace.

Additionally, oxyfuel combustion is not considered commercially available for this type of application. Per the U.S. Department of Energy, there is only one full-scale demonstration project planned to test the effectiveness of oxyfuel combustion. The project, FutureGen 2.0, will capture, compress, and transport CO_2. FutureGen 2.0 in Meredosia, Illinois intends to start an oxyfuel combustion process will CO_2 capture in 2015. The project will collect 1 million tons per year of CO_2.

Gasification and Pre-Combustion CO_2 Capture

There are gasification plants in operation. However, the process of generating additional H_2 by reacting CO and H_2O and then separating and capturing the concentrated CO_2 stream for sequestration is still in development. In order for the gasification process to be implemented for the Magnetation project, significant re-design of the induration furnace would be required, which would re-define the project. The furnace is currently not designed to burn hydrogen. Therefore, this technology is not considered to be technically feasible control option for the Magnetation project.

Additionally, pre-combustion CO_2 capture is not yet considered commercially available for this type of application. The following is a list of facilities that have planned demonstration projects that will capture, compress, and transport CO_2 using a gasification process.

- *Summit Texas Clean Energy*
  Summit Texas Clean Energy is an integrated gasification combined cycle power plant in Odessa, Texas. The facility will collect 3 million tons per year of CO_2 starting in 2014.

- *Southern Company*
  Southern Company is an existing integrated gasification combined cycle power plant in Kemper County, Mississippi. The facility will collect 2 million tons per year of CO_2 starting in 2016.

- *Hydrogen Energy California*
  Hydrogen Energy California is an existing integrated gasification combined cycle power plant in Kern County, California. The facility will collect 2 million tons per year of CO_2 starting in 2016.

<u>CO_2 Mineralization</u>
There are several demonstration plants either underway or planned for these mineralization technologies, two alkalinity based and one electrochemical based.

- *Moss Landing, California (alkalinity driven technology)*
  An alkalinity driven CO_2 mineralization demonstration plant in Moss Landing, California is capable of capturing 30,000 metric tons per year of CO_2 from a natural gas-fired power plant by producing magnesium and calcium carbonates. The size of this plant is significantly less than the size needed for Magnetation.

- *Latrobe Valley in Victoria, Australia (alkalinity driven technology)*
  A commercial-scale demonstration of an alkalinity driven CO_2 mineralization technology is planned in the Latrobe Valley in Victoria, Australia. This project was scheduled to break ground on a smaller demonstration phase in 2010, but is expected to expand its capabilities to capture 300,000 metric tons per year of CO_2 from a coal-fired power plant.[25] The timeframe for the full capacity demonstration is not yet determined.

  [25] Calera, "Notes on Sustainability and Potential Market", 2010.

- *San Antonio, Texas (electrochemical driven technology)*
  This demonstration project, which is receiving funding from the U.S. Department of Energy, will capture 75,000 metric tons per year of CO_2 from a cement manufacturing plant in San Antonio, Texas.[26] The demonstration project is currently in the detailed engineering and construction phase.

  [26] Angelo, David, Skyonic, "SkyMine Commercialization Update", Webinar Presentation, September 9, 2010.

Since none of these facilities have yet to be completed, these technologies are not considered to be commercially available and therefore technically infeasible.

Carbon Transportation and Sequestration

Carbon sequestration is considered to be a potentially technically feasible control option at the time of this report. Currently, research is being completed on several pilot scale tests within the Illinois Basin to determine the long-term effectiveness of sequestration and identify reservoir uncertainties of the storage capability of the target formations. Therefore, carbon sequestration is not considered to be fully commercially available technology at the time of this report.

The feasibility of each of the CO_2 sequestration techniques are discussed below. Carbon sequestration strategies have been researched and investigated in the Illinois Basin for nearly a decade. At this time, most of the pilot projects are in Phase II, where injection of the CO_2 into the target formation is performed.

While pipeline technology exists, there are significant logistical hurdles that make CO_2 transportation economically infeasible given that the nearest possible storage facilities are 20 to 100 miles away. The nearest CO_2 pipeline is in Mississippi (Dooley et al, 2009). Successful receipt of permitting, right-of-way, and other environmental considerations necessary to establish a pipeline to reach sequestration sites is not guaranteed. The cost to the proposer to establish this pipeline would preclude consideration for the Magnetation project.

Deep Saline Aquifers

There is a suitable deep saline aquifer that underlies most of the state of Indiana, the Mt. Simon Sandstone Aquifer. Reservoirs in the Mt. Simon formation are located between 3,000 and 4,000 feet below the surface. Typically the Indiana Geological Survey considers any formation depth shallower than 2,500 feet below ground surface (bgs) to be a potential risk to overlying aquifers. Already several pilot projects are underway that utilize the Mt. Simon Sandstone Aquifer for carbon sequestration. The location of the Magnetation facility is in relatively close proximity (approximately 100 miles or less) to the regions of the Mt. Simon Sandstone Aquifer that would potentially provide an adequate volume of storage (Indiana CCS, 2008).

There are uncertain risks associated with carbon sequestration into a saline aquifer. One major risk is the possibility of unintended leakage of CO_2 from the storage formation into overlying aquifers. If the aquifers are source of drinking water, there is a possibility that the CO_2 will affect water quality characteristics, possibly posing a threat to water resources (Carbon Capture Journal, 2010). The EPA has published federal requirements under the Safe Drinking Water Act (SDWA) for underground injection of CO_2. Additional risks that are still being researched include: release of CO_2 from the storage location, injection pressure increase or seismic events, geochemical reactions, and displacement of brine or other fluids (NETL, 2012). All of these risks are still under evaluation for the pilot projects listed below and continued evaluation will be necessary for definitive data that the risks of sequestration into saline aquifers are minimal.

Therefore, carbon sequestration into a saline aquifer is not considered technically feasible at this time.

To date, there are several demonstration projects planned to research the possibility of injected CO_2 into a saline aquifer. Many of the projects that are currently underway in the United States are government supported by the Department of Energy (DOE) (Herzog, 2010).[27] Additionally, according to the Indiana Clean Air Task Force, saline aquifers represent the largest potential for carbon sequestration within the state, equating to a potential for 38 billion tons of storage capacity (Thompson, 2008).

[27] Herzog, Howard, "Carbon Dioxide Capture and Storage: A Status Report", McIlvane Company Hot Topic Hour, August 26, 2012.

- *Midwest Geological Sequestration Consortium - Illinois Basin Decatur Project*
  In Decatur, Illinois, a pilot project is underway at the Archer Daniels Midland (ADM) ethanol plant. The ADM demonstration project is for the capture and sequestration of 1 million tons per year of CO_2 in 2011. The CO_2 will be injected into the Mt. Simon Sandstone Aquifer, which is located approximately 1 mile from the plant (NETL, 2010). Currently, the project is in the validation phase. Because this is a full scale pilot test, no results have been reported for this project yet.

- *Midwest Regional Carbon Sequestration Partnership - East Bend Kentucky Project*
  For the validation phase of this project, the Midwest Regional Carbon Sequestration Partnership conducted a geologic field demonstration in the Cincinnati Arch province at Duke Energy's East Bend Generating Station in Rabbit Hash, Kentucky; the project entailed injecting approximately 1,000 tons of CO_2. The injection was into a deep saline reservoir in the area, which included targets in the Mt. Simon Sandstone Aquifer. As is the case in all deep saline injection tests, these reservoirs were located well below drinking water supplies, which are about 100 feet deep in this part of the Cincinnati Arch province. The project team took core samples and conducted reservoir tests in the well. Information from these tests were used to assess the nature and strength of the underground rock and determine the maximum acceptable pressure for injection.

As shown above, carbon sequestration is not considered commercially available at the time of this report. This technology is still undergoing research studies, and there is still work being completed to better understand the risks of sequestration of CO_2 into saline aquifers. For these reasons, carbon sequestration into a saline aquifer is not considered technically feasible for the Magnetation project.

Oil and Gas Reserves

Carbon sequestration into an oil and/or gas reserve is considered technically feasible at this time. The Magnetation facility is located near a mature gas field (Trenton Field) that might be appropriate for sequestration. However, pipeline access for transportation of CO_2 to this field for sequestration is not economically feasible as the western border of the field is approximately 50

miles from the site. the cost to develop a pipeline of this length would be $50-75 million with an annual operating cost of approximately $1 million. The capital cost of completing the pipeline would add 30% to the capital cost of the project, and the added operating cost would add 17% to the annual cost of the proposed project.

The closest oil field has been identified in the county immediately northwest of White County. The Gifford Field is located in east central Jasper County; however, the material produced from this field is a very heavy crude which significantly reduces the porosity of the formation and makes the field an unlikely candidate for carbon sequestration. The Gifford Field is also located at a depth shallower than 2,000 feet bgs, which conflicts with the Indiana Geological Survey's preferred depth for carbon sequestration (Indiana Geological Survey PDMS, 2012). To the east of White County is a mature gas field, the Royal Center Field (located in northwestern Cass County and southwestern Fulton County). The Royal Center Field is underlain by the Mt. Simon Sandstone Aquifer and, because of the Kankakee Arch structural feature, the field would be a potential candidate for carbon sequestration (Medina and Rupp, 2012); however, the field is currently in use as a gas storage formation for natural gas and therefore does not have the capacity to be used for carbon sequestration. Larger oil/gas fields are located approximately 100 miles from the site to the southwest and have been identified as highly viable storage sites for carbon sequestration; however, the use of these fields for carbon sequestration would require the development of a CO_2 pipeline at a cost significantly greater than that discussed above. The cost to construct a pipeline 100 miles long would be up to $150 million with an annual operating and maintenance cost of up to $1.25 million.

Currently there are a number of demonstration projects underway in the United States that are examining sequestration into oil and/or gas reserves. Most of the projects are for enhanced oil recovery (EOR). Below are a few examples.

- *Midwest Geological Sequestration Consortium - Loudon Field Illinois Project*
  This project involves the injection of CO2 into a mature oil field (Loudon Field) in Fayette County, Illinois (NETL, 2010). Like many other pilot carbon sequestration projects, the Loudon Field is located in the Illinois Basin. This EOR test was a small scale test with approximately 43 tons of CO_2 injected into the Mississippian Weiler Sandstone at a depth of approximately 1,550 feet below ground surface (bgs). Results of the test indicated that the 43 tons were injected over a five-day period, which resulted in increased oil production for the subsequent two months. The test did not indicate any leakage of the CO_2 into the surrounding or overlying strata.

- *Midwest Geological Sequestration Consortium - Mumford Hills Field Kentucky Project*
  This EOR project involves the pattern flood injection of CO_2 into a mature oil field at a depth of approximately 1,900 feet bgs (NETL, 2010). The project plan is to sequester approximately 30 tons of CO_2 per day for a period of six to eight months followed by a period of water injection for three to five months. As of January 2010, approximately 3,100 tons had been injected at a rate of between 25 and 30 tons per day. The results of this project will be used to estimate CO_2 injectivity, validate Phase I storage estimates, and identify barriers or risks for commercial CO_2 sequestration.

- *Midwest Geological Sequestration Consortium - Sugar Creek Field*
  This project involves a well conversion EOR test at the Sugar Creek oil field in Hopkins County, Kentucky (NETL, 2010). For a period of six to eight months, up to 8,000 tons of CO_2 will be injected into an existing brine-water injection well at depths of approximately 1,900 feet bgs in a mature oil field. To monitor the fate of the CO_2, a monitoring program has been implemented at the site with technical support from the Kentucky Geological Survey. The program consists of tracking the rate and volume of injected CO_2 and the pressures and temperatures within the well. These measurements provide an indication of how efficiently the CO_2 displaces oil within the reservoir and how efficiently the

reservoir stores the CO_2. Results indicate that the CO_2 injection is displacing the oil and, despite one breakthrough at a monitoring well, no other leakages have been detected.

- *Midwest Regional Carbon Sequestration Partnership - East Bend Kentucky Project*
  The test site is located on a state-owned, military land management area in Otsego County, Michigan. The primary carbon dioxide storage formation is the St. Peter Sandstone at a depth of approximately 7,500 feet bgs, below natural gas and oil producing zones. A secondary storage formation is the Bass Island Dolomite at a depth of approximately 3,500 feet bgs. Two rounds of injection were conducted at the site. This portion of the Michigan Basin is in an area of active EOR projects and natural gas processing plants. The research team was able to test innovative monitoring methods including repeated cross-well seismic tests. A total of 60,000 tons of CO2 was injected into saline formations (known as the Bass Islands Dolomite) in an EOR field operated by Core Energy in the vicinity of a DTE natural gas processing plant.

These results should be reviewed prior to determining whether oilfield sequestration is technically feasible for the Magnetation project.

Un-mineable Coal Seams

Although carbon sequestration into an un-mineable coal seam may be technically feasible soon, less research and investigation of carbon sequestration impacts on un-mineable coal seams are being performed compared to the other sequestration methods. Additionally, there is not access to a pipeline for transportation of CO_2 to a coal seam for sequestration. The closest un-mineable coal seam is in southwest Indiana approximately 100 miles away.

A potential problem with sequestering of CO_2 into un-mineable coal seams and ECBM recovery is coal swelling. When coal adsorbs CO_2, it increases or 'swells' in volume. The swelling can cause a significant decrease in permeability, which in turn restricts the flow of CO_2 into the formation and also may prevent the recovery of coal bed methane. Angled drilling techniques and fracturing are being researched as possibilities reducing the effects of coal swelling.

- *Midwest Geological Sequestration Consortium - Tanquary Field Illinois Project*
  The purpose of the Tanquary Field project is to determine the CO2 injection and capacity and the enhanced coal-bed methane recovery potential for Illinois Basin coal seams (NETL, 2010). This particular field is located in Wabash County, Illinois. The target formation was the Pennsylvanian Carbondale formation at a depth of 900 feet in a 7-foot thick Springfield Coal. To provide reference data for the project, the pre- and post-CO_2 injection coal permeability was estimated using a water pressure transient test. Additionally, swelling and permeability reduction was evaluated by means of three monitoring wells located around the injector well. Approximately 100 tons of CO_2 was injected during the project. Results of the test did not indicate any leakage of the CO_2 into the surrounding groundwater sources.

As shown above, carbon sequestration is no considered to be a fully commercially available technology at the time of this report. This technology is still undergoing research studies, and there is still work being completed to better understand the risks of sequestration of CO_2 into saline aquifers, oil fields, and un-mineable coal seams. For these reasons, carbon sequestration is not yet considered to be a technically feasible control option for the Magnetation project.

<u>Energy Efficiency</u>
Magnetation is taking measures to minimize greenhouse gas emissions by both ensuring high levels of energy and production efficiency for the proposed project. The leading technology in the iron oxide pellet industry is being employed as part of the project. Heat recovery will be utilized in the indurating process in order to minimize fuel usage and separate recuperative heat recovery loops are planned which will maximize heat recovery. Minimizing fuel use minimized GHG

emissions. The Magnetation furnace will have up and down draft drying zones which use recuperative heat from the second pellet cooler for pellet drying. Recuperative heat is also used to preheat pellets in the down draft drying, preheat windbox, and firing sections of the furnace using heat recovered from the first pellet cooler. A portion of the hot air coming off the first pellet cooler will be used as combustion air in the firing section of the furnace. Because the combustion air is hot, less fuel is necessary to heat the combustion air and more of the fuel energy can be directed into the production process. As noted in the NO_x control analysis, the amount of preheated combustion air is limited in order to control NO_x emissions in the low NO_x LE burners. Through these energy efficiency measures, the Magnetation project is expected to achieve thermal consumption levels consistent with a modern, well-designed, energy efficient straight grate furnace.

The Energy Star information on the iron and steel production industrial sector does not include benchmark information on iron oxide pellet production processes. It is difficult to make direct comparisons of energy use between iron ore facilities because there are a number of site-specific factors which affect energy use. These factors include the type of iron-bearing materials (magnetite, hematite, and siderites) in the ore, the amount of fluxing agents added, and the type of fuel used in the furnace; plants of identical design could operate at the low end of the energy use range at one location and at the high end of the range at another location based on differences in these factors.

Another indicator of energy efficiency is the amount of waste heat recovered within the process relative to the total amount of waste heat energy that is feasible to recover. The proposed Magnetation straight grate is designed to recover as much heat as practicable (approximately 65-66%). The temperatures of the hood and windbox exhaust streams are so low that very little recoverable energy is left to be recovered, and there are significant technical hurdles to achieve additional energy recovery. The new straight grate is designed to recover waste heat from two pellet coolers. The exhaust from the first cooler is routed through the furnace pellet preheat and firing zones and then through the downdraft drying zone; air from the first pellet cooler is also used to provide preheated combustion air to the firing zone. The exhaust from the second pellet cooler is used for pellet drying in the updraft pellet drying section.

The straight grate induration furnace proposed by Magnetation was designed as an energy efficient furnace to help minimize GHG emissions associated with fuel combustion. Additionally, Magnetation intends to use good operating methods and procedures to reduce GHG emissions.

Magnetation is proposing to process primarily hematite concentrate. Unlike the processing of magnetite material, which is an exothermic reaction, the processing of hematite ore is an endothermic reaction. Magnetation is proposing to add coke breeze to the hematite concentrate during processing in order to replace the energy that is supplied by magnetite in the exothermic reaction. the addition of coke breeze results in a more uniform heat profile, as opposed to adding heat to the outside of the material being processed from the natural gas burners, resulting in a reduction in overall heat input of up to 30%.

Recuperative Heat Recovery

The proposed Magnetation induration furnace process involves pellet pre-heating, drying, hardening, oxidation, and cooling. Each of these steps is accomplished in different sections of the induration furnace as the grate system moves pellets through the furnace.

Minimization of Heat Loss (Insulation)

Insulation will be used as a way to reduce heat loss from the process and the induration furnace. The effectiveness of insulation depends on a number of different factors. Some of these factors include local climate, quality of insulation, and thermal resistance of the insulation. Magnetation

will use good engineering and design practices to determine the correct placement and design features that will minimize the heat loss from the furnace.

Good Design Practices / Good Operating Practices
Good design includes process and mechanical equipment designs which are either inherently lower polluting or are designed to minimize emissions.

Magnetation intends to use good operating practices and procedures to reduce GHG emissions from fuel combustion in the furnace.

Lower Emitting Processes

GHG Emissions Associated with SO_2 Control Reagents

There are a number of different sorbents that can be used in flue gas desulfurization (FGD) units. Some of these sorbents are limestone, lime, sodium bicarbonate, and sodium hydroxide. These sorbents produce CO_2 when reacted with SO_2 during the FG process. These reactions indicate that the use of limestone and sodium bicarbonate both produce one molecule of direct CO_2 emissions per SO_2 molecule reacted. Neither lime nor sodium hydroxide produce any direct CO_2 emissions and can be considered the best choice for SO_2 sorbents when considering direct GHG emissions from FGD.

GHG Emissions from Iron Oxide Pellet Additives

The addition of limestone and other additives is necessary to produce pellets of the quality required by the customers. Because of these quality requirements on the part of the customer, the above additives are required components of the pellet-making process in the amounts that are proposed to be used in the new induration furnace for the proposed Magnetation project. There are no technically and economically feasible alternatives that would produce fewer GHG emissions.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (GHG)

The control technologies for the induration furnace are ranked as follows:

(1) Energy efficiency measures

(2) Clean fuels

(3) Lower emitting processes - SO_2 removal reagent

As part of the proposed project, Magnetation has considered and is taking measures to reduce the greenhouse gas footprint of the facility and decrease the carbon intensity of production by improving both energy and production efficiency. The project will incorporate the leading technology in the iron ore industry to take advantage of energy and fuel saving opportunities at the furnace, in process flow, and for new grinding capacity. Given current technology, energy efficiency measures are the best method for reducing greenhouse gas emissions. Use of lime as a reagent in the proposed SO_2 control technology eliminates GHG from this source.

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (GHG)

Energy Efficiency Measures
There are no adverse energy, environmental, or economic impacts associated with the implementation of the energy efficiency measures proposed for the Magnetation project. Due to reduced fuel rate requirements associated with the energy efficiency measures, all criteria

pollutant emissions will be reduced. Magnetation is proposing to use coke breeze in the combustion process to reduce the overall energy consumption of the induration furnace.

Clean Fuels

There are a few adverse energy, environmental, or economic impacts associated with fuel selection proposed for the Magnetation project. Magnetation intends to use a combination of natural gas and coke breeze for combustion in the induration furnace. As fuel, natural gas will result in the lowest GHG emissions of the possible fuel options for the induration furnace. However, due to the endothermic nature of the proposed pellet production process, the use of only natural gas will result in an increased energy demand of up to 30%

Fuel Cost Comparison			
Parameter	**Natural Gas Only**	**Natural Gas + Coke Breeze**	**Comments/ Assumptions**
Gross Heat Input (MMBtu/yr)	3,900,000	3,000,000	For NG+CB, net heat input = 1 MMBtu/ton. CB heat transfer is 10-30% more efficient than NG. NG only gross heat input = 1.3*Net.
Combustion GHG (tons/yr)	228,000	287,000	
NG Transportation GHG (tons/yr)	2,800	1,300	Based on 2006 IPCC Guidelines for National GHG Inventories, Volume 2 Chapter 4 - Natural Gas Distribution
CB Transportation GHG (tons/yr)	0	300	Based on 2006 IPCC Guidelines for National GHG Inventories, Volume 2 Chapter 3, Section 4 - Mobile Combustion: Railways
GHG Emissions (tons/yr)	230,800	288,600	
GHG Emissions (ton/mt pellets)	0.077	0.096	
Annual NG cost	$22,253,000	$10,325,000	
Annual CB cost	$0	$2,688,000	
Additional NG (cost/ton of GHG removed)	$200	N/A	
% Additional Operating Cost to Use NG Only	71%		(Annual Operating NG Only - Annual Operating NG+CB) ÷ Annual Operating NG+CB

Heat input information is based on engineering study for Magnetation and other induration furnace pellet plants. Existing plants have demonstrated that using coke breeze or anthracite coal will achieve a 30% reduction in heat input for natural gas. In addition, the furnace size length for a natural gas only furnace of equivalent production rates with a coke breeze/natural gas furnace is significantly large (approximately one-third).

The increase in GHG emissions from the use of coke breeze would by itself not trigger PSD permitting thresholds for either a new site (75,000 tons per year) or an existing site (100,000 tons per year). The use of coke breeze as a fuel results in an increase of approximately 60,000 tons per year of GHG emissions, compared to the use of only natural gas to produce the same volume of iron oxide pellets. However, the additional operating cost related to the increased usage of natural gas is equal to $200 per ton of GHG reduction or approximately $11,900,000 annually, using the 2010 annual average natural gas price for Indiana. Using the ten year Henry Hub average natural gas price of $5.83 per million cubic foot, the annual cost would increase to approximately $12,600,000. The annual operational cost of using only natural gas would be approximately 71% more than the annual cost for using a combination of coke breeze and natural gas. The Interim Phase I Report of the Climate Change Work Group identified a cost effectiveness range of $3 to $150 per ton of GHG reduction as guidance for evaluating BACT control. However, there have been few GHG BACT findings on the cost effectiveness for GHG

controls. In the Hyperion Energy Center BACT determination, a cost effectiveness of $43 per ton of GHG reduction for carbon sequestration was deemed not to be BACT.

The additional cost of natural gas as the sole fuel for the proposed pellet plant combined with the reduced energy efficiency and reduced thermal transfer efficiency of the process makes the use of only natural gas as a clean fuel option economically infeasible at $200 per ton of GHG removed. The annual fuel expense for natural gas alone would make the project less economically viable and would impact the cost of production of iron ore pellets. The additional capital cost to construct a natural gas only furnace or subsequent derating of the production capacity of the pellet furnace that is currently being proposed will only further negatively impact the economic viability of the project.

Lower Emitting Processes - SO_2 Removal Reagent
There are very few adverse energy, environmental, or economic impacts associated with the use of lime as a SO_2 control reagent. Magnetation intends to use lime, which is the lowest emitting GHG reagent.

Magnetation LLC BACT Proposal – Induration Furnace (GHG)

The Permittee has proposed that BACT for the GHG emissions from the induration furnace be as follows:

(1) Implementation of an energy efficient furnace design.

(2) Operation of the furnace at energy use rates consistent with the furnace design.

(3) Use of natural gas as fuel in the induration furnace.

(4) Use of coke breeze to offset the endothermic reaction requirements.

(5) Use of lime as an SO_2 removal reagent.

(6) A limit of 661,208 tpy CO_2e per 12-month rolling sum basis.

The design of the proposed facility meets GHG BACT requirement as follows:

(1) The energy efficiency of the proposed design on energy use on an MMBtu/short ton pellets basis (energy use per unit of production) is consistent with industry benchmarks for state-of-the-art energy efficient straight gates.

(2) The proposed design recovers as much waste heat as practicable (65-66%), and only low temperature waste heat remains in the gases exhausted from the furnace.

Step 5: Select BACT - Induration Furnace (GHG)

A detailed GHG BACT for the induration furnace is given in the BACT Conclusion for GHG.

(b) Combustion Units (GHG)

The following emission units associated with combustion processes are subject to GHG BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (GHG)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (GHG)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these GHG BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for generators only used for emergency purposes.

GHG (Carbon Dioxide Equivalent) BACT Determinations - Emergency Generator					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	CO_2e: Use of natural gas, good combustion practices, 144 tons/yr (12-month rolling total), 500 hours/year	NI	BACT-PSD
Existing GHG (Carbon Dioxide Equivalent) BACT Determinations - Emergency Generators					
Iowa Fertilizer Company: Wever, IA	IA-0105/ 12-219 (10/26/2012)	Emergency Generator - Diesel (2,000 kw)	CO_2e: Good combustion practices, 788.50 tons/yr	NI	BACT-PSD
Pyramax Ceramic, LLC: Rome, GA	GA-0147/ 3295-163-0035-P-01-0 (1/27/2012)	Emergency Generator - Natural Gas (1,818 hp)	CO_2e: 153.00 tons/yr (combined 12-month avg)	NI	BACT-PSD
Westlake Vinyls Company: Geismar, LA	LA-256/ PSD-LA-754 (12/6/2011)	(4) 500 kw Emergency Diesel Generators	CO_2e: Use of natural gas, good combustion practices, 1509.23 lb/hr, 39.24 tons/yr, 52 hours/yr	NI	BACT-PSD
Wolverine Power Supply Cooperative, Inc.: Sumpter, MI	MI-0402/ 81-11 (11/17/2011)	Diesel Fuel-Fired Combustion Engine (732 hp)	CO2e: Good combustion practices, 716.60 lb/hr	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (GHG)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (GHG)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (GHG)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas and the use of good combustion practices. Most facilities express exhaust emission limitations in terms of tons per year of carbon dioxide equivalent.

GHG BACT for the natural gas fired fire pump has been determined to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 144 tons of CO_2e per 12-month period for the proposed generator.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (GHG)

A detailed GHG BACT for the natural gas fired emergency generator is given in the BACT Conclusion for GHG.

(2) Natural Gas Fired Fire Pump (GHG)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (GHG)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these GHG BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps only used for emergency purposes.

GHG (Carbon Dioxide Equivalent) BACT Determinations – Fire Pump					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	CO_2e: Use of natural gas, good combustion practices, 66 tons/yr (12-month rolling total), 500 hours/year	NI	BACT-PSD
Existing GHG (Carbon Dioxide Equivalent) BACT Determinations – Fire Pumps					
Iowa Fertilizer Company: Wever, IA	IA-0105/ 12-219 (10/26/2012)	Fire Pump - Diesel (235 kw)	CO_2e: Good combustion practices, 91.00 tons/yr (12-month rolling total)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (GHG)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (GHG)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (GHG)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired fire pumps is the restricted use of only natural gas and the use of good combustion practices. Most facilities express exhaust emission limitations in terms of tons per year of carbon dioxide equivalent.

GHG BACT for the natural gas fired fire pump has been determined to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 66 tons of CO_2e per 12-month period for the proposed fire pump.

Step 5: Select BACT - Natural Gas Fired Fire Pump (GHG)

A detailed GHG BACT for the natural gas fired fire pump is given in the BACT Conclusion for GHG.

(3) Natural Gas Fired Space Heaters and Air Heaters (GHG)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (GHG)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these GHG BACT determinations as provided by the RBLC. The search was limited to entries from January 2003 to January 2013 for space heaters, air heaters, and process heaters that combust only natural gas.

GHG (Carbon Dioxide Equivalent) BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	CO_2e: Use of natural gas, good combustion practices, 3587 tons/yr (12-month rolling total)	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	CO_2e: Use of natural gas, good combustion practices, 9737 tons/yr (12-month rolling total)	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	CO_2e: Use of natural gas, good combustion practices, 871 tons/yr (12-month rolling total)	NI	BACT-PSD

GHG (Carbon Dioxide Equivalent) BACT Determinations - Heaters Firing Natural Gas					
Facility: City, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Existing GHG (Carbon Dioxide Equivalent) BACT Determinations - Heaters Firing Natural Gas					
Iowa Fertilizer Company: Wever, IA	IA-0105/ 12-219 (10/26/2012)	Startup Heater (110.12 MMBtu/hr)	CO_2e: Good combustion practices, 638.00 tons/yr (12-month rolling total)	NI	BACT-PSD
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	CO_2e: Annual boiler tuneups	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (GHG)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (GHG)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (GHG)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired heaters is the use of good combustion practices. Most facilities express exhaust emission limitations in terms of tons per year of carbon dioxide equivalent.

GHG BACT for the natural gas fired heaters has been determined to be the restricted use of only natural gas, the use of good combustion practices, and appropriate emission limits.

*Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (*GHG*)*

A detailed GHG BACT for natural gas fired heaters is given in the BACT Conclusion for GHG.

<u>BACT Conclusion for GHG</u>

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for GHG emissions shall be as follows:

(a) Induration Furnace

The induration furnace operations shall be limited as follows:

(1) Implementation of an energy efficient furnace design.

(2) Operation of the furnace at energy use rates consistent with the furnace design.

(3) Use of natural gas as fuel in the induration furnace.

(4) Use of coke breeze to offset the endothermic reaction requirements.

(5) Use of lime as an SO_2 removal reagent.

(6) A limit of 661,208 tpy CO_2e per 12-month rolling sum basis.

(b) Combustion Units

The combustion units shall be limited as follows:

(1) GHG emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 144 tons of CO_2e per 12-month period.

(2) GHG emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 66 tons of CO_2e per 12-month period.

(3) GHG emissions from the space heaters (EU021) shall be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 3,587 tons of CO_2e per 12-month period.

(4) GHG emissions from the ground limestone/dolomite additive system air heater (EU010) shall be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 9,737 tons of CO_2e per 12-month period.

(5) GHG emissions from the coke breeze additive system air heater (EU009) shall be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 871 tons of CO_2e per 12-month period.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (BACT) with regards to GHG (as CO_2e).

IDEM Contact

Questions regarding this BACT Analysis can be directed to Kristen Willoughby at the Indiana Department Environmental Management, Office of Air Quality, 100 North Senate Avenue, MC 61-53, Room 1003, Indianapolis, Indiana 46204-2251 or by telephone at (317) 233-3031 or toll free at 1-800-451-6027 extension 3-3031.

Addendum to Appendix D
Air Quality Analysis

Magnetation LLC
Reynolds, Indiana (White County)
Tracking and Plant ID: 181-32081-00054

Proposed Project

Magnetation LLC (Magnetation) first submitted their PSD modeling in October 2012. This was followed by other modeling submittals sent in November and December 2012.

Magnetation proposes to construct and operate an iron oxide pellet production facility at 64 East 100 North, Reynolds, Indiana. Reynolds is located in White County. The proposed project will produce iron oxide pellets from iron concentrate and will be designed to process material sufficient to generate three (3) million metric tons of screened iron oxide pellets per year.

Keramida was the consultant that prepared the modeling portion of the permit application for Magnetation. This technical support document provides the air quality analysis review of the submitted modeling by Keramida for Magnetation.

Analysis Summary

Based on the potential emissions after controls, a PSD air quality analysis was triggered for SO_2, PM_{10}, $PM_{2.5,}$ NO_2, and fluorides. The significant impact analysis for $SO_{2,}$ determined that modeling concentrations did not exceed the significant impact levels for the 3-hour, and annual standards. A refined analysis was required for all the other standards for PM_{10}, $PM_{2.5,}$ NO_2, 24-hour SO_2, and 1-hour SO_2. The refined modeling showed NAAQS violations for 1-hour NO_2 but Magnetation was below significance whenever the violations occurred. Pre-construction monitoring requirements were not necessary since existing monitoring is available and Magnetation was below the monitoring significance levels. An additional impact analysis was conducted and showed no significant impact. A Hazardous Air Pollutant (HAP) analysis was performed since one HAP was above the 10 ton per year threshold.

Air Quality Impact Objectives

The purpose of the air quality impact analysis in the permit application is to accomplish the following objectives. Each objective is individually addressed in this document in each section outlined below.

A. Establish which pollutants require an air quality analysis based on PSD significant emission rates.

B. Provide analyses of actual stack heights with respect to Good Engineering Practice (GEP), the meteorological data used, a description of the model used in the analysis, and the receptor grid utilized for the analyses.

C. Determine the significant impact level, the area impacted by the source's emissions, and background air quality levels.

D. Demonstrate that the source will not cause or contribute to a violation of the National

Ambient Air Quality Standard (NAAQS) or PSD increment if the applicant exceeds significant impact levels.

E. Perform a secondary ozone analysis if the applicant is major for NO_2 and/or VOCs.

F. Perform a secondary $PM_{2.5}$ analysis if the applicant is major for NO_2 and SO_2.

G. Perform a qualitative analysis of the source's impact on general growth, soils, vegetation, and visibility in the impact area with emphasis on any Class I areas. The nearest Class I area is Kentucky's Mammoth Cave National Park.

H. Perform a HAP screening for informational purposes.

I. Summarize the Air Quality Analysis.

Section A - Pollutants Analyzed for Air Quality Impact

Applicability

The PSD requirements, 326 IAC 2-2, apply in attainment and unclassifiable areas and require an air quality impact analysis of each regulated pollutant emitted in significant amounts by a major stationary source or modification. Significant emission levels for each pollutant are defined in 326 IAC 2-2-1 and in the Code of Federal Regulations (CFR) 52.21(b)(23)(i).

Proposed Project Emissions

PM_{10}, $PM_{2.5,}$ NO_2, SO_2, CO, and fluorides are the main pollutants that will be emitted from Magnetation and are summarized below in Table 1. PM_{10}, $PM_{2.5,}$ NO_2, SO_2, and fluorides potential emissions after controls exceed the PSD significant emission rates and require an air quality analysis.

TABLE 1
Significant Emission Rates for PSD

POLLUTANT	**SOURCE EMISSION RATE** (Facility totals in tons/year)	**SIGNIFICANT EMISSION RATE** (tons/year)	**PRELIMINARY AQ ANALYSIS REQUIRED**
NO_2	491.7	40	Yes
CO	50.5	100	No
PM_{10}	214.3	10	Yes
$PM_{2.5}$	214.0	40	Yes
SO_2	361.3	40	Yes
Fluorides	61.3	3	Yes

Magnetation's emission rates were taken from Table 1 of their application.

Section B – Good Engineering Practice (GEP), Met Data, Model Used, Receptor

Grid and Terrain

Stack Height Compliance with Good Engineering Practice (GEP)

Applicability

Stacks should comply with GEP requirements established in 326 IAC 1-7-4. If stacks are lower than GEP, excessive ambient concentrations due to aerodynamic downwash may occur. Dispersion modeling credit for stacks taller than 65 meters (213 feet) is limited to GEP for the purpose of establishing emission limitations. The GEP stack height takes into account the distance and dimensions of nearby structures, which affects the downwind wake of the stack. The downwind wake is considered to extend five times the lesser of the structure's height or width. A GEP stack height is determined for each nearby structure by the following formula:

$$Hg = H + 1.5L$$

Where: Hg is the GEP stack height
H is the structure height
L is the structure's lesser dimension (height or width)

New Stacks

Since some of the new stack heights for Magnetation are below GEP stack height, the effect of aerodynamic downwash is accounted for in the air quality analysis for the project.

Meteorological Data

The National Weather Service (NWS) 1-minute Automated Surface Observation Station (ASOS) meteorological data used in AERMOD consisted of 2006 through 2010 surface data from South Bend, Indiana and upper air measurements taken at Lincoln, Illinois. The meteorological data was preprocessed using the latest versions of AERMINUTE, AERSURFACE, and AERMET at that time the permit was prepared.

Model Description

Keramida used AERMOD Version 12060. The Office of Air Quality (OAQ) used the same model version in their air quality analysis review to determine maximum off-property concentrations or impacts for each pollutant. All regulatory default options were utilized in the U.S. EPA approved model, as listed in the 40 Code of Federal Register Part 51, Appendix W “Guideline on Air Quality Models”.

Receptor Grid

OAQ modeling used the same receptor grids generated by Keramida. The receptor grid is outlined below to determine the significant impact area for each pollutant:

- 100 meter spacing along the facility’s property boundary,
- 100 meter spacing out to 1 kilometers,
- 250 meters spacing out to 3 kilometers.
- 500 meters spacing out to 10 kilometers.
- 1000 meters spacing out to 50 kilometers.

NAAQs and increment modeling used a subset of these receptors depending upon the extent of each pollutants significant impact area.

Treatment of Terrain

Receptor terrain elevation inputs were interpolated from NED (National Elevation Dataset) data obtained from the USGS. NED terrain data was preprocessed using AERMAP.

Section C - Significant Impact Level/Area (SIA) and Background Air Quality Levels

A significant impact analysis was conducted to determine if the source would exceed the PSD significant impact levels (concentrations). If the source's concentrations exceed these levels, further air quality analysis is required. Refined modeling for $PM_{2.5}$, PM_{10}, 24-hour SO_2, 1-hour SO_2, and NO_2, was required because the results did exceed significant impact levels. Keramida modeled the worst case operating scenario to predict maximum concentrations. Significant impact levels are defined by the following time periods in Table 2 below with all maximum-modeled concentrations from the worst case operating scenario. A Tier II 80% conversion of NO to NO_2 was assumed based on the March 01, 2011, Tyler Fox memorandum.

TABLE 2
Significant Impact Analysis[4]

POLLUTANT	TIME AVERAGING PERIOD	MAXIMUM MODELED IMPACTS (µg/m³)	SIGNIFICANT IMPACT LEVEL (µg/m³)	REFINED AQ ANALYSIS REQUIRED
NO_2	Annual[1]	1.58[5]	1	Yes
NO_2	1 hour[2]	33.8[5]	7.55	Yes
PM_{10}	Annual[1]	3.13	1	Yes
PM_{10}	24 hour[1]	14.51	5	Yes
$PM_{2.5}$	Annual[3]	1.24	.3	Yes
$PM_{2.5}$	24 hour[3]	5.89	1.2	Yes
SO_2	3 hour[1]	15.47	25	No
SO_2	24 hour[1]	8.38	5	Yes
SO_2	Annual[1]	.4	1	No
SO_2	1 hour[2]	13.55	7.80	Yes
Fluorides	24 hour[1]	1.79	N/A[6]	No

[1] The first highest values per the EPA NSR manual dated October 1990.
[2] In accordance with recent U.S. EPA guidance, the highest of the five year modeled averages predicted each year at each receptor. See the March 01, 2011, memorandum.
[3] In accordance with recent U.S. EPA guidance, the highest modeled average over the five years at each receptor. See the March 23, 2010, memorandum.
[4] Impacts are from Magnetation only.
[5] NO_2 values were multiplied by .8.
[6] There is no significant impact level for fluorides. This value exceeds the monitoring threshold of .25 µg/m³ as stated in 326 IAC 2-2-4. There is no way to monitor for fluorides and no standard to monitor against.

Pre-construction Monitoring Analysis

Applicability

The PSD rule, 326 IAC 2-2-4, requires an air quality analysis of the new source or the major modification to determine if the pre-construction monitoring threshold is triggered. In most cases, monitoring data taken from a similar geographic location can satisfy this requirement if the pre-construction monitoring threshold has been exceeded. Also, post construction monitoring could be required if the air quality in that area could be adversely impacted by applicant's emissions.

Modeling Results

The modeling results were compared to the PSD preconstruction monitoring thresholds. The results are shown in the table below.

TABLE 3
Preconstruction Monitoring Analysis

POLLUTANT	TIME AVERAGING PERIOD	MAXIMUM MODELED IMPACTS (µg/m^3)	DEMINIMIS LEVEL (µg/m3)	ABOVE DE MINIMIS LEVEL
NO_2	Annual[1]	1.58	14	No
PM_{10}	24 hour[1]	14.51	10	Yes
$PM_{2.5}$	24 hour[2]	5.89	4	Yes
SO_2	24 hour[1]	8.38	13	No

[1] The first highest values per the EPA NSR manual dated October 1990. Maximum modeled impacts are from Magnetation only.
[2] In accordance with recent U.S. EPA guidance, the highest average over the five years at each receptor. See the March 23, 2010, memorandums from EPA.

PM_{10} and $PM_{2.5}$ did trigger the preconstruction monitoring threshold level. Magnetation can satisfy the preconstruction monitoring requirement since there is air quality monitoring data representative of the area in other counties.

Background Concentrations

Applicability

EPA's "Ambient Monitoring Guidelines for Prevention of Significant Deterioration" (EPA-450/4-87-007) Section 2.4.1 is cited for approval of the monitoring sites chosen for this area.

Background Monitors

Background data was taken from representative monitoring stations for Magnetation. The background design value was used for $PM_{2.5}$. It was agreed between Magnetation and OAQ that this approach could be taken in place of the preconstruction monitoring requirement.

TABLE 4
Existing Monitoring Data Used For Background Concentrations (ug/m^3)

Pollutant	Averaging Period	Location	Monitoring Site	Monitored Design Values
NO_2	Annual	St. Joseph County - South Bend	18-141-0015	20.9
NO_2	1 hour	St. Joseph County - South Bend	18-141-0015	69.6
PM_{10}	Annual	Porter County - Portage	18-127-0023	20.9
PM_{10}	24 hour	Porter County - Portage	18-127-0023	61.6
$PM_{2.5}$	Annual	Tippecanoe County - Lafayette	18-157-0008	11
$PM_{2.5}$	24 hour	Tippecanoe County - Lafayette	18-157-0008	24
SO_2	1 hour	Lima, Ohio[1]	33-003-0009	47.9
SO_2	3 hour	Lima, Ohio[1]	33-003-0009	36.8
SO_2	24 hour	Lima, Ohio[1]	33-003-0009	17.0
SO_2	Annual	Lima, Ohio[1]	33-003-0009	4.9

[1] EPA approved the use of the Lima, Ohio monitor with the Synergy application. This is more representative of a rural location.
*$PM_{2.5}$ used the design value.

Section D - NAAQS and PSD Increment

OAQ supplied emission inventories of all point sources in Indiana within a 50-kilometer radius of Magnetation. The NAAQS inventories are generated from EMITS (Emission Inventory Tracking System) in accordance with 326 IAC 2-6. The PSD increment inventories include sources that affect the increment and are compiled from permits issued by OAQ. All sources with the potential to cause a significant impact in the vicinity of the proposed facility were explicitly included in the modeling.

NAAQS Compliance Analysis and Results

NAAQs modeling for the appropriate time-averaging periods for NO_2, PM_{10}, $PM_{2.5}$, and SO_2 was conducted and compared to the respective NAAQs limit. OAQ modeling results are shown in Table 5. All maximum-modeled concentrations were compared to the respective NAAQS limit. Not all maximum-

modeled concentrations during the five years were below the NAAQS limits and further modeling was required.

TABLE 5[3]
NAAQS Analysis

Pollutant	Year	Time-Averaging Period	Maximum Concentration ug/m3	Background Concentration ug/m3	Total ug/m3	NAAQS Limit ug/m3	NAAQS Violation
NO_2	2010	Annual[1]	1.58	20.9	22.48	100	No
NO_2	2006-2010	1 hour[4]	132.74	69.6	202.34	188.68	Yes
PM_{10}	2010	Annual[1]	3.13	20.9	28.43	50	No
PM_{10}	2006-2010	24 hour[3]	13.02	61.6	74.62	150	No
$PM_{2.5}$	2006-2010	Annual	1.24	11	12.24	15	No
$PM_{2.5}$	2006-2010	24 hour	5.89	24	29.89	35	No
SO_2	2006-2010	1 hour[5]	81.06	47.9	128.96	195.0	No
SO_2	n/a	3 Hour[2]	Not Required	36.8	n/a	1300	No
SO_2	n/a	24 hour[2]	5.86	17.0	22.86	365	No
SO_2	n/a	Annual[1]	Not Required	4.9	n/a	80	No

[1] First highest values per EPA NSR manual October 1990.
[2] High 2nd high values per EPA NSR manual October 1990.
[3] High 6th High
[4] Any differences between the maximum concentration numbers in Tables 5 and 6 are due to different sources used for the NAAQS and the increment inventories. Table 3 maximum concentrations are from Magnetation only.
[5] Based on the new 1-hour design values.

Further modeling was conducted to determine if Magnetation was culpable during a NAAQs violation. The results are shown in Table 5a.

Table 5a[1]
1-Hour Culpability Analysis for NO_2

Highest Predicted 1-hour NO_2 Concentration from Cumulative Analysis ($\mu g/m^3$)						
Maximum Modeled Concentration Magnetation + Inventory Sources	Background Design Value	Concentration (modeled + background)	Contribution from Modeled Nearby Sources to Total	Contribution from Modeled Magnetation to Total	Is the Total Concentration ≥ NAAQS of 188.679 µg/m3?	Is the Magnetation contribution ≥ SIL of 7.55 µg/m3?
132.74	69.6	**202.34**	132.734	**0.0016**	Yes	**No**

[1]This follows the recent U.S. EPA guidance in the March 23, 2010, memorandum on page 8 which explains how to determine significant contributions to modeled violations.

Even though the model predicts a NAAQS violation, Magnetation was not significant at the same receptor and time period. Therefore, Magnetation does not cause or contribute to a violation of the NAAQS. Magnetation's highest contribution is 0.00572 μ/m^3 during a NAAQs violation and is well below the significant impact level (SIL). This concentration does not contribute to any violation of the standard.

Every receptor over the standard was evaluated below the maximum modeled concentration until there was no longer a NAAQS violation and showed Magnetation was below significance and did not cause or contribute to a violation of the NAAQS. Also, Magnetation's modeled concentrations above the SIL occur when there are no NAAQs violations present.

Analysis and Results of Source Impact on the PSD Increment

Applicability

Maximum allowable increases (PSD increments) are established by 326 IAC 2-2-6. This rule also limits a source to no more than 80 percent of the available PSD increment to allow for future growth.

Source Impact

Since Magnetation impacts for $PM_{2.5}$, PM_{10}, SO_2, and NO_2 modeled greater than or equal to significant impact levels, a PSD increment analysis for Magnetation was required. Because $PM_{2.5}$ increment values were established in 2010 and the PM_{10} surrogacy policy was removed, the baseline date for the increment is within the last few years. The 1-hour SO_2 and NO_2 have no increment standards.

Results of the increment modeling are summarized in Table 6 below.

TABLE 6[1]
Increment Analysis

Pollutant	Year	Time-Averaging Period	Maximum Concentration µg/m3	PSD Increment µg/m3	Percent Impact on the PSD Increment	Increment Violation
$PM_{2.5}$	2007	24-hour[2]	5.86	9	65.1%	No
$PM_{2.5}$	2010	Annual[3]	1.33	4	33.3%	No
PM_{10}	2009	24-hour	13.79	30	46%	No
PM_{10}	2010	Annual	3.13	17	18.4%	No
NO_2	2010	Annual	1.58	25	39.5%	No
SO_2	2009	24-hour[2]	5.86	91	6.4%	No

[1]Any differences between the maximum concentration numbers in Tables 5 and 6 are due to different sources used for the NAAQS and the increment inventories, and different averaging techniques to obtain maximum concentrations. Tables 3 and 6 maximum concentrations are from Magnetation only.
[2]In accordance with the Federal Register dated October 20, 2010; the high 2nd high is used.
[3]In accordance with the Federal Register dated October 20, 2010; the highest annual average is used from any of the years modeled.

The results of the increment analysis show all pollutants for all averaging periods were below 80% of the available increment. No further analysis is required.

Part E - Secondary Ozone Formation Analysis

Because of the well established relationship between nitrogen oxides (NO_x), volatile organic compounds (VOCs), and the regional transport formation of ozone, U.S. EPA recently finalized the Cross State Air Pollution Rule (CSAPR) to assist states to meet the ozone NAAQS. This rule included extensive modeling to support the emissions reductions necessary in each state to achieve the ozone NAAQS in the eastern U.S. The source category responsible for these reductions is Electric Generating Units (EGUs). While the U.S. Court of Appeals for the D.C. Circuit issued a decision vacating CSAPR on August 21, 2012, the modeling analysis conducted by U.S. EPA is considered valid and will be used for the ozone analysis.

U.S. EPA used a regional model, Comprehensive Air Quality Model with extensions (CAMx), and the Air Quality Assessment Tool (AQAT) to determine levels of reduction from EGUs necessary to achieve the NAAQS at every site. The documentation includes extensive tables showing impacts at all ozone monitors in the eastern U.S. and emission reduction levels necessary to achieve those results. To examine the possible impact of Magnetation, results from the modeling U.S. EPA conducted to establish the 2012 and 2014 base case emissions in CSAPR were used for this analysis. The CSAPR website is located at http://www.epa.gov/crossstaterule/techinfo.html.

Information regarding the NO_x emissions modeled for CSAPR can be found in the "EmissionsSummaries.xlsx" spreadsheet under the Emissions Inventory Final Rule TSD section at EPA's CSAPR website for technical information http://www.epa.gov/crossstaterule/techinfo.html. The spreadsheet shows the base case annual NO_x emissions for Indiana by 2012 at 455,325 tons and base case annual NO_x emissions by 2014 at 431,342 tons. Indiana's total NO_x emission reduction between these scenarios totals 23,983 tons. All surrounding states make similar significant reductions. Magnetation' proposed emissions would be 491.7 tons per year of NO_x.

8-Hour Ozone Modeling Results

The nearest ozone monitor to Magnetation is the Flora ozone monitor in Carroll County. The current design value for 2010-2012 is 71 parts per billion (ppb), below the 8-hour NAAQS of 75 ppb. The maximum modeled 8-hour ozone concentration for Carroll County is 67.3 ppb for the 2012 base case and 65.7 ppb for the 2014 base case. This is a decrease of 1.6 ppb as a result of NO_x emission adjustments between 2012 and 2014 base case emission calculations, based on emission growth factors. In order for this modeled 8-hour ozone concentration reduction to occur, Indiana's 2014 NO_x emissions were reduced from the 2012 base case emissions by 23,983 tons. The Carroll County monitoring site is not necessarily impacted by every EGU in Indiana, but in the surrounding states, thousands of tons of annual NO_x emission reductions are projected to occur by 2014, many of which would impact this site. Therefore, to estimate the impact of Magnetation on modeled concentrations, the ratio of Magnetation's NO_x emissions to Indiana's 2012 to 2014 base case NO_x emission reduction was calculated. This ratio was then compared to the modeled ozone impact from the difference between the CSAPR 2012 and 2014 base case modeling results.

1) **491.7 tons** Magnetation NO_x emissions / **23,983 tons** of Indiana's NO_x base case emissions reduced from 2012 to 2014 = **2.05%** ratio of Magnetation's NOx compared to Indiana's NOx emissions

2) **1.6 ppb** maximum 8-hour 2012 to 2014 Base Case modeled results for Carroll County * **2.05%** Magnetation emission ratio = **0.033 ppb** of Magnetation 8-hour ozone impact

3) **0.033 ppb** of Magnetation 8-hour ozone impact / **65.7 ppb** at Carroll County ozone monitor from 2014 base case maximum modeled results = **0.05%** Magnetation's impact on the 2014 base case modeled concentration.

Tables are located in CSAPR_AQModeling.pdf, Appendix B, pages B-10 and B-12, for 8-hour ozone design values that show the base case 2012 ozone concentrations at surrounding monitoring sites versus projected base case 2014 ozone concentrations. 2012 Base Case represents modeled results taken from the 2012 and 2014 Base Case emissions, represents the 2014 Base emissions with emission adjustments from growth factors factored into the modeling. Table 7 below shows the CSAPR modeling results for the Carroll County monitor and the potential impact from Magnetation.

Table 7
EPA's Cross-State Air Pollution Rule - 8-Hour Ozone Modeling Results

Monitor ID	County	2012 Base (ppb)	2014 Base (ppb)	2012 - 2014 Base (ppb)	Anticipated Source Impact (ppb)	Source Impact on 2014 Base Results (%)
180150002	Carroll	67.3	65.7	1.6	0.033	0.05%

Summary of Ozone Results

Magnetation's NO_x emissions were compared with U.S. EPA CSAPR modeling for 8-hour ozone to determine what impacts may occur as a result of ozone formation. When Magnetation emissions were compared with the amount of NO_x emission reductions realized from emission estimates associated with base case emissions for CSAPR and compared with CSAPR modeling results for 8-hour ozone, the impacts from Magnetation on the Carroll County ozone monitor are anticipated to be minimal and will not have a significant impact on the attainment status of Carroll County.

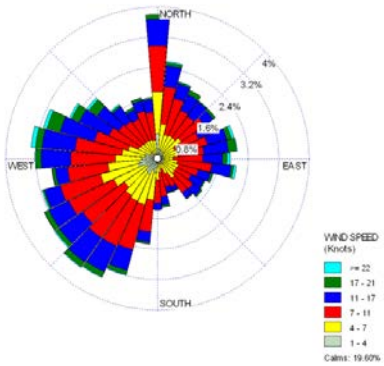
Part F - Secondary $PM_{2.5}$ formation Analysis

In addition to direct emissions of $PM_{2.5}$; other pollutants, chiefly NO_x and SO_2, can lead to formation of $PM_{2.5}$ further downwind. The photochemical reactions that transform these pollutants into particulate nitrates and sulfates, which become the major species of $PM_{2.5}$, take place over hours or days. Dispersion modeling for these two primary pollutants shows that concentrations are below Significant Impact Levels (SIL) for their respective NAAQS and further diminish within the modeling domain of 50 km. Since the NO_x and SO_2 standards are extremely restrictive, being below the SILs would likely prevent the pollutants from impacting secondary formation significantly enough to result in a violation of the $PM_{2.5}$ standards.

However, it is possible that some transformation into nitrates and sulfates from this source may occur and be transported downwind. No peer-reviewed regulatory model presently exists to examine the photochemical impacts of an individual source of SO_2 and NO_x. All photochemical models are regional scale and a source of this size would not show any measurable impact. Therefore, other available information from emissions inventories, meteorological analyses, and other modeling projects can be used to estimate the impact from this source.

The 2011 wind rose taken from the Purdue Airport in West Lafayette shows the winds typically blow from the southwest and west.

West Lafayette 2011



The 2009 – 2011 annual $PM_{2.5}$ design value at the Tippecanoe County $PM_{2.5}$ monitor is 11.0 µg/m^3, well below the annual $PM_{2.5}$ NAAQS of 15.0 0 µg/m3. The 2009 – 2011 24-hour $PM_{2.5}$ design value at the Tippecanoe County $PM_{2.5}$ monitor is 24.0 µg/m^3, below the 24-hour $PM_{2.5}$ NAAQS of 35.0 µg/m$^{3.}$

Secondary $PM_{2.5}$ Weight of Evidence Analysis based on EPA's CSAPR Modeling

Because of the well established relationship between NO_x and SO_2, and the regional transport and formation of $PM_{2.5}$, U.S. EPA recently finalized the Cross State Air Pollution Rule (CSAPR) to assist states to meet the $PM_{2.5}$ NAAQS. This rule included extensive modeling to support the emissions reductions necessary in each state to achieve the $PM_{2.5}$ NAAQS in the eastern U.S. The source category responsible for these reductions is Electric Generating Units (EGUs). While the U.S. Court of Appeals for the D.C. Circuit issued a decision vacating CSAPR on August 21, 2012, the modeling analysis conducted by U.S. EPA is considered valid and will be used for the secondary $PM_{2.5}$ analysis.

U.S. EPA used a regional model, Comprehensive Air Quality Model with extensions (CAMx), and the Air Quality Assessment Tool (AQAT) to determine levels of reduction from EGUs necessary to achieve the NAAQS at every site. The documentation includes extensive tables showing impacts at all $PM_{2.5}$ monitoring sites in the eastern U.S. and emission reduction levels necessary to achieve those results. To examine the possible impact of Magnetation, results from the modeling U.S. EPA conducted to establish the final 2014 budgets in CSAPR were used for this analysis. The CSAPR website is located at http://www.epa.gov/crossstaterule/techinfo.html.

Information regarding SO_2 and NO_x emission reductions necessary to achieve the future year modeled design values can be found in the "EmissionsSummaries.xlsx" spreadsheet under the Emissions Inventory Final Rule TSD section at EPA's CSPAR website for technical information : http://www.epa.gov/crossstaterule/techinfo.html. The spreadsheet shows the base case annual SO_2 and NO_x emissions for Indiana in 2012 and 2014. Indiana's total SO_2 and NO_x emission reductions between these two base case scenarios are 89,222 tons, summarized in Table 10 below. All surrounding states make similar significant reductions. Potentials to emit after controls for Magnetation are 491.7 tons per year of NO_x and 361.3 tons per year of SO_2.

Table 8
EPA's Cross-State Air Pollution Rule Emission Summary for Indiana

	Pollutant	2012 Base Case Emissions (tons/year)	2014 Base Case Emissions (tons/year)	2012-2014 Difference (tons/year)
Indiana	SO_2	929,162	863,923	65,239
Indiana	NO_x	455,325	431,342	23,983
TOTAL				**89,222**

Annual $PM_{2.5}$ Modeling Results

The maximum annual $PM_{2.5}$ modeled concentration for Tippecanoe County is 12.87 µg/m^3 for the 2012 base case and 12.42 µg/m^3 for the 2014 base case results. This is a decrease of 0.45 µg/m^3. Indiana's 2014 SO_2 emissions from EGUs were adjusted by 65,239 tons from the 2012 base case emissions and 2014 NO_x emissions were reduced by 23,983 for a total of 89,222 tons of SO_2 and NO_x. This particular monitoring site is not necessarily impacted by every EGU in Indiana, but in the surrounding states, hundreds of thousands of tons of annual SO_2 and NO_x emission reductions would occur by 2014, many of which would impact the Tippecanoe County monitor. Therefore, to estimate the impact of Magnetation on modeled concentrations, the ratio of Magnetation's SO_2 and NO_x emissions to Indiana's SO_2 and NO_x decreases from 2012 and 2014 base case CSAPR emissions was calculated. This ratio was then compared to the modeled annual $PM_{2.5}$ impact from the difference between the CSAPR 2012 and 2014 base case annual $PM_{2.5}$ modeling results.

1) **853 tons** Magnetation's SO_2 and NO_x emissions / **89,222** tons of SO_2 and NO_x emissions reduced through CSAPR modeling = 0.956%

2) **0.45 µg/m^3** modeled annual $PM_{2.5}$ CSAPR results * **0.956%** Magnetation SO_2/NOx emission ratio = **0.0043 µg/m^3** of Magnetation annual $PM_{2.5}$ impact

3) **0.0043 µg/m^3** Magnetation's annual $PM_{2.5}$ impact /**12.42 µg/m^3** of 2014 Base Case annual $PM_{2.5}$ modeled results = **0.035%** Magnetation's impact on the 2014 modeled Base Case annual $PM_{2.5}$ results.

Tables showing projected base case 2014 $PM_{2.5}$ concentrations at existing monitoring sites versus control strategy $PM_{2.5}$ concentrations are located in CSAPR_AQModeling.pdf, Appendix B, pages B-41 and B-42 for annual design values and pages B-70 to B-72 for 24-hour design values. The 2014 Base represents anticipated 2014 emissions. The 2014 Remedy represents the 2014 Base emissions with emission reductions from CSAPR factored into the modeling. Table 9 below shows the CSAPR annual $PM_{2.5}$ modeled concentrations at the Tippecanoe County ozone monitors and Magnetation anticipated impacts.

Table 9
EPA's Cross-State Air Pollution Rule - Annual $PM_{2.5}$ Modeling Results

Monitor ID	County	2012 Base	2014 Base	2012 - 2014 Base (µg/m^3)	Anticipated Source Impact (µg/m^3)	Source Impact on 2014 Base Case Results (%)
181570008	Tippecanoe	12.87	12.42	0.45	0.0043	0.035%

24-Hour $PM_{2.5}$ Modeling Results

The same emissions and impact analysis methodology used for the annual $PM_{2.5}$ impacts were used to determine the 24-hour $PM_{2.5}$ impacts from Magnetation. The maximum 24-hour modeled concentrations for Tippecanoe County are 33.9 µg/m^3 for the 2012 base case and 32.1 µg/m^3 for the 2014 base case. This is a reduction of modeled concentration of 1.8 µg/m^3. To estimate the 24-hour impact of Magnetation on modeled concentrations, the ratio of Magnetation SO_2 and NO_x emissions and the CSAPR SO_2 and NO_x emission reductions was calculated. This ratio was then compared to the modeled 24-hour $PM_{2.5}$ impact from the difference between the CSAPR 2012 and 2014 base case 24-hour $PM_{2.5}$ modeling results.

1) **853 tons** Magnetation SO_2 and NO_x emissions / **89,222 tons** of SO_2 and NO_x emissions reduced through CSAPR modeling = **0.956%**

2) **1.8 µg/m^3** modeled 24-hour $PM_{2.5}$ CSAPR results * **0.956%** Magnetation SO_2/NOx emission ratio = **0.0172 µg/m^3** of Magnetation 24-hour $PM_{2.5}$ impact

3) **0.0172 µg/m^3** Magnetation 24-hour $PM_{2.5}$ impact /**32.1 µg/m^3** of 2014 Base Case 24-hour $PM_{2.5}$ modeled results = **0.054%** Magnetation's impact on the 2014 modeled Base Case 24-hour $PM_{2.5}$ concentration.

Modeling results below in Table 10 show 2012 and 2014 Base Case modeled 24-hour concentrations and the anticipated Magnetation impacts, based on the emissions comparison and estimated impacts.

Table 10
EPA's Cross-State Air Pollution Rule - 24-Hour $PM_{2.5}$ Modeling Results

Monitor ID	County	2012 Base	2014 Base	2012 - 2014 Base (µg/m^3)	Anticipated Source Impact (µg/m^3)	Source Impact on 2014 Base Case Results (%)
181570008	Tippecanoe	33.9	32.1	1.8	0.0172	0.054%

Summary Annual and 24-Hour $PM_{2.5}$

Magnetation's SO_2 and NO_x emissions were compared with U.S. EPA CSAPR modeling for annual and 24-hour $PM_{2.5}$ to determine what impacts on $PM_{2.5}$ may occur as a result of secondary $PM_{2.5}$ formation. When the Magnetation emissions are compared with the amount of SO_2 and NO_x emission reductions realized from the CSAPR modeling analysis and compared with CSAPR modeling results for annual and 24-hour, the impacts from Magnetation on the nearest $PM_{2.5}$ monitor is anticipated to be minimal and will not have an effect on the attainment status of any $PM_{2.5}$ monitors in the area.

Part G – Qualitative Analysis

Additional Impact Analysis

All PSD permit applicants must prepare an additional impact analysis for each pollutant subject to regulation under the Act. This analysis assesses the impacts on growth, soils and vegetation, endangered species, and visibility caused by any increase in emissions of any regulated pollutant from the source. The Magnetation modeling submittal provided an additional impact analysis performed by Keramida.

Economic Growth

The purpose of the growth analysis is to quantify project associated growth and estimate the air quality impacts from this growth either quantitatively or qualitatively.

It is estimated that approximately 100 to 120 additional jobs will be created as a result of the proposed project. Most of the employees will be drawn from surrounding areas. Since the area is predominately rural, it is not expected the growth impacts will cause a violation of the NAAQS or the PSD increment.

Soils and Vegetation Analysis

A list of soil types present in the general area was determined. Soil types include the following: Loamy Glacial Till, Moderate Thick Loess over Loamy Glacial Till and Thin Loess over Loamy Glacial Till.

Due to the agricultural nature of the land, crops in the White County area consist mainly of corn, sorghum, wheat, soybeans, and oats (2002 Agricultural Census for White County). The maximum modeled concentrations for Magnetation are well below the threshold limits necessary to have adverse impacts on the surrounding vegetation such as autumn bent, nimblewill, barnyard grass, bishops cap and horsetail, and milkweed (Flora of Indiana – Charles Deam). Livestock in White County consist mainly of hogs, cattle, and sheep (2002 Agricultural Census for White County) and will not be adversely impacted from the facility. Trees in the area are mainly hardwoods. These are hardy trees and no significant adverse impacts are expected due to modeled concentrations.

Federal and State Endangered Species Analysis

Federal and state endangered are listed by the U.S. Fish and Wildlife Service; Division of Endangered Species for Indiana. For White County this includes 8 mollusks, 4 reptiles, 8 birds, and 1 mammal which have habitat within the county. The mollusks, certain species of birds and mammals are found along rivers and lakes, while the other species of birds and mammals are found in forested areas. The facility is not expected to have any additional adverse effects on the habitats of the species than what has already occurred from the industrial, farming, and residential activities in the area.

Federal and state endangered plants are listed by the U.S. Fish and Wildlife Service, Division of Endangered Species for Indiana. At this time 5 state endangered plant species are found in White County. The endangered plants do not thrive in industrialized and residential areas. The facility is not expected to adversely affect any plant on the endangered species list.

Visibility Analysis

The Federal Class I areas include national parks and national wilderness areas and are considered environments for which minimal air quality degradation is allowed.

The nearest Class 1 area to Magnetation is Mammoth Cave National Park which is approximately 395 km from the plant. Pursuant to a new federal guidance document (Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase 1 Report – Revised November 2010), the Magnetation facility would not be required to conduct a Class 1 area analysis since the combined emissions of visibility impairing pollutants are less the screening threshold. The threshold is calculated by dividing the emissions by distance for sources more than 50 km from a Class 1 area. If the number is less than 10 then a visibility analysis is not required. Magnetation did not exceed that threshold.

A local visibility analysis was performed using VISCREEN. VISCREEN is designed to calculate two visual effect parameters for a plume as observed from a given vantage point:

1. The color difference parameter (Delta-E) was develop to specify the perceived magnitude of color and brightness changes and is used as the primary basis for determining the perceptibility of plume visual impacts in the screening analysis. The screening threshold is 2.0.
2. Plume (green) contrast is part of the light spectrum measured in wavelengths. The separation of visible light into different colors is known as dispersion. Green is in the middle of wavelength of light. The screening threshold for plume contrast is .55 micrometers or .05.

The primary visibility impairment pollutants are PM_{10}, SO_2, and NO_x. Proposed potential emissions of these pollutants from Magnetation were examined for source contribution to visibility impairment.

The modeling results show that neither of the above thresholds was exceeded. Therefore, Magnetation will not contribute to visibility impairment at the local level, which is at White County airport and Interstate 65.

Additional Analysis Conclusions

Finally, the results of the additional impact analysis conclude the operation of the facility will have no significant impact on economic growth, soils, vegetation, or visibility in the immediate vicinity or on any Class I area.

Part H – HAPs Analysis

OAQ currently requests data concerning the emission of 189 HAPs listed in the 1990 Clean Air Act Amendments (CAAA) that are either carcinogenic or otherwise considered toxic and may be used by industries in the State of Indiana. These substances are listed as air toxic compounds on the State of Indiana, Department of Environmental Management, Office of Air Quality's construction permit application Form GSD-08.

The single HAP with the highest emissions is hydrofluoric acid with estimated annual emissions greater than 10 tons per year.

For Magnetation, a full HAP analysis was completed comparing the maximum estimated concentrations of each pollutant with the Unit Risk Factor (URF) or the Inhalation Unit Risk, and the Reference Concentration (RfC). This analysis offers a refined, up to date site specific analysis that takes into account the different potencies and health effects that each pollutant presents to the public.

The URF is the upper-bound excess lifetime cancer risk estimated to result from continuous inhalation exposure to a pollutant over a 70 year lifetime. Multiplying the estimated concentration by the URF will produce a cancer risk estimate. The cancer risk estimate is the conservative probability of developing cancer from exposure to a pollutant or a mixture of pollutants over a 70 year lifetime, usually expressed as the number of additional cancer cases in a given number of people, e.g., one in a million. For screening purposes at Magnetation, the cancer estimates for each pollutant are considered to be additive when deriving the cumulative maximum individual cancer risk.

Non-cancer health effects are determined using the Reference Concentration (RfC). The RfC is an estimate of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Dividing the

estimated pollutant concentration by the RfC will determine the pollutant's Hazard Quotient (HQ). All of the HAPs' Hazard Quotients were added together to determine Magnetation's Hazard Index (HI).

This HAP screening analysis uses health protective assumptions that overestimate the actual risk associated with emissions from Magnetation. Estimates 1) assume a 70 year exposure time, 2) assume that all carcinogens cause the same type of cancer, 3) assume that all non-carcinogens have additive health effects, 4) assume maximum permit allowable emissions from the facility, and 5) use conservatively derived dose-response information. The risk analysis cannot accurately predict whether there will be observed health problems around Magnetation; rather it identifies possible avenues of risk.

The results of the HAP modeling are in Table 11.

TABLE 11
Hazardous Air Pollutant Modeling Results

Compound	CAS Number	Annual Concentration (µg/m3)	Cancer URF, (µg/m3)-1	Source	Cancer Risk	Non-Cancer Chronic RfC, µg/m3	Source of IDEM RfC	Hazard Quotient
Hydrofluoric acid	7664393	0.09				20.00	IRIS	0.005
				∑ Cancer Risk	**0.0000**		**Hazard Index (HI)**	**0.0045**
				IDEM Standard	**1.0000E-06**		**IDEM Standard**	**1.00+00**
				Comparison	**Below**			**Below**

* Further information on URFs and RfCs can be found at the following EPA web site: http://www.epa.gov/ttn/atw/toxsource/chronicsources.html

The Hazard Index for the project does not exceed 1. Pollutants with a Hazard Quotient (HQ) greater than 1 are considered to be at concentrations that could represent a health concern. Hazard Quotients above 1 do not represent areas where adverse health effects will be observed but indicate that the potential exists.

The additive cancer risk estimate from hydrofluoric acid is 0 additional cancer causes in ten million people. Hydrofluoric acid is not a carcinogen. This means if an individual was exposed to this HAP continuously for 70 years, the risk of getting cancer from this exposure would be 0 in ten million. The US EPA considers one in ten thousand (1.0E-04) excess cancer risks to be the upper range of acceptability with an ample margin of safety. The probability for the general public to be exposed to this HAP for 24 hours a day, seven days a week, and 52 weeks a year for 70 years is minimal.

Part I - Summary of Air Quality Analysis

Keramida prepared the modeling portion of the PSD application. White County is designated as attainment for all criteria pollutants. PM_{10}, NO_2, SO_2, CO, $PM_{2.5}$, and fluorides emission rates associated with the proposed facility exceeded the respective significant emission rates. Modeling results taken from AERMOD model showed PM_{10}, NO_2, SO_2, and $PM_{2.5}$ impacts were predicted to be greater than the significant impact levels. Magnetation did trigger the preconstruction monitoring threshold level but can satisfy the preconstruction monitoring requirement since there is existing air quality monitoring data representative of the area. The NAAQS modeling for 1-hour NO_2 showed violations of the standard, but Magnetation was not significant during those violations. Magnetation was below eighty percent of

available increment modeling. Secondary $PM_{2.5}$ and ozone formation will be below measureable values. The nearest Class I area is Mammoth Cave National Park in Kentucky, just under 395 kilometers away from the source, but emissions are below the Federal Land Manager guidance screening threshold. An additional impact analysis was performed and the operation of the proposed facility will have no significant impact. A HAP analysis was performed and showed no likely adverse impact.

Indiana Department of Environmental Management
Office of Air Quality

Addendum to Appendix E
Maximum Available Control Technology (MACT) Analysis Determination

Source Description and Location

Source Name:	Magnetation LLC
Source Location:	64 East 100 North, Reynolds, Indiana 47980
County:	White
SIC Code:	1011
Operation Permit No.:	T181-32081-00054
Permit Reviewer:	John Haney

Background Information

The Office of Air Quality (OAQ) has performed a maximum achievable control technology (MACT) review relating to the operation of an iron ore concentrate pelletizing plant at Magnetation LLC, in Reynolds, Indiana.

Magnetation LLC submitted an application on July 2, 2012 to construct and operate an induration machine, consisting of a furnace hood exhaust (identified as EU013), a furnace windbox exhaust (identified as EU014), and a furnace discharge system (identified as EU015). The proposed unit has potential hydrogen fluoride (HF) emissions greater than ten (10) tons per year. Therefore, the operation of the new induration furnace is subject to the requirements of 326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP)).

A case-by-case MACT analysis is required when potential emissions of a hazardous air pollutant (HAP) indicate that a process is a major source of HAP and USEPA has not promulgated a specific NESHAP for that process. In general, a MACT analysis is similar to a BACT analysis. IDEM, OAQ conducts MACT analyses in accordance with the “Guidelines for MACT Determinations under Section 112(j) Requirements." These guidelines offer a step-by-step process for making a MACT determination consistent with the above two principles. The process can be summarized as follows:

Step 1: Identify the MACT-affected emissions unit;

Step 2: Make a MACT floor finding;

Step 3: List all available/reasonable applicable control technologies;

Step 4: Eliminate control technologies that are not technically feasible and not cost effective;

Step 5: Determine efficiency of applicable control technologies

Step 6: Identify the maximum emission reduction control technology

The following information resources are available and may be consulted in searching for varied control alternatives for the analyzed emission sources:

(a) On-line USEPA RACT/BACT/LAER Clearinghouse (RBLC) System;

(b) USEPA/State/Local Air Quality Permits;

(c) Federal/State/Local Permit Engineers;

(d) Control Technology Vendors; and

(e) Inspection/Performance Test Reports.

MACT Analysis

Step One: Identify the MACT-affected emissions unit

The following units are considered the MACT-affected emissions units:

(n) One (1) induration machine, approved in 2013 for construction, consisting of one (1) natural gas fired pellet hardening furnace, with a maximum heat input capacity of 436 MMBtu per hour and a maximum throughput rate of 450 tons per hour of iron oxide pellets, equipped with the following:

(2) One (1) furnace windbox exhaust (WBE), identified as EU014, using one (1) gas suspension absorber (GSA) (CE015) and one (1) WBE baghouse (CE016) as control, exhausting to stack SV013B.

Step Two: Make a MACT floor finding

A MACT floor refers to the level of emission control that is achieved in practice by the best controlled similar source. There are two sources in the RBLC database that have a similar process, Essar Steel Minnesota LLC (RBLC ID: MN-0085) and Minnesota Steel Industries, LLC (RBLC ID: MN-0070). The corresponding waste gas exhausts at these sources have existing PSD BACT limits for total fluorides. However, the NSR reform rule promulgation preamble (67 FR 80240, 12/31/2002) states: "As today's regulations provide, the following pollutants currently regulated under the Act are subject to Federal PSD review and permitting requirements: Fluorides (excluding hydrogen fluoride)". Therefore, "fluorides" for purposes of the NSR/PSD significant emission increase rate for major sources includes all inorganic fluoride compounds, except hydrogen fluoride (HF). Consequently, these existing PSD BACT limits for total fluorides should not be used in establishing the MACT floor for hydrogen fluoride. Upon further review of the RBLC database, EPA has not made a MACT determination concerning only hydrogen fluoride for this type of facility.

Magnetation LLC intends to meet the MACT determination using information from the BACT analysis (see Appendix B of this Technical Support Document). This approach is consistent with regulatory requirements for establishing a case-by-case MACT. The use of recent case-by-case emission control equipment standards, including BACT, is an option for meeting MACT requirements allowed pursuant to 40 CFR 63.41. Magnetation LLC proposes to use SO_2 as a surrogate for inorganic HAPs, specifically hydrogen fluoride. The rationale for using a surrogate is the same as the rationale used in promulgated MACT standards for somewhat similar industries; these include the Taconite Iron Ore Processing NESHAP (40 CFR 63, Subpart RRRRR), Iron and Steel Foundries NESHAP (40 CFR 63, Subpart EEEEE), Integrated Iron and Steel Manufacturing Facilities NESHAP (40 CFR 63, Subpart FFFFF), and the Industrial, Commercial, and Institutional Boilers and Process Heaters NESHAP (40 CFR 63, Subpart DDDDD).

Using SO_2 as a surrogate for HF, the MACT floor is proposed to be the use of a GSA dry scrubber. The MACT floor is also proposed to be a maximum outlet concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit. This proposed limit is based on the performance guarantee received from a GSA dry scrubber vendor for a similar project. The

performance guarantee is equal to 97% or a minimum outlet concentration of 10 mg/Nm^3 for fluorides.

Step Three: List All Available/Reasonable Applicable Control Technologies

The control technologies that will be considered in the technical and economically feasible analysis are:

(1) Gas suspension absorber (GSA)

(2) Spray dryer absorption (SDA)

(2) High pressure wet scrubber

(3) Low pressure wet scrubber followed with wet electrostatic precipitator (ESP)

(4) Dry sorbent injection (DSI) dry scrubber

(5) Clean fuels

(6) Good design methods and operating practices

The proposed induration furnace is designed to operate on natural gas (as an external fuel) and coke breeze (which is added to the raw materials). Therefore, use of natural gas as a clean fuel as well as good design methods and operating practices will be implemented regardless of the control system selected.

Step Four: Eliminate Control Technologies that are Not Technically Feasible and Not Cost Effective

The test for technical feasibility of any control option is whether it is both available and applicable to reducing HF emissions from the induration furnace. The previously listed information resources were consulted to determine the extent of applicability of each identified control alternative.

No technologies were eliminated from consideration because of technical infeasibility for the furnace windbox exhaust (EU014).

Step Five: Determine Efficiency of Applicable Control Technologies

(1) Gas suspension absorber (GSA): 95%

(2) High pressure wet scrubber: 80%

(3) Low pressure wet scrubber followed with wet electrostatic precipitator (ESP): 80%

(4) Spray dryer absorption (SDA): 60-70%

(5) Dry sorbent injection (DSI) dry scrubber: 40%

Step Six: Identify the Maximum Emission Reduction Control Technology

BACT controls for the furnace windbox exhaust (EU014) have been deemed equivalent to MACT controls. Therefore, MACT is determined to be as follows:

HF emissions from the furnace windbox exhaust (EU014) shall be controlled by the use of a GSA

dry scrubber with a maximum outlet concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit.

Indiana Department of Environmental Management
Office of Air Quality

Technical Support Document (TSD) for a Prevention of Significant Deterioration (PSD) and Part 70 Operating Permit

Source Description and Location

Source Name:	Magnetation LLC
Source Location:	64 East 100 North, Reynolds, Indiana 47980
County:	White
SIC Code:	1011 (Iron Ores)
Operation Permit No.:	T181-32081-00054
Permit Reviewer:	John Haney

On July 2, 2012, Magnetation LLC submitted an application to the Indiana Department of Environmental Management (IDEM), Office of Air Quality (OAQ) for a Prevention of Significant Deterioration (PSD) and Part 70 Operating Permit to construct and operate an iron ore pelletizing plant to be located at 64 East 100 North, Reynolds, Indiana.

Permitted Emission Units and Pollution Control Equipment

The source consists of the following permitted emission units:

Note: All references to "tons" used throughout this document are short tons (i.e., one short ton equals 2,000 pounds).

(a) One (1) iron concentrate unloading and storage area, identified as EU001, approved in 2013 for construction, with a maximum capacity of 4,950 tons per hour, consisting of the following:

(1) One (1) thaw shed, one (1) rotary rail car dumper, one (1) pedestal mount breaker, two (2) grizzlies, two (2) apron feeders, one (1) dribble conveyor, one (1) breaker, identified as EU001a, using baghouse CE001 as control, exhausting to stack SV001.

(2) One (1) covered conveyor transferring to concentrate storage building which contains four (4) covered conveyors, four (4) loader hoppers, and a storage pile identified as EU001b, exhausting inside the building.

(b) One (1) limestone unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU002a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU002b, exhausting inside the limestone storage pile enclosure. Under 40 CFR 60, Subpart OOO, the limestone unloading and storage area conveyor is considered an affected facility.

(c) One (1) dolomite unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU003a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU003b, exhausting inside the dolomite storage pile enclosure. Under 40 CFR 60, Subpart OOO, the dolomite unloading and storage area conveyor is considered an affected facility.

(d) One (1) coke breeze unloading and storage area, approved in 2013 for construction, with a maximum capacity of 7 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU004a, exhausting uncontrolled to atmosphere.

(2) One (1) pneumatic conveyance system and one (1) coke breeze grinding mill bin identified as EU004b, with a maximum capacity of 1,100 tons, using baghouse CE004 as control, exhausting to stack SV004.

(e) One (1) bentonite unloading and storage area, identified as EU005, approved in 2013 for construction, consisting of one (1) bentonite storage bin with a maximum capacity of 440 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE005 as control, exhausting inside the building.

(f) One (1) organic binder unloading and storage area, identified as EU006, approved in 2013 for construction, consisting of one (1) organic binder feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE006 as control, exhausting inside the building.

(g) One (1) soda ash unloading and storage area, identified as EU007, approved in 2013 for construction, consisting of one (1) soda ash feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE007 as control, exhausting inside the building.

(h) One (1) bentonite additive system, identified as EU008, approved in 2013 for construction, consisting of one (1) bentonite feed bin with a maximum capacity of 220 ton, with a maximum capacity of 3.0 tons per hour, using bin vent CE008 as control, exhausting inside the building.

(i) One (1) coke breeze additive system, identified as EU009, approved in 2013 for construction, with a maximum capacity of 16.5 tons per hour, using baghouse CE009 as control, exhausting to stack SV009, consisting of one (1) coke breeze conveyor, one (1) roller mill for coke breeze grinding with a nominal capacity of 11 tons per hour, one (1) product separation cyclone, and one (1) coke breeze bin with a maximum capacity of 220 tons.

(j) One (1) limestone and dolomite grinding mill bin area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) load hopper, one (1) enclosed vibrating grizzly feeder/screener, and one (1) covered belt feeder, identified as EU025a, exhausting uncontrolled to the atmosphere.

(2) One (1) additive conveyor, one (1) dolomite grinding mill bin with a maximum capacity of 440 tons, and one (1) limestone grinding mill bin with a maximum capacity of 440 tons, identified as EU025b, using baghouse CE023 as control, exhausting inside the building. Under 40 CFR 60, Subpart OOO, these units of the limestone and dolomite grinding mill bin area are considered affected facilities.

(k) One (1) ground limestone and dolomite additive system, identified as EU010, approved in 2013 for construction, with a maximum capacity of 132 tons per hour, using baghouse CE010 as control, exhausting to stack SV010, consisting of the following:

(1) One (1) limestone feed conveyor, one (1) dolomite feed conveyor, one (1) roller mill feed conveyor, one (1) roller mill for limestone and dolomite, one (1) product separation cyclone, and one (1) limestone and dolomite bin with a maximum capacity of 1,100 tons. Under 40 CFR 60, Subpart OOO, these units of the ground limestone and dolomite additive system are considered affected facilities.

(2) One (1) natural gas fired air heater, with a maximum heat input capacity of 19 MMBtu per hour.

(l) One (1) mixing area material handling system, identified as EU011, approved in 2013 for construction, with a maximum capacity of 780 tons per hour, using baghouse CE011 as control, exhausting inside the building, consisting of two (2) filter cake feed conveyors, two (2) mixer feed conveyors, and two (2) mixers.

(m) One (1) hearth layer bin system, identified as EU012, approved in 2013 for construction, with a maximum capacity of 660 tons of iron oxide pellets per hour, using baghouse CE012 as control, exhausting to stack SV012, consisting of two (2) hearth layer conveyors and one (1) hearth layer bin.

(n) One (1) induration machine, approved in 2013 for construction, consisting of one (1) natural gas fired pellet hardening furnace, with a maximum heat input capacity of 436 MMBtu per hour and a maximum throughput rate of 450 tons per hour of iron oxide pellets, equipped with the following:

(1) One (1) furnace hood exhaust, identified as EU013, using hood exhaust baghouse CE013 as control, exhausting to stack SV013A.

(2) One (1) furnace windbox exhaust (WBE), identified as EU014, using one (1) gas suspension absorber (GSA) (CE015) and one (1) WBE baghouse (CE016) as control, exhausting to stack SV013B.

(3) One (1) furnace discharge system, identified as EU015, using baghouse CE017 as control, exhausting to stack SV014, consisting of one (1) dribble conveyor, one (1) discharge hopper, and two (2) discharge vibrating feeders each with a maximum throughput of 1,155 tons per hour.

(4) One (1) induced draft cross flow wet cooling tower, identified as EU024, with a capacity of 4,600 gallons of circulating water per minute and a maximum drift rate of 0.001%, exhausting to stack SV022.

(o) One (1) hearth layer separation system, identified as EU016, approved in 2013 for construction, using baghouse CE018 as control, exhausting inside the building, consisting of the following:

(1) Two (2) product conveyors, identified as P1 and P2, with a maximum capacity of 660 and 770 tons per hour respectively.

(2) Two (2) hearth layer conveyors, identified as HL-1 and HL-2, each with a maximum capacity of 440 tons per hour.

(3) One (1) hearth layer separation bin, one (1) hearth layer separation grizzly, and two (2) reclaim hoppers.

(p) One (1) oxide pellet storage and loadout system, identified as EU019, approved in 2013 for construction, with a maximum capacity of 550 tons per hour, using baghouse CE019 as control, exhausting to stack SV018, consisting of two (2) conveyors, two (2) 8800-ton storage bins, and two (2) 99-ton storage bins.

(q) One (1) WBE lime storage area, identified as EU020, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) lime feed conveyor and one (1) 80 cubic meter lime storage silo, using bin vent CE020 as control, exhausting inside the building.

(r) One (1) WBE residual product loading area, identified as EU022, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) GSA reactor conveyor, one (1) GSA product conveyor, one (1) WBE conveyor, and one (1) 100 cubic meter storage silo, using bin vent CE021 as control, exhausting inside the building.

(s) One (1) recycled dust storage area, identified as EU026, approved in 2013 for construction, consisting of one (1) 55-ton storage bin, with a maximum capacity of 7.0 tons per hour, using dust recycle baghouse CE024 as control, exhausting inside the building.

Specifically Regulated Insignificant Activities

The source also consists of the following specifically regulated insignificant activities, as defined in 326 IAC 2-7-1(21):

(a) Natural gas-fired combustion sources with heat input equal to or less than ten million (10,000,000) Btu per hour, including the following:

(1) Seven (7) natural gas fired space heaters, identified as EU021, approved in 2013 for construction, each with a maximum heat input capacity of 1.0 MMBtu per hour. [326 IAC 2-2]

(2) One (1) coke breeze additive system (EU009) natural gas fired air heater, approved in 2013 for construction, with a maximum heat input capacity of 1.7 MMBtu per hour. [326 IAC 2-2]

(b) A petroleum fuel (other than gasoline) dispensing facility, having a storage tank capacity less than or equal to ten thousand five hundred (10,500) gallons, and dispensing three thousand five hundred (3,500) gallons per day or less. [326 IAC 2-2]

(c) Paved and unpaved roads and parking lots with public access. [326 IAC 2-2] [326 IAC 6-4]

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(f) Other emission units, not regulated by a NESHAP, with PM_{10}, NO_x, and SO_2 emissions less than five (5) pounds per hour or twenty-five (25) pounds per day, CO emissions less than twenty-five (25) pounds per day, VOC emissions less than three (3) pounds per hour or fifteen (15) pounds per day, lead emissions less than six-tenths (0.6) tons per year or three and twenty-nine hundredths (3.29) pounds per day, and emitting greater than one (1) pound per day but less than five (5) pounds per day or one (1) ton per year of a single HAP, or emitting greater than one (1) pound per day but less than twelve and five tenths

(12.5) pounds per day or two and five tenths (2.5) ton per year of any combination of HAPs:

(1) One (1) iron concentrate wet grinding and filter cake production system, approved in 2013 for construction, with a maximum capacity of 700 tons per hour, consisting of three (3) conveyors, and a filter cake feed bin, exhausting uncontrolled into a building. [326 IAC 2-2] [326 IAC 6-3-2]

(2) One (1) greenball production system, approved in 2013 for construction, with a maximum capacity of 900 tons per hour, using a wet spray process as control, consisting of six (6) 110-ton balling disc feed bins, six (6) balling discs, six (6) green pellet roller screens, six (6) shredders, one (1) single deck roller screen, and thirty-one (31) conveyors, exhausting into a building. [326 IAC 2-2] [326 IAC 6-3-2

Insignificant Activities

The source also consists of the following insignificant activities:

(a) Combustion source flame safety purging on startup.

(b) Refractory storage not requiring air pollution control equipment.

(c) Activities associated with the treatment of wastewater streams with an oil and grease content less than or equal to 1% by volume.

(d) Replacement or repair of electrostatic precipitators, bags in baghouses, and filters in other air filtration equipment.

(e) Cooling tower quench water blowdown.

(f) Process water blowdown.

(g) A laboratory, as defined in 326 IAC 2-7-1(21)(H).

Existing Approvals

There have been no previous approvals issued to this source.

Enforcement Issue

There are no enforcement actions pending.

Stack Summary

Stack ID	Operation	Height (ft)	Diameter (ft)	Flow Rate (acfm)	Temperature (^{0}F)
SV001	Iron Concentrate Unloading (Railcar) & Storage Area (Pile)	60.0	5.50	60,000	77
SV004	Coke Breeze Pneumatic Conveyance & Storage Bin	69.8	1.31	2,720	77
SV009	Coke Breeze Additive System	155.0	1.84	5,985	77
SV010	Ground Limestone and Dolomite Additive System	155.0	3.50	24,000	180
SV012	Hearth Layer Bin System	45.0	2.50	10,000	100
SV013A	Furnace Hood Exhaust	245.4	16.25	434,116	246

Stack ID	Operation	Height (ft)	Diameter (ft)	Flow Rate (acfm)	Temperature (^{0}F)
SV013B	Furnace Windbox Exhaust (WBE)	245.4	16.25	487,070	156
SV014	Furnace Discharge System	60.0	5.50	54,000	165
SV016	Emergency Generator	25.0	0.65	varies	910
SV017	Emergency Fire Pump	25.0	0.50	varies	400
SV018	Oxide Product Storage/Unloading System	90.0	4.50	40,000	77
SV022	Cooling Tower	12.0	20.00	varies	100

Emission Calculations

See Appendix A of this Technical Support Document for detailed emission calculations.

County Attainment Status

The source is located in White County.

Pollutant	Designation
SO_2	Better than national standards.
CO	Unclassifiable or attainment effective November 15, 1990.
O_3	Unclassifiable or attainment effective June 15, 2004, for the 8-hour ozone standard.[1]
PM_{10}	Unclassifiable effective November 15, 1990.
NO_2	Cannot be classified or better than national standards.
Pb	Not designated.

[1]Unclassifiable or attainment effective October 18, 2000, for the 1-hour ozone standard which was revoked effective June 15, 2005.
Unclassifiable or attainment effective April 5, 2005, for $PM_{2.5}$.

(a) Ozone Standards
Volatile organic compounds (VOC) and Nitrogen Oxides (NO_x) are regulated under the Clean Air Act (CAA) for the purposes of attaining and maintaining the National Ambient Air Quality Standards (NAAQS) for ozone. Therefore, VOC and NO_x emissions are considered when evaluating the rule applicability relating to ozone. White County has been designated as attainment or unclassifiable for ozone. Therefore, VOC and NO_x emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2.

(b) $PM_{2.5}$
White County has been classified as attainment for $PM_{2.5}$. On May 8, 2008, U.S. EPA promulgated the requirements for Prevention of Significant Deterioration (PSD) for $PM_{2.5}$ emissions. These rules became effective on July 15, 2008. On May 4, 2011, the air pollution control board issued an emergency rule establishing the direct $PM_{2.5}$ significant level at ten (10) tons per year. This rule became effective June 28, 2011. Therefore, direct $PM_{2.5}$ and SO_2 emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2. See the State Rule Applicability – Entire Source section.

(c) Other Criteria Pollutants
White County has been classified as attainment or unclassifiable in Indiana for all regulated pollutants. Therefore, these emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2.

Fugitive Emissions

Since this type of operation is not one of the twenty-eight (28) listed source categories under 326 IAC 2-2, 326 IAC 2-3, or 326 IAC 2-7 and there is no applicable New Source Performance Standard that was in effect on August 7, 1980, fugitive emissions are not counted toward the determination of PSD, Emission Offset, and Part 70 Permit applicability.

Unrestricted Potential Emissions

Unrestricted Potential Emissions	
Pollutant	Tons/year
PM	Greater than 250
PM_{10}	Greater than 250
$PM_{2.5}$	Greater than 250
SO_2	Greater than 250
VOC	Less than 40
CO	Less than 100
NO_x	Greater than 250
Lead	Greater than 0.6
Fluorides	Greater than 3
Sulfuric Acid Mist (H_2SO_4)	Less than 7
GHGs as CO_2e	Greater than 100,000
Acetaldehyde	Less than 10
Acrolein	Less than 10
Arsenic	Less than 10
Chlorine	Less than 10
Chromium	Less than 10
Formaldehyde	Less than 10
Hexane	Less than 10
Hydrogen Chloride (HCl)	Less than 10
Hydrogen Fluoride (HF)	Greater than 25
Manganese	Greater than 25
Methanol	Less than 10
Nickel	Less than 10
Selenium	Less than 10
Total HAPs	Greater than 25

(a) The potential to emit (as defined in 326 IAC 2-7-1(29)) of PM_{10}, $PM_{2.5}$, SO_2, and NO_x is equal to or greater than 100 tons per year, each. Therefore, the source is subject to the provisions of 326 IAC 2-7 and will be issued a Part 70 Operating Permit.

(b) The potential to emit (as defined in 326 IAC 2-7-1(29)) of GHGs is equal to or greater than one hundred thousand (100,000) tons of CO_2 equivalent emissions (CO_2e) per year.

Therefore, the source is subject to the provisions of 326 IAC 2-7 and will be issued a Part 70 Operating Permit.

(c) The potential to emit (as defined in 326 IAC 2-7-1(29)) of any single HAP is equal to or greater than ten (10) tons per year and/or the potential to emit (as defined in 326 IAC 2-7-1(29)) of a combination of HAPs is equal to or greater than twenty-five (25) tons per year. Therefore, the source is subject to the provisions of 326 IAC 2-7 and will be issued a Part 70 Operating Permit.

Part 70 Permit Conditions

This source is subject to the requirements of 326 IAC 2-7, because the source met the following:

(a) Emission limitations and standards, including those operational requirements and limitations that assure compliance with all applicable requirements at the time of issuance of Part 70 permits.

(b) Monitoring and related record keeping requirements which assume that all reasonable information is provided to evaluate continuous compliance with the applicable requirements.

Potential to Emit After Issuance

The table below summarizes the potential to emit, reflecting all limits, of the emission units. Any new control equipment is considered federally enforceable only after issuance of this Part 70 permit renewal, and only to the extent that the effect of the control equipment is made practically enforceable in the permit.

Process/ Emission Unit	Potential To Emit of the Entire Source After Issuance of Renewal (tons/year)											
	PM	PM_{10}*	$PM_{2.5}$**	SO_2	NO_x	VOC	CO	Lead	Total Fluorides	GHGs	Total HAPs	Worst Single HAP
Iron Concentrate Unloading (EU001a)	4.14	4.14	4.14	0	0	0	0	0.01	neg.	0	neg.	neg. (Mn)
Iron Concentrate Transfer & Storage Area (EU001b)	17.21	6.88	6.88	0	0	0	0		neg.	0		
Limestone Unloading (EU002a)	neg.	neg.	neg.	0	0	0	0	neg.	0	0	neg.	neg. (Mn)
Limestone Conveyor & Enclosed Storage (EU002b)	0.10	0.04	0.04	0	0	0	0		0	0		
Dolomite Unloading (EU003a)	neg.	neg.	neg.	0	0	0	0	0	0	0	0	0
Dolomite Conveyor & Enclosed Storage (EU003b)	0.06	0.02	0.02	0	0	0	0	0	0	0	0	0
Coke Breeze Unloading (EU004a)	neg.	neg.	neg.	0	0	0	0	neg.	0	0	neg.	neg. (Mn)
Coke Breeze Pneum. Conveyance & Storage Bin (EU004b)	0.19	0.19	0.19	0	0	0	0		0	0		
Bentonite Unloading & Storage Area (EU005)	0.19	0.19	0.19	0	0	0	0	0	0	0	0	0
Organic Binder Unloading & Storage Area (EU006)	0.19	0.19	0.19	0	0	0	0	0	0	0	0.02	0.02 (chlorine)
Soda Ash Unloading & Storage Area (EU007)	0.19	0.19	0.19	0	0	0	0	neg.	0	0	neg.	neg. (chlorine)

Process/ Emission Unit	Potential To Emit of the Entire Source After Issuance of Renewal (tons/year)											
	PM	PM_{10}*	$PM_{2.5}$**	SO_2	NO_x	VOC	CO	Lead	Total Fluorides	GHGs	Total HAPs	Worst Single HAP
Bentonite Additive System (EU008)	0.19	0.19	0.19	0	0	0	0	0	0	0	0	0
Coke Breeze Additive System and Air Heater (EU009)	0.46	0.46	0.46	neg.	0.09	0.04	0.61	neg.	neg.	871	0.02	0.01 (hexane)
Limestone/Dolomite Hopper & Feeders (EU025a)	1.92	0.70	0.70	0	0	0	0	neg.	0	0	neg.	neg. (Mn)
Limestone/Dolomite Grinding Mill Bin Area (EU025b)	0.95	0.95	0.95	0	0	0	0		0	0		
Ground Limestone/Dolomite Additive System and Air Heater (EU010)	1.99	1.99	1.99	0.04	1.00	0.45	6.85	neg.	neg.	9,737	0.15	0.15 (hexane)
Mixing Area Material Handling System (EU011)	1.50	1.50	1.50	0	0	0	0	neg.	neg.	0	neg.	neg. (Mn)
Hearth Layer Bin System (EU012)	0.66	0.66	0.66	0	0	0	0	neg.	neg.	0	neg.	neg. (Mn)
Furnace Hood Exhaust (EU013)	44.31	88.62	88.62	94.94	477.42	1.74	3.62	0.13	8.66	661,208	9.63	9.11 (HF)
Furnace Windbox Exhaust (EU014)	53.10	106.21	106.21	85.89		21.41	44.60	0.22	54.06		63.75	54.05 (HF)
Furnace Discharge System (EU015)	3.20	3.20	3.20	0	0	0	0	neg.	neg.	0	neg.	neg. (Mn)
Hearth Layer Separation System (EU016)	3.45	3.45	3.45	0	0	0	0	neg.	neg.	0	neg.	neg. (Mn)
Oxide Pellet Storage & Unloading System (EU019)	2.76	2.76	2.76	0	0	0	0	neg.	neg.	0	neg.	neg. (Mn)
WBE Lime Storage Area (EU020)	0.08	0.08	0.08	0	0	0	0	0	0	0	neg.	neg. (Mn)
WBE Residual Product Loading Area (EU022)	0.08	0.08	0.08	0	0	0	0	0	0	0	neg.	neg. (Mn)
Recycled Dust Storage Area (EU026)	0.69	0.69	0.69	0	0	0	0	neg.	neg.	0	neg.	neg. (Mn)
Insignificant Activities	19.30	3.86	2.10	0.01	0.62	0.24	2.70	neg.	neg.	3,789	2.59	1.59 (formal-dehyde)
Total PTE of Entire Source (Including Fugitives)	**156.26**	**226.59**	**224.84**	**180.88**	**479.13**	**23.87**	**58.39**	**0.38**	**62.72**	**675,605**	**76.17**	**63.16 (HF)**
Title V Major Source Thresholds	NA	100	100	100	100	100	100	100	100	100,000 CO_2e	25	10
PSD Major Source Thresholds	250	250	250	250	250	250	250	250	250	100,000 CO_2e	NA	NA

neg. = negligible
*Under the Part 70 Permit program (40 CFR 70), particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM10), not particulate matter (PM), is considered as a "regulated air pollutant".
**$PM_{2.5}$ listed is direct $PM_{2.5}$.

This stationary source is major for PSD because the emissions of at least one attainment pollutant are greater than two hundred fifty (>250) tons per year, emissions of GHGs are equal to or greater than one hundred thousand (>100,000) tons of CO_2 equivalent emissions (CO_2e) per year, and it is not in one of the twenty-eight (28) listed source categories.

Federal Rule Applicability Determination

NSPS:

(a) The coke breeze unloading and storage area (EU004) is not subject to the requirements of the New Source Performance Standards for Coal Preparation and Processing Plants, 40 CFR 60.250, Subpart Y because coke breeze does not meet the definition of coal, pursuant to 40 CFR 60.251.

(b) The source is not subject to the requirements of the New Source Performance Standards for Metallic Mineral Processing Plants, 40 CFR 60.380, Subpart LL because the source does not meet the definition of a metallic mineral processing plant, pursuant to 40 CFR 60.381. The source does not produce metallic mineral concentrates from ore; it receives iron ore concentrate and converts it into iron pellets.

(c) The source is not subject to the requirements of the New Source Performance Standards for Nonmetallic Mineral Processing Plants, 40 CFR 60.670, Subpart OOO, as folows:

(1) The following facilities are not subject to the requirements of the New Source Performance Standards for Nonmetallic Mineral Processing Plants, 40 CFR 60.670, Subpart OOO because they handle or process materials that do not meet the definition of a nonmetallic mineral, pursuant to 40 CFR 60.671:

(a) One (1) iron concentrate unloading and storage area, identified as EU001, approved in 2013 for construction, with a maximum capacity of 4,950 tons per hour, consisting of the following:

(1) One (1) thaw shed, one (1) rotary rail car dumper, one (1) pedestal mount breaker, two (2) grizzlies, two (2) apron feeders, one (1) dribble conveyor, one (1) breaker, identified as EU001a, using baghouse CE001 as control, exhausting to stack SV001.

(2) One (1) covered conveyor transferring to concentrate storage building which contains, two (2) covered conveyors, four (4) loader hoppers, and a storage pile identified as EU001b, exhausting inside the building.

(d) One (1) coke breeze unloading and storage area, approved in 2013 for construction, with a maximum capacity of 7 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU004a, exhausting uncontrolled to atmosphere.

(2) One (1) pneumatic conveyance system and one (1) coke breeze grinding mill bin identified as EU004b, with a maximum capacity of 1,100 tons, using baghouse CE004 as control, exhausting to stack SV004.

(i) One (1) coke breeze additive system, identified as EU009, approved in 2013 for construction, with a maximum capacity of 16.5 tons per hour, using baghouse CE009 as control, exhausting to stack SV009, consisting of one (1) coke breeze conveyor, one (1) roller mill for coke breeze grinding with a nominal capacity of 11 tons per hour, one (1) product separation cyclone, and one (1) coke breeze bin with a maximum capacity of 220 tons.

(2) The following facilities are not subject to the requirements of the New Source Performance Standards for Nonmetallic Mineral Processing Plants, 40 CFR

60.670, Subpart OOO because they do not meet the definition of a nonmetallic mineral processing plant, pursuant to 40 CFR 60.671, since the corresponding nonmetallic mineral is not crushed or ground as part of the process:

(e) One (1) bentonite unloading and storage area, identified as EU005, approved in 2013 for construction, consisting of one (1) bentonite storage bin with a maximum capacity of 440 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE005 as control, exhausting inside the building.

(f) One (1) organic binder unloading and storage area, identified as EU006, approved in 2013 for construction, consisting of one (1) organic binder feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE006 as control, exhausting inside the building.

(g) One (1) soda ash unloading and storage area, identified as EU007, approved in 2013 for construction, consisting of one (1) soda ash feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE007 as control, exhausting inside the building.

(h) One (1) bentonite additive system, identified as EU008, approved in 2013 for construction, consisting of one (1) bentonite feed bin with a maximum capacity of 220 ton, with a maximum capacity of 3.0 tons per hour, using bin vent CE008 as control, exhausting inside the building.

(3) Truck dumping into feed hoppers is not subject to the requirements of the Standards of Performance for Nonmetallic Mineral Processing Plants, 40 CFR 60.670, Subpart OOO because, pursuant to 40 CFR 60.672(d), the process is exempt from the requirements of this section. Pursuant to 40 CFR 60.671, truck dumping includes dumping from both trucks and front end loaders.

(4) The following facilities are not subject to the requirements of the New Source Performance Standards for Nonmetallic Mineral Processing Plants, 40 CFR 60.670, Subpart OOO:

(l) One (1) mixing area material handling system, identified as EU011, approved in 2013 for construction, with a maximum capacity of 780 tons per hour, using baghouse CE011 as control, exhausting inside the building, consisting of two (2) filter cake feed conveyors, two (2) mixer feed conveyors, and two (2) mixers.

Pursuant to EPA's Applicability Determination Index (ADI) database (http://www.epa.gov/compliance/monitoring/programs/caa/adi.html) posting dated August 15, 2002 (Control Number: 0200088), since the nonmetallic mineral coming from the storage bins is used in the manufacture of final product rather than being crushed or ground, all emission units following the storage locations are not affected facilities in a production line at a nonmetallic mineral processing plant. Therefore, the facilities listed above are not subject to the requirements of the Standards of Performance for Nonmetallic Mineral Processing Plants, 40 CFR 60.670, Subpart OOO.

(d) The source is subject to the New Source Performance Standards for Nonmetallic Mineral Processing Plants (40 CFR 60.670, Subpart OOO), which is incorporated by reference as 326 IAC 12. Pursuant to 40 CFR 60.670(a)(1), the provisions of this subpart are applicable to the following affected facilities in fixed or portable nonmetallic mineral processing plants: each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station. The facilities subject to this rule include the following:

(b) One (1) limestone unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(2) One (1) covered conveyor, identified as EU002b, exhausting inside the limestone storage pile enclosure. Under 40 CFR 60, Subpart OOO, the limestone unloading and storage area conveyor is considered an affected facility.

(c) One (1) dolomite unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(2) One (1) covered conveyor, identified as EU003b, exhausting inside the dolomite storage pile enclosure. Under 40 CFR 60, Subpart OOO, the dolomite unloading and storage area conveyor is considered an affected facility.

(j) One (1) limestone and dolomite grinding mill bin area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(2) One (1) additive conveyor, one (1) dolomite grinding mill bin with a maximum capacity of 440 tons, and one (1) limestone grinding mill bin with a maximum capacity of 440 tons, identified as EU025b, using baghouse CE023 as control, exhausting inside the building. Under 40 CFR 60, Subpart OOO, these units of the limestone and dolomite grinding mill bin area are considered affected facilities.

(k) One (1) ground limestone and dolomite additive system, identified as EU010, approved in 2013 for construction, with a maximum capacity of 132 tons per hour, using baghouse CE010 as control, exhausting to stack SV010, consisting of the following:

(1) One (1) limestone feed conveyor, one (1) dolomite feed conveyor, one (1) roller mill feed conveyor, one (1) roller mill for limestone and dolomite, one (1) product separation cyclone, and one (1) limestone and dolomite bin with a maximum capacity of 1,100 tons. Under 40 CFR 60, Subpart OOO, these units of the ground limestone and dolomite additive system are considered affected facilities.

Pursuant to 40 CFR 60.676(i)(1), a notification of facility start-up must be submitted no later than 15 calendar days after the actual date of initial startup.

The entire rule has been included as Attachment A to the permit. These facilities are subject to the following portions of 40 CFR 60, Subpart OOO:

(1) 40 CFR 60.670(a), (e), (f);
(2) 40 CFR 60.671;
(3) 40 CFR 60.672(a), (b), (d), (e);
(4) 40 CFR 60.673;
(5) 40 CFR 60.674(c), (d);
(6) 40 CFR 60.675(a), (b), (c)(1)(i), (c)(1)(ii), (c)(3), (d), (e), (g), (i);
(7) 40 CFR 60.676(b), (f), (h), (i)(1), (j), (k);
(8) Table 1 to 40 CFR 63, Subpart OOO;
(9) Table 2 to 40 CFR 63, Subpart OOO; and
(10) Table 3 to 40 CFR 63, Subpart OOO.

(e) Magnetation LLC is not subject to the requirements of the Standards of Performance for Calciners and Dryers in Mineral Industries, 40 CFR 60.730, Subpart UUU. Pursuant to 40 CFR 60.731, a mineral processing plant means any facility that processes or produces any of the following minerals, their concentrates, or any mixture of which the majority (>50 percent) is any of the following minerals or a combination of these minerals: alumina, ball clay, bentonite, diatomite, feldspar, fire clay, fuller's earth, gypsum, industrial sand, kaolin, lightweight aggregate, magnesium compounds, perlite, roofing granules, talc, titanium dioxide, and vermiculite.

(1) Since coke breeze, limestone, and dolomite are not listed in this definition, the air heaters for the coke breeze grinding system (EU009) and the ground limestone and dolomite additive system (EU010) are not part of a mineral processing plant and therefore are not subject to the requirements of 40 CFR 63, Subpart UUU.

(2) Bentonite is listed in the definition of a mineral processing plant. However, the ground bentonite utilized at the source is not processed or conveyed with any form of a calciner or dryer. Therefore, the bentonite unloading and storage area (EU005) and the bentonite additive system (EU008) are not subject to the requirements of 40 CFR 63, Subpart UUU.

(3) Since the manufactured greenballs do not contain a mixture of which the majority is any of the above stated minerals, the induration machine is not part of a mineral processing plant and therefore is not subject to the requirements of 40 CFR 63, Subpart UUU.

(f) The emergency generator (EU017) and the emergency fire pump (EU018) are not subject to the requirements of the New Source Performance Standard for Stationary Compression Ignition Internal Combustion Engines, 40 CFR 60.4200, Subpart IIII because these emission units utilize spark ignition internal combustion engines.

(g) The source is subject to the New Source Performance Standards for Stationary Spark Ignition Internal Combustion Engines (40 CFR 60.4230, Subpart JJJJ), which is incorporated by reference as 326 IAC 12. The specifically regulated insignificant activities subject to this rule include the following:

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

Pursuant to 40 CFR 60.4230(a), the date that construction commences is the date the engine is ordered by the owner or operator. These engines were ordered after June 12, 2006 and were manufactured after 2007.

The entire rule has been included as Attachment B to the permit. This unit is subject to the following portions of 40 CFR 60, Subpart JJJJ:

(1) 40 CFR 60.4230(a)(3)(iv), (a)(4)(iv), (a)(6);
(2) 40 CFR 60.4233(e), (h);
(3) 40 CFR 60.4234;

(4) 40 CFR 60.4236;
(5) 40 CFR 60.4237(a), (b);
(6) 40 CFR 60.4243(b), (d), (e), (f), (g);
(7) 40 CFR 60.4244;
(8) 40 CFR 60.4245;
(9) 40 CFR 60.4246;
(10) 40 CFR 60.4248;
(11) Table 1 to 40 CFR 60, Subpart JJJJ; and
(12) Table 2 to 40 CFR 60, Subpart JJJJ.

NESHAP:

(h) This source is not subject to the requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAPs): Publicly Owned Treatment Works, 40 CFR 63.1580, Subpart VVV because the source does not meet the definition of a publicly owned treatment works (POTW), pursuant to 40 CFR 63.1595. The water treatment facility at this source will be owned by the source and not by a State, municipality, or intermunicipal or interstate agency.

(i) This source is subject to the National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (40 CFR 63.6580, Subpart ZZZZ), which is incorporated by reference as 326 IAC 20-82. The specifically regulated insignificant activities subject to this rule include the following:

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

The entire rule has been included as Attachment C to the permit. These units are subject to the following portions of 40 CFR 63, Subpart ZZZZ:

(1) 40 CFR 63.6580;
(2) 40 CFR 63.6585(a), (b);
(3) 40 CFR 63.6590(a)(2)(i), (a)(2)(ii), (b)(1)(i), (c)(6);
(4) 40 CFR 63.6645(f);
(5) 40 CFR 63.6665;
(6) 40 CFR 63.6670; and
(7) 40 CFR 63.6675.

The provisions of 40 CFR 63 Subpart A – General Provisions, which are incorporated as 326 IAC 20-1-1, apply to the facility described in this section except when otherwise specified in 40 CFR 63 Subpart ZZZZ.

(j) This source is not subject to the requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Lime Manufacturing Plants, 40 CFR 63.7080, Subpart AAAAA because the source does not meet the definition of a lime manufacturing plant, pursuant to 40 CFR 63.7143.

(k) The requirements of the National Emissions Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters, Subpart DDDDD are not included in the permit as follows:

(1) The space heaters are not subject to the requirements of 40 CFR 63, Subpart DDDDD because they do not meet the definition of "process heater" pursuant to 40 CFR 63.7575. Specifically, process heaters do not include units used for comfort heat or space heat.

(2) The following combustion units are not subject to the requirements of 40 CFR 63, Subpart DDDDD because they do not meet the definition of "process heater" pursuant to 40 CFR 63.7575:

- Ground limestone and dolomite additive system (EU010) natural gas fired air heater,
- Induration machine (EU013 and EU014), and
- Coke breeze additive system (EU009) natural gas fired air heater

Specifically, process heaters are units in which the combustion gases do not directly come into contact with process materials. These combustion units are direct-fired.

(l) The requirements of the following NESHAPs under 40 CFR Part 63 are not included in the permit:

- NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources (40 CFR 63.11193, Subpart JJJJJJ).

These NESHAPs apply only to area sources of hazardous air pollutants. Since the potential to emit of any single HAP is greater than 10 tons per year and the potential to emit of all combined HAPs is greater than 25 tons per year, Magnetation LLC is a major source of HAPs; therefore, Magnetation LLC is not subject to these NESHAPs.

CAM:

(m) Pursuant to 40 CFR 64.2, Compliance Assurance Monitoring (CAM) is applicable to new or modified emission units that involve a pollutant-specific emission unit and meet the following criteria:

(1) has a potential to emit before controls equal to or greater than the Part 70 major source threshold for the pollutant involved;

(2) is subject to an emission limitation or standard for that pollutant; and

(3) uses a control device, as defined in 40 CFR 64.1, to comply with that emission limitation or standard.

The following table is used to identify the applicability of each of the criteria, under 40 CFR 64.1, to each new or modified emission unit involved:

CAM Applicability Analysis							
Emission Unit/ Pollutant	**Control Device Used**	**Emission Limitation** (Y/N)	**Uncontrolled PTE** (tons/yr)	**Controlled PTE** (tons/yr)	**Part 70 Major Source Threshold** (tons/yr)	**CAM Applicable** (Y/N)	**Large Unit** (Y/N)
Iron Concentrate Unloading (EU001a): PM	Baghouse CE001	Y	> 100	< 100	100	Y	N

CAM Applicability Analysis							
Emission Unit/ Pollutant	**Control Device Used**	**Emission Limitation** (Y/N)	**Uncontrolled PTE** (tons/yr)	**Controlled PTE** (tons/yr)	**Part 70 Major Source Threshold** (tons/yr)	**CAM Applicable** (Y/N)	**Large Unit** (Y/N)
Iron Concentrate Unloading (EU001a): $PM_{10}/PM_{2.5}$	Baghouse CE001	Y	> 100	< 100	100	Y	N
Iron Concentrate Unloading (EU001a): Total Fluorides	Baghouse CE001	Y	< 0.01	---	100	N	N
Coke Breeze Unloading/Storage Area (EU004b): PM	Baghouse CE004	Y	< 100	---	100	N	N
Coke Breeze Unloading/Storage Area (EU004b): $PM_{10}/PM_{2.5}$	Baghouse CE004	Y	< 100	---	100	N	N
Bentonite Unloading/Storage Area (EU005): PM	Bin Vent CE005	Y	< 100	---	100	N	---
Bentonite Unloading/Storage Area (EU005): $PM_{10}/PM_{2.5}$	Bin Vent CE005	Y	< 100	---	100	N	---
Organic Binder Unloading/Storage Area (EU006): PM	Bin Vent CE006	Y	< 100	---	100	N	---
Organic Binder Unloading/Storage Area (EU006): $PM_{10}/PM_{2.5}$	Bin Vent CE006	Y	< 100	---	100	N	---
Soda Ash Unloading/Storage Area (EU007): PM	Bin Vent CE007	Y	< 100	---	100	N	---
Soda Ash Unloading/Storage Area (EU007): $PM_{10}/PM_{2.5}$	Bin Vent CE007	Y	< 100	---	100	N	---
Bentonite Additive System (EU008): PM	Bin Vent CE008	Y	< 100	---	100	N	---
Bentonite Additive System (EU008): $PM_{10}/PM_{2.5}$	Bin Vent CE008	Y	< 100	---	100	N	---
Coke Breeze Additive System (EU009): PM	Baghouse CE009	Y	< 100	---	100	N	---
Coke Breeze Additive System (EU009): $PM_{10}/PM_{2.5}$	Baghouse CE009	Y	< 100	---	100	N	---
Limestone/Dolomite Grinding Mill Bin Area (EU025b): PM	Baghouse CE023	Y	< 100	---	100	N	---
Limestone/Dolomite Grinding Mill Bin Area (EU025b): $PM_{10}/PM_{2.5}$	Baghouse CE023	Y	< 100	---	100	N	---

CAM Applicability Analysis							
Emission Unit/ Pollutant	**Control Device Used**	**Emission Limitation** (Y/N)	**Uncontrolled PTE** (tons/yr)	**Controlled PTE** (tons/yr)	**Part 70 Major Source Threshold** (tons/yr)	**CAM Applicable** (Y/N)	**Large Unit** (Y/N)
Ground Limestone/ Dolomite Additive System (EU010): PM	Baghouse CE010	Y	> 100	< 100	100	Y	N
Ground Limestone/ Dolomite Additive System (EU010): $PM_{10}/PM_{2.5}$	Baghouse CE010	Y	> 100	< 100	100	Y	N
Mixing Area Material Handling System (EU011): PM	Baghouse CE011	Y	> 100	< 100	100	Y	N
Mixing Area Material Handling System (EU011): $PM_{10}/PM_{2.5}$	Baghouse CE011	Y	> 100	< 100	100	Y	N
Mixing Area Material Handling System (EU011): Total Fluorides	Baghouse CE011	Y	< 0.1	---	100	N	---
Hearth Layer Bin System (EU012): PM	Baghouse CE012	Y	< 100	---	100	N	---
Hearth Layer Bin System (EU012): $PM_{10}/PM_{2.5}$	Baghouse CE012	Y	< 100	---	100	N	---
Hearth Layer Bin System (EU012): Total Fluorides	Baghouse CE012	Y	< 100	---	100	N	---
Furnace Hood Exhaust (EU013): PM	Baghouse CE013	Y	> 100	< 100	100	Y	N
Furnace Hood Exhaust (EU013): $PM_{10}/PM_{2.5}$	Baghouse CE013	Y	> 100	< 100	100	Y	N
Furnace Hood Exhaust (EU013): NO_x	Low NO_x LE Burners[1]	---	---	----	---	N	---
Furnace Hood Exhaust (EU013): SO_2	None	---	---	----	---	N	---
Furnace Hood Exhaust (EU013): Total Fluorides	None	---	---	----	---	N	---
Furnace Windbox Exhaust (EU014): PM	Baghouse CE016	Y	> 100	< 100	100	Y	N
Furnace Windbox Exhaust (EU014): $PM_{10}/PM_{2.5}$	Baghouse CE016	Y	> 100	> 100	100	Y	Y
Furnace Windbox Exhaust (EU014): NO_x	Low NO_x LE Burners[1]	---	---	----	---	N	---
Furnace Windbox Exhaust (EU014): SO_2	Gas Suspension Absorber CE015	Y	> 100	< 100	100	Y	N

CAM Applicability Analysis							
Emission Unit/ Pollutant	**Control Device Used**	**Emission Limitation** (Y/N)	**Uncontrolled PTE** (tons/yr)	**Controlled PTE** (tons/yr)	**Part 70 Major Source Threshold** (tons/yr)	**CAM Applicable** (Y/N)	**Large Unit** (Y/N)
Furnace Windbox Exhaust (EU014): Total Fluorides	Gas Suspension Absorber CE015	Y	> 100	< 100	100	Y	N
Furnace Discharge System (EU015): PM	Baghouse CE017	Y	> 100	< 100	100	Y	N
Furnace Discharge System (EU015): $PM_{10}/PM_{2.5}$	Baghouse CE017	Y	> 100	< 100	100	Y	N
Furnace Discharge System (EU015): Total Fluorides	Baghouse CE017	Y	< 0.1	---	100	N	---
Hearth Layer Separation System (EU016): PM	Baghouse CE018	Y	> 100	< 100	100	Y	N
Hearth Layer Separation System (EU016): $PM_{10}/PM_{2.5}$	Baghouse CE018	Y	> 100	< 100	100	Y	N
Hearth Layer Separation System (EU016): Total Fluorides	Baghouse CE018	Y	< 0.1	---	100	N	---
Oxide Pellet Storage/Unloading System (EU019): PM	Baghouse CE019	Y	> 100	< 100	100	Y	N
Oxide Pellet Storage/Unloading System (EU019): $PM_{10}/PM_{2.5}$	Baghouse CE019	Y	> 100	< 100	100	Y	N
Oxide Pellet Storage/Unloading System (EU019): Total Fluorides	Baghouse CE019	Y	< 0.1	---	100	N	---
WBE Lime Storage Area (EU020): PM	Bin Vent CE020	Y	< 100	---	100	N	---
WBE Lime Storage Area (EU020): $PM_{10}/PM_{2.5}$	Bin Vent CE020	Y	< 100	---	100	N	---
WBE Residual Product Loading Area (EU020): PM	Bin Vent CE021	Y	< 100	---	100	N	---
WBE Residual Product Loading Area (EU020): $PM_{10}/PM_{2.5}$	Bin Vent CE021	Y	< 100	---	100	N	---
Recycled Dust Storage Area (EU026): PM	Baghouse CE024	Y	< 100	---	100	N	---
Recycled Dust Storage Area (EU026): $PM_{10}/PM_{2.5}$	Baghouse CE024	Y	< 100	---	100	N	---

CAM Applicability Analysis							
Emission Unit/ Pollutant	**Control Device Used**	**Emission Limitation** (Y/N)	**Uncontrolled PTE** (tons/yr)	**Controlled PTE** (tons/yr)	**Part 70 Major Source Threshold** (tons/yr)	**CAM Applicable** (Y/N)	**Large Unit** (Y/N)
Recycled Dust Storage Area (EU026): Total Fluorides	Baghouse CE024	Y	< 0.1	---	100	N	---

[1] These devices for controlling NO_x do not meet the definition of "control device" per 40 CFR 64.1.

Based on this evaluation, the requirements of 40 CFR Part 64, CAM are applicable to the Furnace Windbox Exhaust (EU014) for PM_{10} and $PM_{2.5}$ upon start-up. A CAM plan has been submitted and the Compliance Determination and Monitoring Requirements section includes a detailed description of the CAM requirements.

Based on this evaluation, the requirements of 40 CFR Part 64, CAM are applicable to the Furnace Windbox Exhaust (EU014) for PM, SO_2, and total fluorides upon issuance of the Title V Renewal. A CAM plan must be submitted as part of the renewal application.

Based on this evaluation, the requirements of 40 CFR Part 64, CAM are applicable to the Iron Concentrate Unloading (EU001a), Ground Limestone/ Dolomite Additive System (EU010), Mixing Area Material Handling System (EU011), Furnace Hood Exhaust (EU013), Furnace Discharge System (EU015), Hearth Layer Separation System (EU016), and Oxide Pellet Storage/Unloading System (EU019) for PM, PM_{10}, and $PM_{2.5}$ upon issuance of the Title V Renewal. A CAM plan must be submitted as part of the renewal application.

State Rule Applicability - Entire Source

326 IAC 2-6 (Emission Reporting)
This source, not located in Lake, Porter, or LaPorte County, is subject to 326 IAC 2-6 (Emission Reporting) because it is required to have an operating permit pursuant to 326 IAC 2-7 (Part 70). The potential to emit of VOC and PM_{10} is less than 250 tons per year each, and the potential to emit of CO, NO_x, and SO_2 is less than 2,500 tons per year each. Therefore, pursuant to 326 IAC 2-6-3(a)(2), triennial reporting is required. An emission statement shall be submitted in accordance with the compliance schedule in 326 IAC 2-6-3 by July 1, 2013, and every three (3) years thereafter. The emission statement shall contain, at a minimum, the information specified in 326 IAC 2-6-4.

326 IAC 5-1 (Opacity Limitations)
This source is subject to the opacity limitations specified in 326 IAC 5-1-2(1).

326 IAC 6-4 (Fugitive Dust Emissions)
The Permittee shall not allow fugitive dust to escape beyond the property line or boundaries of the property, right-of-way, or easement on which the source is located, in a manner that would violate 326 IAC 6-4 (Fugitive Dust Emissions).

326 IAC 6-5 (Fugitive Particulate Matter Emission Limitations)
This source is not subject to 326 IAC 6-5 because it has fugitive particulate emissions less than 25 tons per year.

326 IAC 6.5 (PM Limitations Except Lake County)
This source is not subject to 326 IAC 6.5 because it is not located in one of the following counties: Clark, Dearborn, Dubois, Howard, Marion, St. Joseph, Vanderburgh, Vigo, or Wayne.

326 IAC 8-9 (Volatile Organic Liquid Storage Vessels)
This source is located in White County. Therefore, the requirements of 326 IAC 8-9 are not applicable.

326 IAC 9-1 (Carbon Monoxide Emission Limits)
Although this is a stationary source of CO emissions commencing operation after March 21, 1972, there are no applicable CO emission limits for this type of source pursuant to 326 IAC 9-1-2. Therefore, 326 IAC 9-1 does not apply.

326 IAC 10-1 (Nitrogen Oxide Emission Limitations)
The plant is not subject to the requirements of 326 IAC 10-1 (Nitrogen Oxide Emission Limitations) because the plant is not located in Clark County or Floyd County.

State Rule Applicability - Section D.1 (Raw Material Handling)

326 IAC 2-2-3 (PSD BACT)

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Raw Material Handling operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations		
		Pollutant	Gr/dscf	Lb/hr
Iron Concentrate Unloading (EU001a)	Baghouse CE001 (SV001)	PM	0.002	0.95
		PM_{10}*	0.002	0.95
		$PM_{2.5}$*	0.002	0.95
Coke Breeze Pneumatic Conveyance & Storage Bin (EU004b)	Baghouse CE004 (SV004)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429
Bentonite Unloading & Storage Area (EU005)	Bin Vent CE005 (inside building)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429
Organic Binder Unloading & Storage Area (EU006)	Bin Vent CE006 (inside building)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429
Soda Ash Unloading & Storage Area (EU007)	Bin Vent CE007 (inside building)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the following Raw Material Handling operations shall be a fugitive dust control plan, an enclosure, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Iron Concentrate Transfer and Storage Area	EU001b	PM	3.93	17.21
		PM_{10}*	1.57	6.88
		$PM_{2.5}$*	1.57	6.88
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	PM	0.05	0.10
		PM_{10}*	0.02	0.04
		$PM_{2.5}$*	0.02	0.04
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	PM	0.03	0.06
		PM_{10}*	0.01	0.02
		$PM_{2.5}$*	0.01	0.02

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the following Truck Unloading operations shall be a fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM	1.07 E-03	2.20 E-03
		PM_{10}*	1.07 E-03	2.20 E-03
		$PM_{2.5}$*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM	5.53 E-04	1.22 E-03
		PM_{10}*	5.53 E-04	1.22 E-03
		$PM_{2.5}$*	5.53 E-04	1.22 E-03
Coke Breeze Unloading	EU004a	PM	7.45 E-04	3.26 E-03

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
(Truck)		PM_{10}*	3.52 E-04	1.54 E-03
		$PM_{2.5}$*	1.02 E-04	4.45 E-04

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Raw Material Handling operations shall be as follows:

(1) The Fluoride Concentration in the Iron Concentrate shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and the following:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Iron Concentrate Unloading (EU001a)	Baghouse CE001 (SV001)	F	4.73 E-05

326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP))
The operation of these emission units will emit less than ten (10) tons per year for a single HAP and less than twenty-five (25) tons per year for a combination of HAPs, each. Therefore, 326 IAC 2-4.1 does not apply to these units.

326 IAC 6-3-2 (Particulate Emission Limitations for Manufacturing Processes)
(a) Pursuant to 326 IAC 6-3-2(e)(1), the allowable particulate emissions from each of the following processes shall not exceed the pound per hour limitations specified in the following table:

Unit Description	Max. Process Weight Rate (tons/hr)	Particulate Emission Limit (lb/hr)
Iron Concentrate Transfer & Storage Area (EU001b)	4,950	100.2
Limestone Unloading & Storage Area (EU002a and EU002b)	495	68.8
Dolomite Unloading & Storage Area (EU003a and EU003b)	495	68.8
Coke Breeze Unloading & Storage Area (EU004a and EU004b)	7	15.1

The pounds per hour limitations were calculated with the following equations:

Interpolation of the data for the process weight rate up to sixty thousand (60,000) pounds per hour shall be accomplished by use of the equation:

$E = 4.10\ P^{0.67}$ where E = rate of emission in pounds per hour, and
P = process weight rate in tons per hour

Interpolation and extrapolation of the data for the process weight rate in excess of sixty thousand (60,000) pounds per hour shall be accomplished by use of the equation:

$E = 55.0\ P^{0.11} - 40$ where E = rate of emission in pounds per hour, and
P = process weight rate in tons per hour

Pursuant to 326 IAC 6-3-2(e)(3), when the process weight exceeds 200 tons per hour, the maximum allowable emissions may exceed the above emission limits, provided the concentration of particulate matter in the gas discharged to the atmosphere is less than

0.10 pounds per 1,000 pounds of gases.

Each of these emission units is capable of complying with the corresponding 326 IAC 6-3-2 limit without the use of controls.

(b) Particulate limitations pursuant to 326 IAC 2-2-3 have been established for the Iron Concentrate Unloading (EU001a), Bentonite Unloading & Storage Area (EU005), Organic Binder Unloading & Storage Area (EU006), and Soda Ash Unloading & Storage Area (EU007) that are more stringent than limitations established in 326 IAC 6-3-2(e)(1). Therefore, pursuant to 326 IAC 6-3-2(c)(1), 326 IAC 6-3-2 does not apply to these emission units.

326 IAC 7-1.1 Sulfur Dioxide Emission Limitations
These emission units are not subject to 326 IAC 326 IAC 7-1.1 because the SO_2 PTE of each emission unit is less than 25 tons per year or 10 pounds per hour.

326 IAC 8-1-6 (New Facilities; General Reduction Requirements)
326 IAC 8-1-6 does not apply since the potential VOC emissions from each emission unit is less than twenty-five (25) tons per year.

State Rule Applicability - Section D.2 (Additive Grinding and Mixing)

326 IAC 2-2-3 (PSD BACT)
(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Additive Grinding and Mixing operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations		
		Pollutant	Gr/dscf	Lb/hr
Bentonite Additive System (EU008)	Bin Vent CE008 (inside building)	PM	0.002	0.0429
		PM_{10}*	0.002	0.0429
		$PM_{2.5}$*	0.002	0.0429
Coke Breeze Additive System (EU009)	Baghouse CE009 (SV009)	PM	0.002	0.09
		PM_{10}*	0.002	0.09
		$PM_{2.5}$*	0.002	0.09
Limestone and Dolomite Grinding Mill Bin Area (EU025b)	Baghouse CE023 (inside building)	PM	0.002	0.22
		PM_{10}*	0.002	0.22
		$PM_{2.5}$*	0.002	0.22
Ground Limestone and Dolomite Area Additive System (EU010)	Baghouse CE010 (SV010)	PM	0.002	0.32
		PM_{10}*	0.002	0.32
		$PM_{2.5}$*	0.002	0.32
Mixing Area Material Handling System (EU011)	Baghouse CE011 (inside building)	PM	0.002	0.34
		PM_{10}*	0.002	0.34
		$PM_{2.5}$*	0.002	0.34
Hearth Layer Bin System (EU012)	Baghouse CE012 (SV012)	PM	0.002	0.15
		PM_{10}*	0.002	0.15
		$PM_{2.5}$*	0.002	0.15

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Additive Grinding and Mixing operations shall be an enclosure conveyor and Grizzly Feeder, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone/Dolomite Hopper &Grizzly	EU025a	PM	0.90	1.92
		PM_{10}*	0.33	0.70

Feeder/Screener and Belt Feeder		$PM_{2.5}$*	0.33	0.70

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for the Additive Grinding and Mixing operations shall be as follows:

Emission Unit Description (ID)	Control Device	Pollutant	Emission Limitations
Ground Limestone/ Dolomite Additive System Air Heater (EU010)	No Control	PM	0.0072 lb/MMBtu
		PM_{10}*	0.0072 lb/MMBtu
		$PM_{2.5}$*	0.0072 lb/MMBtu
		SO_2	0.00048 lb/MMBtu
	Low NO_x Burners	NO_x	0.012 lb/MMBtu
	No Control	F	9.40×10^{-6} lb/MMBtu
		GHG (as CO_2e)	9,737 tons per 12-month period

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

This unit shall only combust natural gas, and the Permittee shall practice good combustion practices when this unit is combusting natural gas.

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Additive Grinding and Mixing operations shall be as follows:

(1) The Fluoride Concentration in the oxide pellets handled by the mixing area material handling system (EU011) and hearth layer bin system (EU012) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Mixing Area Material Handling System (EU011)	Baghouse CE011 (inside building)	F	1.71 E-05
Hearth Layer Bin System (EU012)	Baghouse CE012 (SV012)	F	7.55 E-06

326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP))
The operation of these emission units will emit less than ten (10) tons per year for a single HAP and less than twenty-five (25) tons per year for a combination of HAPs, each. Therefore, 326 IAC 2-4.1 does not apply to these units.

326 IAC 6-3-2 (Particulate Emission Limitations for Manufacturing Processes)
(a) Pursuant to 326 IAC 6-3-2(e)(1), the allowable particulate emissions from each of the following processes shall not exceed the pound per hour limitations specified in the following table:

Unit Description	Max. Process Weight Rate (tons/hr)	Particulate Emission Limit (lb/hr)
Limestone & Dolomite Grinding Mill Bin Area (EU025a)	495	68.8

The pounds per hour limitations were calculated with the following equations:

Interpolation and extrapolation of the data for the process weight rate in excess of sixty thousand (60,000) pounds per hour shall be accomplished by use of the equation:

$E = 55.0\ P^{0.11} - 40$ where E = rate of emission in pounds per hour, and
P = process weight rate in tons per hour

Pursuant to 326 IAC 6-3-2(e)(3), when the process weight exceeds 200 tons per hour, the maximum allowable emissions may exceed the above emission limits, provided the concentration of particulate matter in the gas discharged to the atmosphere is less than 0.10 pounds per 1,000 pounds of gases.

Each of these emission units is capable of complying with the corresponding 326 IAC 6-3-2 limit without the use of controls.

(b) Particulate limitations pursuant to 326 IAC 2-2-3 have been established for the Bentonite Additive System (EU008), Coke Breeze Additive System (EU009), Ground Limestone & Dolomite Additive System (EU010), Mixing Area Material Handling System (EU011), and Hearth Layer Bin System (EU012) that are more stringent than limitations established in 326 IAC 6-3-2(e)(1). Therefore, pursuant to 326 IAC 6-3-2(c)(1), 326 IAC 6-3-2 does not apply to these emission units.

326 IAC 7-1.1 Sulfur Dioxide Emission Limitations
These emission units are not subject to 326 IAC 326 IAC 7-1.1 because the SO_2 PTE of each emission unit is less than 25 tons per year or 10 pounds per hour.

326 IAC 8-1-6 (New Facilities; General Reduction Requirements)
326 IAC 8-1-6 does not apply since the potential VOC emissions from each emission unit is less than twenty-five (25) tons per year.

State Rule Applicability - Section D.3 (Induration)

326 IAC 2-2 (PSD)
The Lead emissions from the following emission units shall not exceed the emission limits in the table below:

Emission Unit Description (ID)	Control Device (Stack ID)	Pollutant	Emission Limitations
Furnace Hood Exhaust (EU013)	Baghouse CE013 (SV013A)	Lead	0.03 lb/hr
Furnace Windbox Exhaust (EU014)	Baghouse CE016 (SV013B)	Lead	0.05 lb/hr

Compliance with the above Lead emission limits, in conjunction with the unrestricted PTE from this source, shall limit the potential to emit of Lead from the entire source to less than 0.6 tons per twelve (12) consecutive month period. Therefore, the requirements of 326 IAC 2-2, Prevention of Significant Deterioration (PSD), are not applicable to the source for Lead.

326 IAC 2-2-3 (PSD BACT)
(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for the Induration operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Pollutant	Emission Limitations
Furnace Hood Exhaust (EU013)	Baghouse CE013 (SV013A)	PM	0.004 gr/dscf
		PM	10.12 lb/hr
		PM_{10}*	0.008 gr/dscf
		PM_{10}*	20.23 lb/hr
		$PM_{2.5}$*	0.008 gr/dscf
		$PM_{2.5}$*	20.23 lb/hr
		Opacity	5% (6-minute average)

	No Control	SO_2	7.1 ppmv wet corrected to 20% O_2 and 21.68 lb/hr
	Low NO_x Burners	NO_x	0.25 lb NO_x/MMBtu and 109 lb/hr (combined emissions SV013A and SV013B)
	No Control	F	2.1 ppmv wet corrected to 20% O_2 and 1.98 lb/hr
Furnace Windbox Exhaust (EU014)	Baghouse CE016 (SV013B)	PM	0.004 gr/dscf
		PM	12.12 lb/hr
		PM_{10}*	0.008 gr/dscf
		PM_{10}*	24.25 lb/hr
		$PM_{2.5}$*	0.008 gr/dscf
		$PM_{2.5}$*	24.25 lb/hr
		Opacity	5% (6-minute average)
	GSA Dry Scrubber	SO_2	5.0 ppmv wet corrected to 15% O_2 and 19.61 lb/hr
	Low NO_x Burners	NO_x	0.25 lb NO_x/MMBtu and 109 lb/hr (combined emissions SV013A and SV013B)
	GSA Dry Scrubber	F	11.4 ppmv wet corrected to 15% O_2 and 12.34 lb/hr
Furnace Discharge System (EU015)	Baghouse CE017 (SV014)	PM	0.002 gr/dscf
		PM	0.72 lb/hr
		PM_{10}*	0.002 gr/dscf
		PM_{10}*	0.72 lb/hr
		$PM_{2.5}$*	0.002 gr/dscf
		$PM_{2.5}$*	0.72 lb/hr

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Furnace Discharge System (EU015) shall be as follows:

(1) The Fluoride Concentration in the oxide pellets handled by the furnace discharge system (EU015) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Furnace Discharge System (EU015)	Baghouse CE017 (SV014)	F	3.65 E-05

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for greenhouse gases (as CO_2e) for the Induration operations shall be as follows:

Emission Unit Description	GHG (as CO_2e) Emission Limit (tons per 12-month period)
Hardening Furnace	661,208

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the cooling tower shall be the use of drift eliminators with a maximum drift rate of 0.001%, the use of cooling water with less than 6,009 milligrams per liter TDS concentration, and a 0.138 pound per hour limitation.

326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP))

(a) The operation of the Furnace Windbox Exhuast, identified as EU014, will emit greater than ten (10) tons per year for a single HAP and greater than twenty-five (25) tons per year for a combination of HAPs. Therefore, 326 IAC 2-4.1 will apply. MACT is determined to be the use of a GSA dry scrubber with a maximum outlet HF concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit. A detailed MACT analysis is included in Appendix E.

(b) The operation of the remaining emission units will emit less than ten (10) tons per year for a single HAP and less than twenty-five (25) tons per year for a combination of HAPs, each. Therefore, 326 IAC 2-4.1 does not apply to these units.

326 IAC 6-3-2 (Particulate Emission Limitations for Manufacturing Processes)

Particulate limitations pursuant to 326 IAC 2-2-3 have been established for the Furnace Hood Exhaust (EU013), Furnace Windbox Exhaust (EU014), and Furnace Discharge System (EU015) that are more stringent than limitations established in 326 IAC 6-3-2(e)(1). Therefore, pursuant to 326 IAC 6-3-2(c)(1), 326 IAC 6-3-2 does not apply to these emission units.

326 IAC 7-1.1 Sulfur Dioxide Emission Limitations

(a) The potential to emit SO_2 from the furnace hood exhaust (EU013) and the furnace windbox exhaust (EU014) are greater than twenty-five (25) tons per year or ten (10) pounds per hour, each. Therefore, each emission unit is subject to the requirements of 326 IAC 7-1.1; however, there are no limits under this rule for natural gas combustion, coke breeze combustion, or non-combustion sources of sulfur dioxide. The source must comply with the reporting requirements in 326 IAC 7-2-1.

(b) The SO_2 emissions from the entire source are less than ten thousand (10,000) tons per year. Therefore, the requirements of 326 IAC 7-3 are not applicable.

(c) Magnetation LLC is located in White County. Therefore, the requirements of 326 IAC 7-4 are not applicable.

326 IAC 8-1-6 (New Facilities; General Reduction Requirements)

326 IAC 8-1-6 does not apply since the potential VOC emissions from each emission unit is less than twenty-five (25) tons per year.

State Rule Applicability - Section D.4 (Separation and Loadout)

326 IAC 2-2-3 (PSD BACT)

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Separation and Loadout operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations		
		Pollutant	Gr/dscf	Lb/hr
Hearth Layer Separation System (EU016)	Baghouse CE018 (inside building)	PM	0.002	0.79
		PM_{10}*	0.002	0.79
		$PM_{2.5}$*	0.002	0.79
Oxide Pellet Storage and Unloading System (EU019)	Baghouse CE019 (SV018)	PM	0.002	0.63
		PM_{10}*	0.002	0.63
		$PM_{2.5}$*	0.002	0.63

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Separation and Loadout operations shall be as follows:

(1) The Fluoride Concentration in the finished oxide pellets handled by the hearth layer separation system (EU016) and the oxide pellet storage and unloading

system (EU019) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Hearth Layer Separation System (EU016)	Baghouse CE018 (inside building)	F	3.94 E-05
Oxide Pellet Storage and Unloading System (EU019)	Baghouse CE019 (SV018)	F	3.15 E-05

326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP))
The operation of these emission units will emit less than ten (10) tons per year for a single HAP and less than twenty-five (25) tons per year for a combination of HAPs, each. Therefore, 326 IAC 2-4.1 does not apply to these units.

326 IAC 6-3-2 (Particulate Emission Limitations for Manufacturing Processes)
Particulate limitations pursuant to 326 IAC 2-2-3 have been established for the Hearth Layer Separation System (EU016) and Oxide Pellet Storage and Unloading System (EU019) that are more stringent than limitations established in 326 IAC 6-3-2(e)(1). Therefore, pursuant to 326 IAC 6-3-2(c)(1), 326 IAC 6-3-2 does not apply to these emission units.

326 IAC 7-1.1 Sulfur Dioxide Emission Limitations
These emission units are not subject to 326 IAC 326 IAC 7-1.1 because the SO_2 PTE of each emission unit is less than 25 tons per year or 10 pounds per hour.

326 IAC 8-1-6 (New Facilities; General Reduction Requirements)
326 IAC 8-1-6 does not apply since the potential VOC emissions from each emission unit is less than twenty-five (25) tons per year.

State Rule Applicability - Section D.5 (Windbox Exhaust Air Pollution Control Equipment)

326 IAC 2-2-3 (PSD BACT)

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Windbox Exhaust Air Pollution Control Equipment operations shall be as follows:

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations		
		Pollutant	Gr/dscf	Lb/hr
WBE Lime Storage Area (EU020)	Bin Vent CE020 (inside building)	PM	0.002	0.02
		PM_{10}*	0.002	0.02
		$PM_{2.5}$*	0.002	0.02
WBE Residual Product Loading Area (EU022)	Bin Vent CE021 (inside building)	PM	0.002	0.02
		PM_{10}*	0.002	0.02
		$PM_{2.5}$*	0.002	0.02
Recycled Dust Storage Area (EU026)	Baghouse CE024 (inside building)	PM	0.002	0.16
		PM_{10}*	0.002	0.16
		$PM_{2.5}$*	0.002	0.16

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the Windbox Exhaust Air Pollution Control Equipment shall be as follows:

(1) The Fluoride Concentration in the recycled handled by the recycled dust storage areas (EU026) shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly, and

Emission Unit Description (ID)	Control Device (Stack ID)	Emission Limitations	
		Pollutant	Lb/hr
Recycled Dust Storage Area (EU026)	Baghouse CE024 (inside building)	F	7.88 E-06

326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP))
The operation of these emission units will emit less than ten (10) tons per year for a single HAP and less than twenty-five (25) tons per year for a combination of HAPs, each. Therefore, 326 IAC 2-4.1 does not apply to these units.

326 IAC 6-3-2 (Particulate Emission Limitations for Manufacturing Processes)
Particulate limitations pursuant to 326 IAC 2-2-3 have been established for the WBE Lime Storage Silo (EU020), WBE Residual Product Loading Area (EU022), and Recycled Dust Storage Area (EU026) that are more stringent than limitations established in 326 IAC 6-3-2(e)(1). Therefore, pursuant to 326 IAC 6-3-2(c)(1), 326 IAC 6-3-2 does not apply to these emission units.

326 IAC 7-1.1 Sulfur Dioxide Emission Limitations
These emission units are not subject to 326 IAC 326 IAC 7-1.1 because the SO_2 PTE of each emission unit is less than 25 tons per year or 10 pounds per hour.

326 IAC 8-1-6 (New Facilities; General Reduction Requirements)
326 IAC 8-1-6 does not apply since the potential VOC emissions from each emission unit is less than twenty-five (25) tons per year.

State Rule Applicability - Section D.6 (Insignificant Activities)

326 IAC 2-2-3 (PSD BACT)

(a) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for the insignificant activities shall be as follows:

Emission Unit Description (ID)	Control Device	Pollutant	Emission Limitations
Emergency Generator (EU017), Fire Pump (EU018)	No Control	PM	0.20 g/kw-hr, each
		PM_{10}*	0.20 g/kw-hr, each
		$PM_{2.5}$*	0.20 g/kw-hr, each
		SO_2	0.0015 g/kw-hr, each
		NO_x	0.50 g/hp-hr, each
		F	6.95×10^{-6} lb/MMBtu, each
Space Heaters (EU021), Coke Breeze Additive System Air Heater (EU009)	No Control	PM	0.0072 lb/MMBtu, each
		PM_{10}*	0.0072 lb/MMBtu, each
		$PM_{2.5}$*	0.0072 lb/MMBtu, each
		SO_2	0.00048 lb/MMBtu, each
	Low NO_x Burners	NO_x	0.05 lb/MMBtu, each
	No Control	F	9.40×10^{-6} lb/MMBtu, each

*PM_{10} and $PM_{2.5}$ include both filterable and condensible.

(1) These units shall only combust natural gas, and the Permittee shall practice good combustion practices when these units are combusting natural gas.

(2) The emergency generator (EU017) shall not exceed 500 hours of operation per 12-month period.

(3) The fire pump (EU018) shall not exceed 500 hours of operation per 12-month period.

(b) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for greenhouse gases (as CO_2e) for the insignificant activities shall be as follows:

Emission Unit		GHG (as CO_2e) Emission Limit (tons per 12-month period)
Description	Unit No.	
Emergency Generator	EU017	144
Fire Pump	EU018	66
Space Heaters	EU021	3,587
Coke Breeze Additive System Air Heater	EU009	871

(c) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System shall be that the opacity shall not exceed five percent (5%) on a six (6) minute average and the following:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Iron Ore Wet Grinding and Filter Cake Production	PM	0.77	3.37
	PM_{10}*	0.07	0.31
	$PM_{2.5}$*	0.07	0.31
Greenball Production System	PM	0.77	3.37
	PM_{10}*	0.07	0.31
	$PM_{2.5}$*	0.07	0.31

(d) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for total fluorides for the insignificant activities shall be as follows:

(1) The Fluoride Concentration in the material handled by the iron ore wet grinding and filter cake production and greenball production system shall be less than or equal to 50.0 mg/kg, per twelve (12) consecutive month period with compliance determined monthly.

(e) Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (PSD BACT) for PM, PM_{10}, and $PM_{2.5}$ for the Paved Roads shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan.

326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP))
The operation of these emission units will emit less than ten (10) tons per year for a single HAP and less than twenty-five (25) tons per year for a combination of HAPs, each. Therefore, 326 IAC 2-4.1 does not apply to these units.

326 IAC 6-3-2 (Particulate Emission Limitations for Manufacturing Processes)
Pursuant to 326 IAC 6-3-2(e)(1), the allowable particulate emissions from each of the following processes shall not exceed the pound per hour limitations specified in the following table:

Unit Description	Max. Process Weight Rate (tons/hr)	Particulate Emission Limit (lb/hr)
Iron Concentrate Wet Grinding and Filter Cake Production System	900	76.2
Greenball Production System	700	73.0

The pounds per hour limitations were calculated with the following equations:

Interpolation and extrapolation of the data for the process weight rate in excess of sixty thousand (60,000) pounds per hour shall be accomplished by use of the equation:

$E = 55.0\ P^{0.11} - 40$ where E = rate of emission in pounds per hour, and

P = process weight rate in tons per hour

Pursuant to 326 IAC 6-3-2(e)(3), when the process weight exceeds 200 tons per hour, the maximum allowable emissions may exceed the above emission limits, provided the concentration of particulate matter in the gas discharged to the atmosphere is less than 0.10 pounds per 1,000 pounds of gases.

Each of these emission units is capable of complying with the corresponding 326 IAC 6-3-2 limit without the use of controls.

326 IAC 7-1.1 Sulfur Dioxide Emission Limitations
These emission units are not subject to 326 IAC 326 IAC 7-1.1 because the SO_2 PTE of each emission unit is less than 25 tons per year or 10 pounds per hour.

326 IAC 8-1-6 (New Facilities; General Reduction Requirements)
326 IAC 8-1-6 does not apply since the potential VOC emissions from each emission unit is less than twenty-five (25) tons per year.

326 IAC 8-4-6 (Gasoline Dispensing Facilities)
The insignificant petroleum fuel dispensing facility does not meet the definition of a "gasoline dispensing facility" because, pursuant to 326 IAC 8-4-6(a)(8), diesel fuel is not considered to be a motor vehicle fuel. Therefore, the requirements of 326 IAC 8-4-6 are not applicable.

Compliance Determination and Monitoring Requirements

Permits issued under 326 IAC 2-7 are required to ensure that sources can demonstrate compliance with all applicable state and federal rules on a continuous basis. All state and federal rules contain compliance provisions; however, these provisions do not always fulfill the requirement for a continuous demonstration. When this occurs, IDEM, OAQ, in conjunction with the source, must develop specific conditions to satisfy 326 IAC 2-7-5. As a result, compliance determination requirements are included in the permit. The compliance determination requirements in Section D of the permit are those conditions that are found directly within state and federal rules and the violation of which serves as grounds for enforcement action.

If the compliance determination requirements are not sufficient to demonstrate continuous compliance, they will be supplemented with compliance monitoring requirements, also in Section D of the permit. Unlike compliance determination requirements, failure to meet compliance monitoring conditions would serve as a trigger for corrective actions and not grounds for enforcement action. However, a violation in relation to a compliance monitoring condition will arise through a source's failure to take the appropriate corrective actions within a specific time period.

The compliance determination requirements applicable to this source are as follows:

(a) The emission units associated with Raw Material Handling have applicable compliance determination conditions as specified below:

(1) Emission Controls Operation
Each of the following emission units shall be controlled by the associated control devices, as listed in the table below, when the corresponding units are in operation:

Emission Unit	Control Device
Iron Concentrate Unloading (EU001a)	Baghouse CE001
Coke Breeze Unloading/Storage Area (EU004b)	Baghouse CE004

Emission Unit	Control Device
Bentonite Unloading/Storage Area (EU005)	Bin Vent CE005
Organic Binder Unloading/Storage Area (EU006)	Bin Vent CE006
Soda Ash Unloading/Storage Area (EU007)	Bin Vent CE007

(2) Testing Requirements
Not later than 180 days from plant startup, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing of the Group 1 emission points (as indicated below) utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

Group 1 Emission Points
Baghouse CE001
Baghouse CE009
Stacks SV013A, SV013B, SV014
Baghouse CE019

Not later than 180 days from the date the last of the tests required above is completed or not later than 360 days from plant startup, whichever is later, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing of the Group 2 emission points (as indicated below) utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

Group 2 Emission Points
Baghouse CE004
Baghouse CE023
Baghouse CE010
Baghouse CE011
Baghouse CE012
Baghouse CE018
Baghouse CE024

(3) Total Fluorides Emissions and Fluoride Content
The Permittee shall provide a documentation and/or analysis of the fluoride concentration of the iron concentrate to ensure compliance with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

These requirements are required to ensure compliance with 326 IAC 2-2 (PSD) and 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes).

(b) The emission units associated with Additive Grinding and Mixing have applicable compliance determination conditions as specified below:

(1) Emission Controls Operation
Each of the following emission units shall be controlled by the associated control device, as listed in the table below, when the corresponding units are in operation:

Emission Unit	Control Device
Bentonite Additive System (EU008)	Bin Vent CE008
Coke Breeze Additive System (EU009)	Baghouse CE009
Limestone/Dolomite Grinding Mill Bin Area (EU025b)	Baghouse CE023

Emission Unit	Control Device
Ground Limestone/ Dolomite Additive System (EU010)	Baghouse CE010
Mixing Area Material Handling System (EU011)	Baghouse CE011
Hearth Layer Bin System (EU012)	Baghouse CE012
Ground Limestone/ Dolomite Additive System Air Heater (EU010)	Low NO_x Burners

(2) Testing Requirements
Not later than 180 days from plant startup, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing of the Group 1 emission points (as indicated below) utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

Group 1 Emission Points
Baghouse CE001
Baghouse CE009
Stacks SV013A, SV013B, SV014
Baghouse CE019

Not later than 180 days from the date the last of the tests required above is completed or not later than 360 days from plant startup, whichever is later, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing of the Group 2 emission points (as indicated below) utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

Group 2 Emission Points
Baghouse CE004
Baghouse CE023
Baghouse CE010
Baghouse CE011
Baghouse CE012
Baghouse CE018
Baghouse CE024

(3) Total Fluorides Emissions and Fluoride Content
The Permittee shall provide a documentation and/or analysis of the fluoride concentration of the oxide pellets (greenballs) to determine the compliance status with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

(4) Greenhouse Gases
The Permittee shall use the given CO_2e emissions formula to determine to determine the compliance status with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

These requirements are required to ensure compliance with 326 IAC 2-2 (PSD) and 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes).

(c) The emission units associated with Induration have applicable compliance determination conditions as specified below:

(1) Emission Controls Operation
Each of the following emission units shall be controlled by the associated control device, as listed in the table below, when the corresponding units are in operation:

Emission Unit	Control Device
Furnace Hood Exhaust (EU013)	Baghouse CE013
Furnace Windbox Exhaust (EU014)	Low NO_x LE Burners
Furnace Windbox Exhaust (EU014)	Gas Suspension Absorber CE015
Furnace Windbox Exhaust (EU014)	Baghouse CE016
Furnace Discharge System (EU015)	Baghouse CE017

(2) Testing Requirements

(a) Not later than 180 days from plant startup, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing of the Group 1 emission points (as indicated below) utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

Group 1 Emission Points
Baghouse CE001
Baghouse CE009
Stacks SV013A, SV013B, SV014
Baghouse CE019

(b) Not later than 180 days from plant startup, the Permittee shall perform SO_2, NO_x, and Fluoride testing for stacks SV013A and SV013B utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

(c) Not later than 180 days from plant startup, the Permittee shall perform lead testing for stacks SV013A and SV013B utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

(3) Total Fluorides Emissions and Fluoride Content
The Permittee shall provide a documentation and/or analysis of the fluoride concentration of the finished oxide pellets to determine the compliance status with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

(4) Greenhouse Gases
The Permittee shall use the given CO_2e emissions formula to determine to determine the compliance status with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

(5) Cooling Tower Total Dissolved Solids
The Permittee shall perform tests of the total dissolved solids (TDS) in the blow-down water on a weekly basis using an EPA approved test and shall make a notation of water circulation rate at the time of the test. The Permittee shall calculate the PM, PM_{10}, and $PM_{2.5}$ emission rates using an EPA-approved calculation based on the TDS testing results and the water circulation rate at the time of the TDS testing.

These requirements are required to ensure compliance with 326 IAC 2-2 (PSD) and 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes).

(d) The emission units associated with Separation and Loadout have applicable compliance determination conditions as specified below:

(1) Emission Controls Operation
Each of the following emission units shall be controlled by the associated control device, as listed in the table below, when the corresponding units are in operation:

Emission Unit	Control Device
Hearth Layer Separation System (EU016)	Baghouse CE018
Oxide Pellet Storage/Unloading System (EU019)	Baghouse CE019

(2) Testing Requirements
Not later than 180 days from plant startup, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing of the Group 1 emission points (as indicated below) utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

Group 1 Emission Points
Baghouse CE001
Baghouse CE009
Stacks SV013A, SV013B, SV014
Baghouse CE019

Not later than 180 days from the date the last of the tests required above is completed or not later than 360 days from plant startup, whichever is later, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing of the Group 2 emission points (as indicated below) utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

Group 2 Emission Points
Baghouse CE004
Baghouse CE023
Baghouse CE010
Baghouse CE011
Baghouse CE012
Baghouse CE018
Baghouse CE024

(3) Total Fluorides Emissions and Fluoride Content
The Permittee shall provide a documentation and/or analysis of the fluoride concentration of the finished oxide pellets to determine the compliance status with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

These requirements are required to ensure compliance with 326 IAC 2-2 (PSD) and 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes).

(e) The emission units associated with Windbox Exhaust Air Pollution Control Equipment have applicable compliance determination conditions as specified below:

(1) Emission Controls Operation
Each of the following emission units shall be controlled by the associated control device, as listed in the table below, when the corresponding units are in operation:

Emission Unit	Control Device
WBE Lime Storage Area (EU020)	Bin Vent CE020
WBE Residual Product Loading Area (EU022)	Bin Vent CE021

Emission Unit	Control Device
Recycled Dust Storage Area (EU026)	Baghouse CE024

(2) Testing Requirements
Not later than 180 days from the date the last of the tests required of the Group 1 emission points is completed or not later than 360 days from plant startup, whichever is later, the Permittee shall perform PM, PM_{10}, and $PM_{2.5}$ testing of the Group 2 emission points (as indicated below) utilizing methods as approved by the Commissioner. Testing shall be repeated every five (5) years.

Group 2 Emission Points
Baghouse CE004
Baghouse CE023
Baghouse CE010
Baghouse CE011
Baghouse CE012
Baghouse CE018
Baghouse CE024

(3) Total Fluorides Emissions and Fluoride Content
The Permittee shall provide a documentation and/or analysis of the fluoride concentration of the recycled dust to determine the compliance status with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

These requirements are required to ensure compliance with 326 IAC 2-2 (PSD) and 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes).

(f) The emission units associated with Insignificant Activities have applicable compliance determination conditions as specified below:

(1) Emission Controls Operation
Each of the following emission units shall be controlled by the associated control device, as listed in the table below, when the corresponding units are in operation:

Emission Unit Description	Control Device
Iron Concentrate Wet Grinding and Filter Cake Production System	Wet Spray
Greenball Production System	Wet Spray
Space Heaters (EU021)	Low NOx Burners
Coke Breeze Additive System Air Heater (EU009)	Low NOx Burners

(2) Total Fluorides Emissions and Fluoride Content
The Permittee shall provide a documentation and/or analysis of the fluoride concentration of the filter cake material and greenball material to determine the compliance status with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

(3) Greenhouse Gases
The Permittee shall use the given CO_2e emissions formula to determine to determine the compliance status with the emission limitations pursuant to 326 IAC 2-2-3 (PSD BACT).

These requirements are required to ensure compliance with 326 IAC 2-2 (PSD) and 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes).

The compliance monitoring requirements applicable to this source are as follows:

(a) The emission units associated with Raw Material Handling have applicable compliance determination conditions as specified below:

(1) Visible Emissions Notations
The Permittee shall perform daily visible emission notations of the following stack exhausts: baghouses CE001 and CE004.

(2) Baghouse Parametric Monitoring
The Permittee shall record the pressure drop across baghouses CE001 and CE004 at least once per day when the associated emission units are in operation.

(3) Bin Vent Inspections
The Permittee shall perform semi-annual inspections of the following bin vents: bin vents CE005, CE006, and CE007.

(4) Broken or Failed Bag Detection
The Permittee shall maintain the baghouses and replace broken or failed bags as needed.

(5) Bin Vent Filter Failure Detection
The Permittee shall maintain the bin vents and replace broken or failed bags as needed.

These monitoring conditions are necessary because the baghouses and bin vents must operate properly to ensure compliance with 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes), 326 IAC 2-2 (PSD), and 326 IAC 2-7 (Part 70).

(b) The emission units associated with Additive Grinding and Mixing have applicable compliance determination conditions as specified below:

(1) Visible Emissions Notations
The Permittee shall perform daily visible emission notations of the following stack exhausts: baghouses CE009, CE010, and CE012.

(2) Baghouse Parametric Monitoring
The Permittee shall record the pressure drop across baghouses CE009, CE010, and CE012 at least once per day when the associated emission units are in operation.

(3) Baghouse and Bin Vent Inspections
The Permittee shall perform semi-annual inspections of baghouses CE023 and CE011 and bin vent CE008.

(4) Broken or Failed Bag Detection
The Permittee shall maintain the baghouses and replace broken or failed bags as needed.

(5) Bin Vent Filter Failure Detection
The Permittee shall maintain the bin vents and replace broken or failed bags as needed.

These monitoring conditions are necessary because the baghouses and bin vents must operate properly to ensure compliance with 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes), 326 IAC 2-2 (PSD), and 326 IAC 2-7 (Part 70).

(c) The emission units associated with Induration have applicable compliance determination conditions as specified below:

(1) Visible Emissions Notations
The Permittee shall perform daily visible emission notations of the following stack exhaust: baghouse CE017.

(2) Baghouse Parametric Monitoring
The Permittee shall record the pressure drop across baghouse CE017 at least once per day when the associated emission units are in operation.

(3) Broken or Failed Bag Detection
The Permittee shall maintain the baghouse and replace broken or failed bags as needed.

(4) Gas Suspension Absorber Monitoring
The Permittee shall monitor the minimum air flow rate through the reactor at least once per day when the hardening furnace is in operation.

These monitoring conditions are necessary because the baghouses and gas suspension absorber must operate properly to ensure compliance with 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes), 326 IAC 2-2 (PSD), 40 CFR 64 (CAM), and 326 IAC 2-7 (Part 70).

(d) The emission units associated with Separation and Loadout have applicable compliance determination conditions as specified below:

(1) Visible Emissions Notations
The Permittee shall perform daily visible emission notations of the following stack exhaust: baghouse CE019.

(2) Baghouse Parametric Monitoring
The Permittee shall record the pressure drop across baghouse CE019 at least once per day when the associated emission units are in operation.

(3) Baghouse Inspections
The Permittee shall perform semi-annual inspections of baghouse CE018.

(4) Broken or Failed Bag Detection
The Permittee shall maintain the baghouse and replace broken or failed bags as needed.

These monitoring conditions are necessary because the baghouses must operate properly to ensure compliance with 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes), 326 IAC 2-2 (PSD), and 326 IAC 2-7 (Part 70).

(e) The emission units associated with Windbox Exhaust Air Pollution Control Equipment have applicable compliance determination conditions as specified below:

(1) Baghouse and Bin Vent Inspections
The Permittee shall perform semi-annual inspections of baghouse CE024 and bin vents CE020 and CE021.

(2) Broken or Failed Bag Detection
The Permittee shall maintain the baghouse and replace broken or failed bags as needed.

(3) Bin Vent Filter Failure Detection
The Permittee shall maintain the bin vents and replace broken or failed bags as needed.

These monitoring conditions are necessary because the baghouses and bin vents must operate properly to ensure compliance with 326 IAC 6-3 (Particulate Emission Limitations for Manufacturing Processes), 326 IAC 2-2 (PSD), and 326 IAC 2-7 (Part 70).

(f) There are no applicable compliance determination conditions associated with the Insignificant Activities.

Recommendation

The staff recommends to the Commissioner that the Prevention of Significant Deterioration (PSD) and Part 70 Operating Permit be approved. This recommendation is based upon the following facts and conditions:

Unless otherwise stated, information used in this review was derived from the application and additional information submitted by the applicant.

An application for the purposes of this review was received on July 2, 2012. Additional information was received on July 13, 2012; August 7, 2012; August 28, 2012; September 5, 2012; September 17, 2012; September 19, 2012; September 24, 2012; September 27, 2012; October 22, 2012; October 24, 2012; November 2, 2012; November 6, 2012; November 29, 2012; and December 7, 2012.

Conclusion

The construction and operation of this iron ore pelletizing plant shall be subject to the conditions of the attached Prevention of Significant Deterioration (PSD) and Part 70 Operating Permit No. T181-32081-00054.

IDEM Contact

(a) Questions regarding this proposed permit can be directed to John Haney at the Indiana Department Environmental Management, Office of Air Quality, Permits Branch, 100 North Senate Avenue, MC 61-53 IGCN 1003, Indianapolis, Indiana 46204-2251 or by telephone at (317) 234-5328 or toll free at 1-800-451-6027 extension 4-5328.

(b) A copy of the findings is available on the Internet at: http://www.in.gov/ai/appfiles/idem-caats/

(c) For additional information about air permits and how the public and interested parties can participate, refer to the IDEM's Guide for Citizen Participation and Permit Guide on the Internet at: www.idem.in.gov

Appendix A: Emissions Calculations
Source Summary
Potential to Emit

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Potential To Emit before Control

Emission Units				PM (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)	SO_2 (tons/yr)	NO_x (tons/yr)	VOC (tons/yr)	CO (tons/yr)	Pb (tons/yr)	Fluorides (tons/yr)	H_2SO_4 (tons/yr)	GHGs as CO_2e (tons/yr)	Total HAPs (tons/yr)	Single HAP (tons/yr)	HAP
Iron Concentrate Unloading	EU001a	Baghouse	SV001	414.02	414.02	414.02	-	-	-	-	1.37E-02	2.07E-02	-	-	0.36	0.31	manganese
Iron Concentrate Transfer & Storage Area (pile)	EU001b	fugitives	enclosure	68.83	27.53	27.53	-	-	-	-		3.44E-03	-	-			
Limestone Unloading (truck)	EU002a	fugitives	atmosphere	2.20E-03	2.20E-03	2.20E-03	-	-	-	-	2.07E-06	-	-	-	2.40E-04	2.31E-04	manganese
Limestone Conveyor & Enclosed Storage (pile)	EU002b	fugitives	enclosure	0.41	0.15	0.15	-	-	-	-		-	-	-			
Dolomite Unloading (truck)	EU003a	fugitives	atmosphere	1.22E-03	1.22E-03	1.22E-03	-	-	-	-	-	-	-	-	-	-	-
Dolomite Conveyor & Enclosed Storage (pile)	EU003b	fugitives	enclosure	0.23	0.08	0.08	-	-	-	-		-	-	-			
Coke Breeze Unloading (truck)	EU004a	fugitives	atmosphere	3.26E-03	1.54E-03	4.45E-04	-	-	-	-	2.44E-03	-	-	-	0.11	0.08	manganese
Coke Breeze Pneumatic Coveyance & Storage Bin	EU004b	Baghouse	SV004	18.77	18.77	18.77	-	-	-	-		-	-	-			
Bentonite Unloading (truck) & Storage Area	EU005	Bin Vent	building	18.77	18.77	18.77	-	-	-	-	-	-	-	-	-	-	-
Organic Binder Unloading & Storage Area	EU006	Bin Vent	building	18.77	18.77	18.77	-	-	-	-	-	-	-	-	1.82	1.82	chlorine
Soda Ash Unloading & Storage Area	EU007	Bin Vent	building	18.77	18.77	18.77	-	-	-	-	1.88E-05	-	-	-	0.02	0.02	chlorine
Bentonite Additive System	EU008	Bin Vent	building	18.77	18.77	18.77	-	-	-	-	-	-	-	-	-	-	-
Coke Breeze Additive System	EU009	Baghouse	SV009	41.30	41.30	41.30	-	-	-	-	5.37E-03	-	-	-	0.23	0.17	manganese
Coke Breeze Additive System Air Heater		--	--				4.38E-03	0.37	0.04	0.61	3.65E-06	6.86E-08	-	871	0.01	0.01	hexane
Limestone/Dolomite hopper, belt feeder, grizzly feeder	EU025a	fugitives	atmosphere	1.92	0.70	0.70	-	-	-	-	3.32E-03	-	-	-	0.09	0.08	manganese
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse	building	96.61	96.61	96.61	-	-	-	-		-	-	-			
Ground Limestone and Dolomite Additive System	EU010	Baghouse	SV010	138.96	138.96	138.96	-	-	-	-	3.27E-04	-	-	-	0.04	0.04	manganese
Limestone/Dolomite Additive System Air Heater		--	--				0.05	4.08	0.45	6.85	4.08E-05	7.67E-07	-	9,737	0.15	0.15	hexane
Mixing Area Material Handling System	EU011	Baghouse	building	150.17	150.17	150.17	-	-	-	-	1.50E-03	7.51E-03	-	-	0.10	0.08	manganese
Hearth Layer Bin System	EU012	Baghouse	SV012	66.17	66.17	66.17	-	-	-	-	6.62E-04	3.31E-03	-	-	0.05	0.04	manganese
Furnace Hood Exhaust	EU013	Baghouse	SV013A	4,430.99	8,861.98	8,861.98	94.94	35.81	1.74	3.62	0.80	8.66	0.24	661,208	11.89	9.11	hydrogen fluoride
Furnace Windbox Exhaust	EU014	Baghouse/GSA	SV013B	5,310.36	10,620.72	10,620.72	1,170.90	441.61	21.41	44.60	1.43	164.51	3.01		217.05	173.16	hydrogen fluoride
Furnace Discharge System	EU015	Baghouse	SV014	320.16	320.16	320.16	-	-	-	-	6.40E-04	1.60E-02	-	-	0.23	0.20	manganese
Hearth Layer Separation System	EU016	Baghouse	building	345.02	345.02	345.02	-	-	-	-	6.90E-04	1.73E-02	-	-	0.25	0.22	manganese
Oxide Pellet Storage & Unloading System	EU019	Baghouse	SV018	276.02	276.02	276.02	-	-	-	-	5.52E-04	1.38E-02	-	-	0.20	0.18	manganese
WBE Lime Storage Area	EU020	Bin Vent	building	7.51	7.51	7.51	-	-	-	-	-	-	-	-	1.50E-03	1.50E-03	manganese
WBE Residual Product Loading Area	EU022	Bin Vent	building	7.51	7.51	7.51	-	-	-	-	-	-	-		1.50E-03	1.50E-03	manganese
Recycled Dust Storage Area	EU026	Baghouse	building	69.00	69.00	69.00	-	-	-	-	1.38E-04	3.45E-03	-		0.05	0.04	manganese
Space Heaters	EU021	--	--	0.23	0.23	0.23	0.02	1.50	0.17	2.52	-	2.83E-07	-	3,587	0.41	0.39	hexane
Emergency Generator - Natural Gas	EU017	--	SV016	0.00	0.00	0.00	2.32E-04	1.61	0.05	0.12	-	7.67E-07	-	136	1.47	1.07	formaldehyde
Fire Water Pump - Natural Gas	EU018	--	SV017	0.00	0.00	0.00	1.12E-04	0.78	0.02	0.06	-	6.86E-08	-	66	0.71	0.52	formaldehyde
Cooling Tower	EU024	--	SV022	0.61	0.61	0.61	-	-	-	-	-	-	-	-	-	-	-
Iron Ore Wet Grinding and Filter Cake Production	IA	Wet Suppression	building	67.40	6.20	6.20	-	-	-	-	6.74E-04	3.37E-03	-	-	0.05	0.04	manganese
Greenball Production System	IA	Wet Suppression	building	67.40	6.20	6.20	-	-	-	-	6.74E-04	3.37E-03	-	-	0.05	0.04	manganese
Paved Roads	IA	fugitives	atmosphere	11.65	2.33	0.57	-	-	-	-	-	-	-	-	-	-	-
Total PTE at Entire Source (Including Fugitives)				**11,986.32**	**21,553.04**	**21,551.28**	**1,265.90**	**485.75**	**23.87**	**58.39**	**2.26**	**173.26**	**3.25**	**675,605**	**235.33**	**182.28**	**hydrogen fluoride**

Controlled Potential To Emit

Emission Units				PM (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)	SO_2 (tons/yr)	NO_x (tons/yr)	VOC (tons/yr)	CO (tons/yr)	Pb (tons/yr)	Fluorides (tons/yr)	H_2SO_4 (tons/yr)	GHGs as CO_2e (tons/yr)	Total HAPs (tons/yr)	Single HAP (tons/yr)	HAP
Iron Concentrate Unloading	EU001a	Baghouse	SV001	4.14	4.14	4.14	-	-	-	-	1.37E-04	2.07E-04	-	-	3.60E-03	3.15E-03	manganese
Iron Concentrate Transfer & Storage Area (pile)	EU001b	fugitives	enclosure	17.21	6.88	6.88	-	-	-	-		8.60E-04	-	-			
Limestone Unloading (truck)	EU002a	fugitives	atmosphere	2.20E-03	2.20E-03	2.20E-03	-	-	-	-	5.26E-07	-	-	-	6.10E-05	5.87E-05	manganese
Limestone Conveyor & Enclosed Storage (pile)	EU002b	fugitives	enclosure	0.10	0.04	0.04	-	-	-	-		-	-	-			
Dolomite Unloading (truck)	EU003a	fugitives	atmosphere	1.22E-03	1.22E-03	1.22E-03	-	-	-	-	-	-	-	-	-	-	-
Dolomite Conveyor & Enclosed Storage (pile)	EU003b	fugitives	enclosure	0.06	0.02	0.02	-	-	-	-		-	-	-			
Coke Breeze Unloading (truck)	EU004a	fugitives	atmosphere	3.26E-03	1.54E-03	4.45E-04	-	-	-	-	2.48E-05	-	-	-	1.14E-03	7.98E-04	manganese
Coke Breeze Pneumatic Coveyance & Storage Bin	EU004b	Baghouse	SV004	0.19	0.19	0.19	-	-	-	-		-	-				
Bentonite Unloading (truck) & Storage Area	EU005	Bin Vent	building	0.19	0.19	0.19	-	-	-	-	-	-	-	-	-	-	-
Organic Binder Unloading & Storage Area	EU006	Bin Vent	building	0.19	0.19	0.19	-	-	-	-	-	-	-	-	0.02	0.02	chlorine
Soda Ash Unloading & Storage Area	EU007	Bin Vent	building	0.19	0.19	0.19	-	-	-	-	1.88E-07	-	-	-	2.43E-04	2.43E-04	chlorine
Bentonite Additive System	EU008	Bin Vent	building	0.19	0.19	0.19	-	-	-	-	-	-	-	-	-	-	-
Coke Breeze Additive System	EU009	Baghouse	SV009	0.41	0.41	0.41	-	-	-	-	-	-	-	-	0.23	-	-
Coke Breeze Additive System Air Heater		--	--				4.38E-03	0.37	0.04	0.61	5.73E-05	6.86E-08	-	871	0.02	0.01	hexane
Limestone/Dolomite hopper, belt feeder, grizzly feeder	EU025a	fugitives	atmosphere	1.92	0.70	0.70	-	-	-	-	1.15E-05	-	-		1.34E-03	1.29E-03	manganese
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse	building	0.97	0.97	0.97	-	-	-	-		-	-				
Ground Limestone and Dolomite Additive System	EU010	Baghouse	SV010	1.39	1.39	1.39	-	-	-	-	-	-	-	-	0.04	-	-
Limestone/Dolomite Additive System Air Heater		--	--				0.05	4.08	0.45	6.85	4.41E-05	7.67E-07	-	9,737	0.15	0.15	hexane
Mixing Area Material Handling System	EU011	Baghouse	building	1.50	1.50	1.50	-	-	-	-	1.50E-05	7.51E-05	-	-	1.03E-03	8.11E-04	manganese
Hearth Layer Bin System	EU012	Baghouse	SV012	0.66	0.66	0.66	-	-	-	-	6.62E-06	3.31E-05	-	-	4.52E-04	3.57E-04	manganese
Furnace Hood Exhaust	EU013	Baghouse	SV013A	44.31	88.62	88.62	94.94	35.81	1.74	3.62	7.71E-03	8.66	0.02	661,208	9.63	9.11	hydrogen fluoride
Furnace Windbox Exhaust	EU014	Baghouse/GSA	SV013B	53.10	106.21	106.21	85.89	441.61	21.41	44.60	7.71E-03	54.06	0.22		66.60	56.90	hydrogen fluoride
Furnace Discharge System	EU015	Baghouse	SV014	3.20	3.20	3.20	-	-	-	-	6.40E-06	1.60E-04	-	-	2.29E-03	2.05E-03	manganese
Hearth Layer Separation System	EU016	Baghouse	building	3.45	3.45	3.45	-	-	-	-	6.90E-06	1.73E-04	-	-	2.47E-03	2.21E-03	manganese
Oxide Pellet Storage & Unloading System	EU019	Baghouse	SV018	2.76	2.76	2.76	-	-	-	-	5.52E-06	1.38E-04	-	-	1.97E-03	1.77E-03	manganese
WBE Lime Storage Area	EU020	Bin Vent	building	0.08	0.08	0.08	-	-	-	-	-	-	-	-	1.50E-05	1.50E-05	manganese
WBE Residual Product Loading Area	EU022	Bin Vent	building	0.08	0.08	0.08	-	-	-	-	-	-	-		1.50E-05	1.50E-05	manganese
Recycled Dust Storage Area	EU026	Baghouse	building	0.69	0.69	0.69	-	-	-	-	1.38E-06	3.45E-05	-		4.93E-04	4.42E-04	manganese
Space Heaters	EU021	--	--	0.23	0.23	0.23	0.02	1.50	0.17	2.52	-	2.83E-07	-	3,587	0.41	0.39	hexane
Emergency Generator - Natural Gas	EU017	--	SV016	0.00	0.00	0.00	2.32E-04	1.61	0.05	0.12	-	2.74E-06	-	136	1.47	1.07	formaldehyde
Fire Water Pump - Natural Gas	EU018	--	SV017	0.00	0.00	0.00	1.12E-04	0.78	0.02	0.06	-	1.32E-06	-	66	0.71	0.52	formaldehyde
Cooling Tower	EU024	--	SV022	0.61	0.61	0.61	-	-	-	-	-	-	-		-	-	-
Iron Ore Wet Grinding and Filter Cake Production	IA	Wet Suppression	building	3.37	0.31	0.31	-	-	-	-	6.74E-06	1.68E-04	-		2.41E-03	2.16E-03	manganese
Greenball Production System	IA	Wet Suppression	building	3.37	0.31	0.31	-	-	-	-	6.74E-06	1.68E-04	-		2.41E-03	2.16E-03	manganese
Paved Roads	IA	fugitives	atmosphere	11.65	2.33	0.57	-	-	-	-	-	-	-	-	-	-	-
Total PTE at Entire Source (Including Fugitives)				**156.20**	**226.53**	**224.77**	**180.90**	**485.75**	**23.87**	**58.39**	**0.02**	**62.72**	**0.24**	**675,605**	**79.29**	**66.02**	**hydrogen fluoride**

Limted Potential To Emit after Issuance of Permit

Emission Units				PM (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)	SO_2 (tons/yr)	NO_x (tons/yr)	VOC (tons/yr)	CO (tons/yr)	Pb (tons/yr)	Fluorides (tons/yr)	H_2SO_4 (tons/yr)	GHGs as CO_2e (tons/yr)	Total HAPs (tons/yr)	Single HAP (tons/yr)	HAP
Iron Concentrate Unloading	EU001a	Baghouse	SV001	4.14	4.14	4.14	-	-	-	-	1.37E-02	2.07E-04	-	-	3.60E-03	3.15E-03	manganese
Iron Concentrate Transfer & Storage Area (pile)	EU001b	fugitives	enclosure	17.21	6.88	6.88	-	-	-	-		8.60E-04	-	-			
Limestone Unloading (truck)	EU002a	fugitives	atmosphere	2.20E-03	2.20E-03	2.20E-03	-	-	-	-	2.07E-06	-	-	-	6.10E-05	5.87E-05	manganese
Limestone Conveyor & Enclosed Storage (pile)	EU002b	fugitives	enclosure	0.10	0.04	0.04	-	-	-	-		-	-	-			
Dolomite Unloading (truck)	EU003a	fugitives	atmosphere	1.22E-03	1.22E-03	1.22E-03	-	-	-	-	-	-	-	-	-	-	-
Dolomite Conveyor & Enclosed Storage (pile)	EU003b	fugitives	enclosure	0.06	0.02	0.02	-	-	-	-		-	-	-			
Coke Breeze Unloading (truck)	EU004a	fugitives	atmosphere	3.26E-03	1.54E-03	4.45E-04	-	-	-	-	2.44E-03	-	-	-	1.14E-03	7.98E-04	manganese
Coke Breeze Pneumatic Coveyance & Storage Bin	EU004b	Baghouse	SV004	0.19	0.19	0.19	-	-	-	-		-	-				
Bentonite Unloading (truck) & Storage Area	EU005	Bin Vent	building	0.19	0.19	0.19	-	-	-	-	-	-	-	-	-	-	-
Organic Binder Unloading & Storage Area	EU006	Bin Vent	building	0.19	0.19	0.19	-	-	-	-	-	-	-	-	0.02	0.02	chlorine
Soda Ash Unloading & Storage Area	EU007	Bin Vent	building	0.19	0.19	0.19	-	-	-	-	1.88E-05	-	-	-	0.00	0.00	chlorine
Bentonite Additive System	EU008	Bin Vent	building	0.19	0.19	0.19	-	-	-	-	-	-	-	-	-	-	-
Coke Breeze Additive System	EU009	Baghouse	SV009	0.41	0.41	0.41	-	-	-	-	0.01	-	-	-	0.23	-	-
Coke Breeze Additive System Air Heater		--	--				3.57E-03	0.09	0.04	0.61	3.65E-06	7.00E-05	-	871	0.02	0.01	hexane
Limestone/Dolomite hopper, belt feeder, grizzly feeder	EU025a	fugitives	atmosphere	1.92	0.70	0.70	-	-	-	-	3.32E-03	-	-		1.34E-03	1.29E-03	manganese
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse	building	0.97	0.97	0.97	-	-	-	-		-	-				
Ground Limestone and Dolomite Additive System	EU010	Baghouse	SV010	1.39	1.39	1.39	-	-	-	-	0.00	-	-	-	0.04	-	-
Limestone/Dolomite Additive System Air Heater		--	--				0.04	1.00	0.45	6.85	4.08E-05	7.82E-04	-	9,737	0.15	0.15	hexane
Mixing Area Material Handling System	EU011	Baghouse	building	1.50	1.50	1.50	-	-	-	-	1.50E-03	7.51E-05	-	-	0.00	0.00	manganese
Hearth Layer Bin System	EU012	Baghouse	SV012	0.66	0.66	0.66	-	-	-	-	6.62E-04	3.31E-05	-	-	0.00	0.00	manganese
Furnace Hood Exhaust *	EU013	Baghouse	SV013A	44.31	88.62	88.62	94.94	477.42	1.74	3.62	0.13	8.66	0.24	661,208	9.63	9.11	hydrogen fluoride
Furnace Windbox Exhaust *	EU014	Baghouse/GSA	SV013B	53.10	106.21	106.21	85.89		21.41	44.60	0.22	54.06	3.01		66.60	54.05	hydrogen fluoride
Furnace Discharge System	EU015	Baghouse	SV014	3.20	3.20	3.20	-	-	-	-	6.40E-04	1.60E-04	-	-	0.00	0.00	manganese
Hearth Layer Separation System	EU016	Baghouse	building	3.45	3.45	3.45	-	-	-	-	6.90E-04	1.73E-04	-	-	0.00	0.00	manganese
Oxide Pellet Storage & Unloading System	EU019	Baghouse	SV018	2.76	2.76	2.76	-	-	-	-	5.52E-04	1.38E-04	-	-	0.00	0.00	manganese
WBE Lime Storage Area	EU020	Bin Vent	building	0.08	0.08	0.08	-	-	-	-	-	-	-	-	0.00	0.00	manganese
WBE Residual Product Loading Area	EU022	Bin Vent	building	0.08	0.08	0.08	-	-	-	-	-	-	-		0.00	0.00	manganese
Recycled Dust Storage Area	EU026	Baghouse	building	0.69	0.69	0.69	-	-	-	-	1.38E-04	3.45E-05	-		0.00	0.00	manganese
Space Heaters	EU021	--	--	0.22	0.22	0.22	0.01	0.37	0.17	2.52	-	2.88E-04	-	3,587	0.41	0.39	hexane
Emergency Generator - Natural Gas	EU017	--	SV016	0.05	0.05	0.05	3.82E-04	0.17	0.05	0.12	-	2.74E-06	-	136	1.47	1.07	formaldehyde
Fire Water Pump - Natural Gas	EU018	--	SV017	0.03	0.03	0.03	1.89E-04	0.08	0.02	0.06	-	1.32E-06	-	66	0.71	0.52	formaldehyde
Cooling Tower	EU024	--	SV022	0.61	0.61	0.61	-	-	-	-	-	-	-		-	-	-
Iron Ore Wet Grinding and Filter Cake Production	IA	Wet Suppression	building	3.37	0.31	0.31	-	-	-	-	6.74E-04	1.68E-04	-		0.00	0.00	manganese
Greenball Production System	IA	Wet Suppression	building	3.37	0.31	0.31	-	-	-	-	6.74E-04	1.68E-04	-		0.00	0.00	manganese
Paved Roads	IA	fugitives	atmosphere	11.65	2.33	0.57	-	-	-	-	-	-	-	-	-	-	-
Total PTE at Entire Source (Including Fugitives)				**156.26**	**226.59**	**224.84**	**180.88**	**479.13**	**23.87**	**58.39**	**0.38**	**62.72**	**3.25**	**675,605**	**79.29**	**63.16**	**hydrogen fluoride**

* Lead PTE (tpy) was based on the baghouse achieving 85% control efficiency for the Furnace Hood Exhaust and the Furnace Windbox Exhaust and a permit limited value of 0.03 lb Pb/hr from SV013A and 0.05 lb Pb/hr from SV013B

Appendix A: Emission Calculations
Criteria Emissions Inventory
Point Sources

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Control ID / Stack No.	EU	Unit Name	Pollutant	Maximum Hourly Rate	Units	Maximum Annual Rate	Units	Emission Factor	Units	Controlled Emission Rate (lb/hr)	Controlled Potential to Emit (tons/yr)	Control Factor (%)	Uncontrolled Emission Rate (lb/hr)	Uncontrolled Potential to Emit (tons/yr)
CE001 / SV001	EU001a	Iron Concentrate Unloading	PM	55,140	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.95	4.14	99	94.53	414.02
			PM_{10}	55,140	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.95	4.14	99	94.53	414.02
			$PM_{2.5}$	55,140	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.95	4.14	99	94.53	414.02
			Fluorides	94.53	lb/hr PM	414.02	tons/yr PM	5.00E-03	wt%	4.73E-05	2.07E-04	99	4.73E-03	2.07E-02
CE001 / SV001	EU001b	Iron Concentrate Transfer & Storage Area (pile) (4 drop points)	PM	392.9	st iron/hr	3,441,530	tons/yr	0.04	lb/st iron	3.93	17.21	75	15.71	68.83
			PM_{10}	392.9	st iron/hr	3,441,530	tons/yr	0.016	lb/st iron	1.57	6.88	75	6.29	27.53
			$PM_{2.5}$	392.9	st iron/hr	3,441,530	tons/yr	0.016	lb/st iron	1.57	6.88	75	6.29	27.53
			Fluorides	15.71	lb/hr PM	68.83	tons/yr PM	5.00E-03	wt%	1.96E-04	8.60E-04	75	7.86E-04	3.44E-03
fugitives - atmosphere	EU002a	Limestone Unloading	PM	66.7	st limestone/hr	274,769	tons/yr	1.6E-05	lb/st limestone	1.07E-03	2.20E-03	0	1.1E-03	2.20E-03
			PM_{10}	66.7	st limestone/hr	274,769	tons/yr	1.6E-05	lb/st limestone	1.07E-03	2.20E-03	0	1.1E-03	2.20E-03
			$PM_{2.5}$	66.7	st limestone/hr	274,769	tons/yr	1.6E-05	lb/st limestone	1.07E-03	2.20E-03	0	1.1E-03	2.20E-03
fugitives - building	EU002b	Limestone Conveyor & Enclosed Storage Pile	PM	66.7	st limestone/hr	274,769	tons/yr	0.00300	lb/st limestone	0.05	0.10	75	0.20	0.41
			PM_{10}	66.7	st limestone/hr	274,769	tons/yr	0.00110	lb/st limestone	0.02	0.04	75	0.07	0.15
			$PM_{2.5}$	66.7	st limestone/hr	274,769	tons/yr	0.00110	lb/st limestone	0.02	0.04	75	0.07	0.15
fugitives - atmosphere	EU003a	Dolomite Unloading	PM	33.3	st dolomite/hr	152,210	tons/yr	1.6E-05	lb/st dolomite	5.33E-04	1.22E-03	0	5.33E-04	1.22E-03
			PM_{10}	33.3	st dolomite/hr	152,210	tons/yr	1.6E-05	lb/st dolomite	5.33E-04	1.22E-03	0	5.33E-04	1.22E-03
			$PM_{2.5}$	33.3	st dolomite/hr	152,210	tons/yr	1.6E-05	lb/st dolomite	5.33E-04	1.22E-03	0	5.33E-04	1.22E-03
fugitives - enclosure	EU003b	Dolomite Conveyor & Enclosed Storage Pile	PM	33.3	st dolomite/hr	152,210	tons/yr	0.00300	lb/st dolomite	0.03	0.06	75	0.10	0.23
			PM_{10}	33.3	st dolomite/hr	152,210	tons/yr	0.00110	lb/st dolomite	0.01	0.02	75	0.04	0.08
			$PM_{2.5}$	33.3	st dolomite/hr	152,210	tons/yr	0.00110	lb/st dolomite	0.01	0.02	75	0.04	0.08
fugitives - atmosphere	EU004a	Coke Breeze Unloading & Storage Area	PM	6.8	st coke breeze/hr	59,303	tons/yr	0.00011	lb/st coke breeze	7.45E-04	3.26E-03	0	7.45E-04	3.26E-03
			PM_{10}	6.8	st coke breeze/hr	59,303	tons/yr	0.000052	lb/st coke breeze	3.52E-04	1.54E-03	0	3.52E-04	1.54E-03
			$PM_{2.5}$	6.8	st coke breeze/hr	59,303	tons/yr	0.000015	lb/st coke breeze	1.02E-04	4.45E-04	0	1.02E-04	4.45E-04
CE004 / SV004	EU004b	Coke Breeze Unloading & Storage Area	PM	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			PM_{10}	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			$PM_{2.5}$	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
CE005 / building	EU005	Bentonite Unloading & Storage Area	PM	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			PM_{10}	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			$PM_{2.5}$	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
CE006 / building	EU006	Organic Binder Unloading & Storage Area	PM	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			PM_{10}	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			$PM_{2.5}$	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
CE007 / building	EU007	Soda Ash Unloading & Storage Area	PM	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			PM_{10}	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			$PM_{2.5}$	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
CE008 / building	EU008	Bentonite Additive System	PM	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			PM_{10}	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
			$PM_{2.5}$	2,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.0429	0.19	99	4.29	18.77
CE009 / SV009	EU009	Coke Breeze Additive System (Material Handling)	PM	5,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.09	0.41	99	9.43	41.30
			PM_{10}	5,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.09	0.41	99	9.43	41.30
			$PM_{2.5}$	5,500	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.09	0.41	99	9.43	41.30
CE009 / SV009	EU009	Coke Breeze Additive System Air Heater	PM	0.0017	MMscf/hr	15	MMscf/yr	7.6	lb/MMscf	** Included in BACT limit for EU009 (see above)	** Included in BACT limit for EU009 (see above)	0	0.01	0.06
			PM_{10}	0.0017	MMscf/hr	15	MMscf/yr	7.6	lb/MMscf			0	0.01	0.06
			$PM_{2.5}$	0.0017	MMscf/hr	15	MMscf/yr	7.6	lb/MMscf			0	0.01	0.06
			SO_2	0.0017	MMscf/hr	15	MMscf/yr	0.6	lb/MMscf	1.00E-03	4.38E-03	0	1.00E-03	4.38E-03
			NO_x	0.0017	MMscf/hr	15	MMscf/yr	50	lb/MMscf	0.08	0.37	inherent	0.08	0.37
			CO	0.0017	MMscf/hr	15	MMscf/yr	84	lb/MMscf	0.14	0.61	0	0.14	0.61
			VOC	0.0017	MMscf/hr	15	MMscf/yr	5.5	lb/MMscf	0.01	0.04	0	0.01	0.04
			Fluorides	0.0017	MMscf/hr	15	MMscf/yr	9.40E-06	lb/MMscf	1.57E-08	6.86E-08	0	1.57E-08	6.86E-08
fugitives - atmosphere	EU025a	Limestone/Dolomite Grinding Mill Bin Area (3 drop points)	PM	100.0	st aggregate/hr	426,979	tons/yr	0.0090	lb/st aggregate	0.90	1.92	0	0.90	1.92
			PM_{10}	100.0	st aggregate/hr	426,979	tons/yr	0.00330	lb/st aggregate	0.33	0.70	0	0.33	0.70
			$PM_{2.5}$	100.0	st aggregate/hr	426,979	tons/yr	0.00330	lb/st aggregate	0.33	0.70	0	0.33	0.70
CE023 / building	EU025b	Limestone/Dolomite Grinding Mill Bin Area	PM	12,866	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.22	0.97	99	22.06	96.61
			PM_{10}	12,866	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.22	0.97	99	22.06	96.61
			$PM_{2.5}$	12,866	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.22	0.97	99	22.06	96.61

Appendix A: Emission Calculations
Criteria Emissions Inventory
Point Sources

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Control ID / Stack No.	EU	Unit Name	Pollutant	Maximum Hourly Rate	Units	Maximum Annual Rate	Units	Emission Factor	Units	Controlled Emission Rate (lb/hr)	Controlled Potential to Emit (tons/yr)	Control Factor (%)	Uncontrolled Emission Rate (lb/hr)	Uncontrolled Potential to Emit (tons/yr)
CE010 / SV010	EU010	Ground Limestone/Dolomite Additive System	PM	18,506	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.32	1.39	99	31.73	138.96
			PM_{10}	18,506	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.32	1.39	99	31.73	138.96
			$PM_{2.5}$	18,506	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.32	1.39	99	31.73	138.96
CE010 / SV010	EU010	Ground Limestone/Dolomite Additive System Air Heater	PM	0.02	MMscf/hr	163	MMscf/yr	7.6	lb/MMscf	** Included in BACT limit for EU010 (see above)	** Included in BACT limit for EU010 (see above)	0	0.14	0.62
			PM_{10}	0.02	MMscf/hr	163	MMscf/yr	7.6	lb/MMscf			0	0.14	0.62
			$PM_{2.5}$	0.02	MMscf/hr	163	MMscf/yr	7.6	lb/MMscf			0	0.14	0.62
			SO_2	0.02	MMscf/hr	163	MMscf/yr	0.6	lb/MMscf	0.01	0.05	0	0.01	0.05
			NO_x	0.02	MMscf/hr	163	MMscf/yr	50	lb/MMscf	0.93	4.08	inherent	0.93	4.08
			CO	0.02	MMscf/hr	163	MMscf/yr	84	lb/MMscf	1.56	6.85	0	1.56	6.85
			VOC	0.02	MMscf/hr	163	MMscf/yr	5.5	lb/MMscf	0.10	0.45	0	0.10	0.45
			Fluorides	0.02	MMscf/hr	163	MMscf/yr	9.40E-06	lb/MMscf	1.75E-07	7.67E-07	0	1.75E-07	7.67E-07
CE011 / building	EU011	Mixing Area Material Handling System	PM	20,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.34	1.50	99	34.29	150.17
			PM_{10}	20,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.34	1.50	99	34.29	150.17
			$PM_{2.5}$	20,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.34	1.50	99	34.29	150.17
			Fluorides	34.29	lb/hr PM	150.17	tons/yr PM	5.00E-03	wt%	1.71E-05	7.51E-05	99	1.71E-03	7.51E-03
CE012 / SV012	EU012	Hearth Layer Bin System	PM	8,813	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.15	0.66	99	15.11	66.17
			PM_{10}	8,813	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.15	0.66	99	15.11	66.17
			$PM_{2.5}$	8,813	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.15	0.66	99	15.11	66.17
			Fluorides	15.11	lb/hr PM	66.17	tons/yr PM	5.00E-03	wt%	7.55E-06	3.31E-05	99	7.55E-04	3.31E-03
CE013 / SV013a	EU013	Furnace Hood Exhaust	PM	295,062	dcfm	8,760	hr/yr	0.0040	gr/dscf	10.12	44.31	99	1,011.64	4,430.99
			PM_{10}	295,062	dcfm	8,760	hr/yr	0.0080	gr/dscf	20.23	88.62	99	2,023.28	8,861.98
			$PM_{2.5}$	295,062	dcfm	8,760	hr/yr	0.0080	gr/dscf	20.23	88.62	99	2,023.28	8,861.98
			SO_2	444.5	st material/hr	3,894,207	st material/yr	0.015	lb/st material	6.66	29.18	0	6.66	29.18
			SO_2	6.8	st coke breeze/hr	59,303	st coke breeze/yr	2.218	lb/st coke breeze	15.01	65.76	0	15.01	65.76
			NO_x	436	MMBtu/hr	3,819,360	MMBtu/yr	0.019	lb/MMBtu	8.18	35.81	inherent	8.18	35.81
			CO	451.3	st pellets/hr	3,953,510	st pellets/yr	0.0018	lb/st pellets	0.83	3.62	0	0.83	3.62
			VOC	451.3	st pellets/hr	3,953,510	st pellets/yr	0.0009	lb/st pellets	0.40	1.74	0	0.40	1.74
			Lead	451.3	st pellets/hr	3,953,510	st pellets/yr	0.00039	lb/st pellets	1.76E-03	7.71E-03	99	0.18	0.77
			H_2SO_4	451.3	st pellets/hr	3,953,510	st pellets/yr	0.00012	lb/st pellets	0.01	0.02	91	0.06	0.24
			Fluorides	451.3	st pellets/hr	3,953,510	st pellets/yr	0.0044	lb/st pellets	1.98	8.66	0	1.98	8.66
CE015 & CE016 / SV013b	EU014	Furnace Windbox Exhaust	PM	353,620	dcfm	8,760	hr/yr	0.0040	gr/dscf	12.12	53.10	99	1,212.41	5,310.36
			PM_{10}	353,620	dcfm	8,760	hr/yr	0.0080	gr/dscf	24.25	106.21	99	2,424.82	10,620.72
			$PM_{2.5}$	353,620	dcfm	8,760	hr/yr	0.0080	gr/dscf	24.25	106.21	99	2,424.82	10,620.72
			SO_2	353,620	dcfm	8,760	hr/yr	5	ppm	19.61	85.89	93	267.33	1,170.90
			NO_x	436	MMBtu/hr	3,819,360	MMBtu/yr	0.231	lb/MMBtu	100.83	441.61	inherent	100.83	441.61
			CO	451.3	st pellets/hr	3,953,510	st pellets/yr	0.0226	lb/st pellets	10.18	44.60	0	10.18	44.60
			VOC	451.3	st pellets/hr	3,953,510	st pellets/yr	0.0108	lb/st pellets	4.89	21.41	0	4.89	21.41
			Lead	451.3	st pellets/hr	3,953,510	st pellets/yr	0.00039	lb/st pellets	1.76E-03	7.71E-03	99	0.18	0.77
			H_2SO_4	451.3	st pellets/hr	3,953,510	st pellets/yr	0.0015	lb/st pellets	0.05	0.22	93	0.69	3.01
			Fluorides	451.3	st pellets/hr	3,953,510	st pellets/yr	0.0832	lb/st pellets	12.34	54.06	67	37.56	164.51
CE017 / SV014	EU015	Furnace Discharge System	PM	42,639	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.73	3.20	99	73.09	320.16
			PM_{10}	42,639	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.73	3.20	99	73.09	320.16
			$PM_{2.5}$	42,639	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.73	3.20	99	73.09	320.16
			Fluorides	73.09	lb/hr PM	320.16	tons/yr PM	5.00E-03	wt%	3.65E-05	1.60E-04	99	3.65E-03	1.60E-02
NA / SV022	EU024	Cooling Tower	PM	4,600	gal/min	2.42E+09	gal/yr	0.0010%	total drift	0.14	0.61	inherent	0.14	0.61
			PM_{10}	4,600	gal/min	2.42E+09	gal/yr	0.0010%	total drift	0.14	0.61	inherent	0.14	0.61
			$PM_{2.5}$	4,600	gal/min	2.42E+09	gal/yr	0.0010%	total drift	0.14	0.61	inherent	0.14	0.61
CE018 / building	EU016	Hearth Layer Separation System	PM	45,950	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.79	3.45	99	78.77	345.02
			PM_{10}	45,950	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.79	3.45	99	78.77	345.02
			$PM_{2.5}$	45,950	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.79	3.45	99	78.77	345.02
			Fluorides	78.77	lb/hr PM	345.02	tons/yr PM	5.00E-03	wt%	3.94E-05	1.73E-04	99	3.94E-03	1.73E-02

Appendix A: Emission Calculations
Criteria Emissions Inventory
Point Sources

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Control ID / Stack No.	EU	Unit Name	Pollutant	Maximum Hourly Rate	Units	Maximum Annual Rate	Units	Emission Factor	Units	Controlled Emission Rate (lb/hr)	Controlled Potential to Emit (tons/yr)	Control Factor (%)	Uncontrolled Emission Rate (lb/hr)	Uncontrolled Potential to Emit (tons/yr)
NA / SV016	EU017	Emergency Generator - Natural Gas	PM	1.575	MMBtu/hr	788	MMBtu/yr	9.91E-03	lb/MMBtu	0.02	0.00	0	1.56E-02	3.90E-03
			PM_{10}	1.575	MMBtu/hr	788	MMBtu/yr	7.71E-05	lb/MMBtu	0.00	0.00	0	1.21E-04	3.04E-05
			$PM_{2.5}$	1.575	MMBtu/hr	788	MMBtu/yr	7.71E-05	lb/MMBtu	0.00	0.00	0	1.21E-04	3.04E-05
			SO_2	1.575	MMBtu/hr	788	MMBtu/yr	5.88E-04	lb/MMBtu	9.26E-04	2.32E-04	0	9.26E-04	2.32E-04
			NO_x	1.575	MMBtu/hr	788	MMBtu/yr	4.08E+00	lb/MMBtu	6.43	1.61	0	6.43E+00	1.61E+00
			CO	1.575	MMBtu/hr	788	MMBtu/yr	3.17E-01	lb/MMBtu	0.50	0.12	0	4.99E-01	1.25E-01
			VOC	1.575	MMBtu/hr	788	MMBtu/yr	1.18E-01	lb/MMBtu	0.19	0.05	0	1.86E-01	4.65E-02
			Fluorides	1.575	MMBtu/hr	788	MMBtu/yr	6.95E-06	lb/MMBtu	1.09E-05	2.74E-06	0	1.09E-05	2.74E-06
NA / SV017	EU018	Fire Water Pump - Natural Gas	PM	0.763	MMBtu/hr	381	MMBtu/yr	9.91E-03	lb/MMBtu	0.01	0.00	0	7.56E-03	1.89E-03
			PM_{10}	0.763	MMBtu/hr	381	MMBtu/yr	7.71E-05	lb/MMBtu	0.00	0.00	0	5.88E-05	1.47E-05
			$PM_{2.5}$	0.763	MMBtu/hr	381	MMBtu/yr	7.71E-05	lb/MMBtu	0.00	0.00	0	5.88E-05	1.47E-05
			SO_2	0.763	MMBtu/hr	381	MMBtu/yr	5.88E-04	lb/MMBtu	4.48E-04	1.12E-04	0	4.48E-04	1.12E-04
			NO_x	0.763	MMBtu/hr	381	MMBtu/yr	4.08E+00	lb/MMBtu	3.11	0.78	0	3.11E+00	7.78E-01
			CO	0.763	MMBtu/hr	381	MMBtu/yr	3.17E-01	lb/MMBtu	0.24	0.06	0	2.42E-01	6.04E-02
			VOC	0.763	MMBtu/hr	381	MMBtu/yr	1.18E-01	lb/MMBtu	0.09	0.02	0	9.00E-02	2.25E-02
			Fluorides	0.763	MMBtu/hr	381	MMBtu/yr	6.95E-06	lb/MMBtu	5.30E-06	1.32E-06	0	5.30E-06	1.32E-06
CE019 / SV018	EU019	Oxide Pellet Storage & Unloading System	PM	36,760	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.63	2.76	99	63.02	276.02
			PM_{10}	36,760	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.63	2.76	99	63.02	276.02
			$PM_{2.5}$	36,760	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.63	2.76	99	63.02	276.02
			Fluorides	63.02	lb/hr PM	276.02	tons/yr PM	5.00E-03	wt%	3.15E-05	1.38E-04	99	3.15E-03	1.38E-02
CE020 / building	EU020	WBE Lime Storage Area	PM	1,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.02	0.08	99	1.71	7.51
			PM_{10}	1,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.02	0.08	99	1.71	7.51
			$PM_{2.5}$	1,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.02	0.08	99	1.71	7.51
CE021 / building	EU022	WBE Residual Product Loading Area	PM	1,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.02	0.08	99	1.71	7.51
			PM_{10}	1,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.02	0.08	99	1.71	7.51
			$PM_{2.5}$	1,000	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.02	0.08	99	1.71	7.51
CE024 / building	EU026	Recycled Dust Storage Area	PM	9,190	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.16	0.69	99	15.75	69.00
			PM_{10}	9,190	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.16	0.69	99	15.75	69.00
			$PM_{2.5}$	9,190	dcfm	8,760	hr/yr	0.0020	gr/dscf	0.16	0.69	99	15.75	69.00
			Fluorides	15.75	lb/hr PM	69.00	tons/yr PM	5.00E-03	wt%	7.88E-06	3.45E-05	99	7.88E-04	3.45E-03
NA	EU021	Space Heaters	PM	0.0069	MMscf/hr	60	MMscf/yr	7.6	lb/MMscf	0.05	0.23	0	0.05	0.23
			PM_{10}	0.0069	MMscf/hr	60	MMscf/yr	7.6	lb/MMscf	0.05	0.23	0	0.05	0.23
			$PM_{2.5}$	0.0069	MMscf/hr	60	MMscf/yr	7.6	lb/MMscf	0.05	0.23	0	0.05	0.23
			SO_2	0.0069	MMscf/hr	60	MMscf/yr	0.6	lb/MMscf	0.004	0.02	0	0.004	0.02
			NO_x	0.0069	MMscf/hr	60	MMscf/yr	50	lb/MMscf	0.34	1.50	inherent	0.34	1.50
			CO	0.0069	MMscf/hr	60	MMscf/yr	84	lb/MMscf	0.58	2.52	0	0.58	2.52
			VOC	0.0069	MMscf/hr	60	MMscf/yr	5.5	lb/MMscf	0.04	0.17	0	0.04	0.17
			Fluorides	0.0069	MMscf/hr	60	MMscf/yr	9.40E-06	lb/MMscf	6.45E-08	2.83E-07	0	6.45E-08	2.83E-07
NA	IA	Iron Ore Wet Grinding and Filter Cake Production	PM	615.5	st aggregate/hr	5,391,780	tons/yr	0.025	lb/st pellets	0.77	3.37	95	15.39	67.40
			PM_{10}	615.5	st aggregate/hr	5,391,780	tons/yr	0.0023	lb/st pellets	0.07	0.31	95	1.42	6.20
			$PM_{2.5}$	615.5	st aggregate/hr	5,391,780	tons/yr	0.0023	lb/st pellets	0.07	0.31	95	1.42	6.20
			Fluorides	15.39	lb/hr PM	67.40	tons/yr PM	5.00E-03	wt%	3.85E-05	1.68E-04	95	7.69E-04	3.37E-03
NA	IA	Greenball Production System	PM	615.5	st aggregate/hr	5,391,780	tons/yr	0.025	lb/st pellets	0.77	3.37	95	15.39	67.40
			PM_{10}	615.5	st aggregate/hr	5,391,780	tons/yr	0.0023	lb/st pellets	0.07	0.31	95	1.42	6.20
			$PM_{2.5}$	615.5	st aggregate/hr	5,391,780	tons/yr	0.0023	lb/st pellets	0.07	0.31	95	1.42	6.20
			Fluorides	15.39	lb/hr PM	67.40	tons/yr PM	5.00E-03	wt%	3.85E-05	1.68E-04	95	7.69E-04	3.37E-03

Appendix A: Emission Calculations
Hazardous Air Pollutants
Non-Combustion Units

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Uncontrolled Potential to Emit

Pollutant Name	Emission Unit ID:	EU001	EU002	EU004	EU006	EU007	EU009	EU025	EU010	EU011	EU012	EU013		EU014		EU015	EU016	EU019	EU020	EU022	EU019	IA	IA	Subtotal (lb/hr)	Subtotal (tons/yr)
	Stack/Vent ID:	SV001	atm & bldg	atm & SV004	bldg	bldg	SV009	atm & bldg	SV010	bldg	SV012	SV013A[1]		SV013B[1]		SV014	bldg	SV018	bldg	bldg	bldg	bldg	bldg		
	Material Type:	Concentrate	Limestone	Coke Breeze	Organic Binder (Alcotac)	Soda Ash	Coke Breeze	Limestone	Limestone	Greenball	Greenball	Greenball	Coke Breeze	Greenball	Coke Breeze	Pellet	Pellet	Pellet	Lime	Residual Product	Recycled Dust	Filter Cake	Greenball		
	PM (lb/hr):	94.53	0.20	4.29	4.29	4.29	9.43	22.96	31.73	34.29	15.11	1,011.64		1,212.41		73.09	78.77	63.02	1.71	1.71	15.75	15.39	15.39		
Antimony Compounds		4.73E-04	2.51E-08	0	0	0	0	1.15E-04	3.97E-06	1.71E-04	7.55E-05	2.53E-04	0	5.76E-03	0	3.65E-04	3.94E-04	3.15E-04	0	0	0	7.69E-05	7.69E-05	**8.08E-03**	**3.54E-02**
Arsenic Compounds[2]		6.62E-04	4.01E-07	2.14E-04	0	4.29E-07	4.71E-04	1.61E-04	6.33E-05	1.48E-04	6.51E-05	3.22E-03		6.11E-02		4.39E-05	4.73E-05	3.78E-05	0	0	9.45E-06	6.63E-05	6.63E-05	**6.64E-02**	**2.91E-01**
Beryllium Compounds		2.65E-05	6.03E-08	0	0	0	0	6.43E-06	9.52E-06	7.54E-05	3.32E-05	1.11E-04	0	2.53E-03	0	3.95E-05	4.25E-05	3.40E-05	0	0	8.51E-06	3.39E-05	3.39E-05	**2.99E-03**	**1.31E-02**
Cadmium Compounds		1.13E-04	1.41E-08	1.24E-05	0	0	2.73E-05	2.75E-05	2.22E-06	3.43E-05	1.51E-05	5.06E-05	1.47E-04	1.15E-03	3.34E-03	3.65E-05	3.94E-05	3.15E-05	0	0	7.88E-06	1.54E-05	1.54E-05	**5.07E-03**	**2.22E-02**
Chlorine		9.45E-04	0	4.72E-03	4.16E-01	5.55E-03	1.04E-02	0	0	2.74E-03	1.21E-03	4.05E-03	5.56E-02	9.21E-02	1.27E+00	2.92E-03	3.15E-03	2.52E-03	0	0	6.30E-04	1.23E-03	1.23E-03	**1.87E+00**	**8.20E+00**
Chromium Compounds[3]		1.42E-03	3.52E-07	0	0	0	0	3.44E-04	5.55E-05	8.57E-04	3.78E-04	2.80E-03		5.32E-02		1.97E-03	2.13E-03	1.70E-03	0	0	4.25E-04	3.85E-04	3.85E-04	**6.60E-02**	**2.89E-01**
Cobalt Compounds[4]		2.65E-04	1.71E-07	0	0	0	0	6.43E-05	2.70E-05	1.20E-04	5.29E-05	5.05E-05		9.60E-04		3.65E-05	3.94E-05	3.15E-05	0	0	7.88E-06	5.39E-05	5.39E-05	**1.76E-03**	**7.72E-03**
Formaldehdye[5]		0	0	0	0	0	0	0	0	0	0	6.54E-03		1.24E-01		0	0	0	0	0	0	0	0	**1.31E-01**	**5.73E-01**
Hydrogen Chloride[6]		0	0	0	0	0	0	0	0	0	0	9.97E-02		1.90E+00		0	0	0	0	0	0	0	0	**1.99E+00**	**8.74E+00**
Hydrogen Fluoride[7]		0	0	0	0	0	0	0	0	0	0	2.08E+00		3.95E+01		0	0	0	0	0	0	0	0	**4.16E+01**	**1.82E+02**
Lead		3.12E-03	4.73E-07	5.57E-04	0	4.29E-06	1.23E-03	7.58E-04	7.46E-05	3.43E-04	1.51E-04	1.76E-01	6.58E-03	1.76E-01	1.50E-01	1.46E-04	1.58E-04	1.26E-04	0	0	3.15E-05	1.54E-04	1.54E-04	**5.16E-01**	**2.26E+00**
Manganese Compounds		7.18E-02	5.28E-05	1.79E-02	0	0	3.94E-02	1.74E-02	8.33E-03	1.85E-02	8.16E-03	2.73E-02	2.11E-01	6.22E-01	4.81E+00	4.68E-02	5.04E-02	4.03E-02	3.43E-04	3.43E-04	1.01E-02	8.31E-03	8.31E-03	**6.02E+00**	**2.64E+01**
Mercury Compounds[8]		5.01E-07	1.40E-10	8.92E-09	0	0	1.96E-08	1.22E-07	2.20E-08	1.82E-07	8.01E-08	1.93E-06	7.58E-07	4.11E-06	1.61E-06	5.12E-09	5.51E-09	4.41E-09	0	0	1.10E-09	8.16E-08	8.16E-08	**9.53E-06**	**4.17E-05**
Nickel Compounds[9]		1.70E-03	5.43E-07	7.12E-04	0	0	1.57E-03	4.13E-04	8.57E-05	1.71E-04	7.55E-05	4.17E-04		7.93E-03		7.31E-05	7.88E-05	6.30E-05	0	0	1.58E-05	7.69E-05	7.69E-05	**1.35E-02**	**5.89E-02**
Selenium Compounds		1.61E-03	6.03E-08	8.44E-06	0	0	1.86E-05	3.90E-04	9.52E-06	2.57E-04	1.13E-04	3.79E-04	9.96E-05	8.64E-03	2.27E-03	1.83E-04	1.97E-04	1.58E-04	0	0	3.94E-05	1.15E-04	1.15E-04	**1.46E-02**	**6.39E-02**
Total HAPs (lb/hr)		**0.08**	**5.49E-05**	**0.02**	**0.42**	**0.01**	**0.05**	**0.02**	**0.01**	**0.02**	**0.01**	**2.68**		**48.82**		**0.05**	**0.06**	**0.05**	**3.43E-04**	**3.43E-04**	**0.01**	**0.01**	**0.01**	**52.32**	
Total HAPs (tons/yr)		**0.36**	**2.40E-04**	**0.11**	**1.82**	**0.02**	**0.23**	**0.09**	**0.04**	**0.10**	**0.05**	**11.72**		**213.82**		**0.23**	**0.25**	**0.20**	**1.50E-03**	**1.50E-03**	**0.05**	**0.05**	**0.05**		**229.18**

Limited Potential to Emit

Pollutant Name	Emission Unit ID:	EU001	EU002	EU004	EU006	EU007	EU009	EU025	EU010	EU011	EU012	EU013		EU014		EU015	EU016	EU019	EU020	EU022	EU019	IA	IA	Subtotal (lb/hr)	Subtotal (tons/yr)
	Stack/Vent ID:	SV001	atm & bldg	atm & SV004	bldg	bldg	SV009	atm & bldg	SV010	bldg	SV012	SV013A[1]		SV013B[1]		SV014	bldg	SV018	bldg	bldg	bldg	bldg	bldg		
	Material Type:	Concentrate	Limestone	Coke Breeze	Organic Binder (Alcotac)	Soda Ash	Coke Breeze	Limestone	Limestone	Greenball	Greenball	Greenball	Coke Breeze	Greenball	Coke Breeze	Pellet	Pellet	Pellet	Lime	Residual Product	Recycled Dust	Filter Cake	Greenball		
	PM (lb/hr):	0.95	5.11E-02	4.36E-02	0.04	0.04	0.09	1.12	0.32	0.34	0.15	10.12		12.12		0.73	0.79	0.63	0.02	0.02	0.16	0.77	0.77		
Antimony Compounds		4.73E-06	6.38E-09	0	0	0	0	1.40E-07	3.97E-08	1.71E-06	7.55E-07	2.53E-06	0	5.76E-05	0	0	0	0	0	0	0	0	0	**6.75E-05**	**2.96E-04**
Arsenic Compounds[2]		6.62E-06	1.02E-07	2.18E-06	0	4.29E-09	4.71E-06	2.24E-06	6.33E-07	1.48E-06	6.51E-07	3.22E-03		6.11E-02		4.39E-07	4.73E-07	3.78E-07	0	0	9.45E-08	4.62E-07	4.62E-07	**6.44E-02**	**2.82E-01**
Beryllium Compounds		2.65E-07	1.53E-08	0	0	0	0	3.36E-07	9.52E-08	7.54E-07	3.32E-07	1.11E-06	0	2.53E-05	0	3.95E-07	4.25E-07	3.40E-07	0	0	8.51E-08	4.15E-07	4.15E-07	**2.94E-05**	**1.29E-04**
Cadmium Compounds		1.13E-06	3.57E-09	1.26E-07	0	0	2.73E-07	7.84E-08	2.22E-08	3.43E-07	1.51E-07	5.06E-07	1.47E-06	1.15E-05	3.34E-05	3.65E-07	3.94E-07	3.15E-07	0	0	7.88E-08	3.85E-07	3.85E-07	**5.01E-05**	**2.19E-04**
Chlorine		9.45E-06	0	4.80E-05	4.16E-03	5.55E-05	1.04E-04	0	0	2.74E-05	1.21E-05	4.05E-05	5.56E-04	9.21E-04	1.27E-02	2.92E-05	3.15E-05	2.52E-05	0	0	6.30E-06	3.08E-05	3.08E-05	**1.87E-02**	**8.19E-02**
Chromium Compounds[3]		1.42E-05	8.94E-08	1.48E-05	0	0	3.21E-05	1.96E-06	5.55E-07	8.57E-06	3.78E-06	2.80E-03		5.32E-02		1.97E-05	2.13E-05	1.70E-05	0	0	4.25E-06	2.08E-05	2.08E-05	**5.61E-02**	**2.46E-01**
Cobalt Compounds[4]		2.65E-06	4.34E-08	0	0	0	0	9.52E-07	2.70E-07	1.20E-06	5.29E-07	5.05E-05		9.60E-04		3.65E-07	3.94E-07	3.15E-07	0	0	7.88E-08	3.85E-07	3.85E-07	**1.02E-03**	**4.46E-03**
Formaldehdye[5]		0	0	0	0	0	0	0	0	0	0	6.54E-03		1.24E-01		0	0	0	0	0	0	0	0	**0.13**	**0.57**
Hydrogen Chloride[6]		0	0	0	0	0	0	0	0	0	0	9.97E-02		1.90E+00		0	0	0	0	0	0	0	0	**1.99**	**8.74**
Hydrogen Fluoride[7]		0	0	0	0	0	0	0	0	0	0	2.08E+00		1.30E+01		0	0	0	0	0	0	0	0	**15.07**	**66.02**
Lead		3.12E-05	1.20E-07	5.67E-06	0	4.29E-08	1.23E-05	2.63E-06	7.46E-07	3.43E-06	1.51E-06	1.76E-03	6.58E-05	1.76E-03	1.50E-03	1.46E-06	1.58E-06	1.26E-06	0	0	3.15E-07	1.54E-06	1.54E-06	**5.15E-03**	**2.25E-02**
Manganese Compounds		7.18E-04	1.34E-05	1.82E-04	0	0	3.94E-04	2.94E-04	8.33E-05	1.85E-04	8.16E-05	2.73E-04	2.11E-03	6.22E-03	4.81E-02	4.68E-04	5.04E-04	4.03E-04	3.43E-06	3.43E-06	1.01E-04	4.92E-04	4.92E-04	**6.00E-02**	**2.63E-01**
Mercury Compounds[8]		5.01E-09	3.55E-11	9.07E-11	0	0	1.96E-10	7.79E-10	2.20E-10	1.82E-09	8.01E-10	1.93E-08	7.58E-09	4.11E-08	1.61E-08	5.12E-11	5.51E-11	4.41E-11	0	0	1.10E-11	5.39E-11	5.39E-11	**9.32E-08**	**4.08E-07**
Nickel Compounds[9]		1.70E-05	1.38E-07	7.24E-06	0	0	1.57E-05	3.03E-06	8.57E-07	1.71E-06	7.55E-07	4.17E-04		7.93E-03		7.31E-07	7.88E-07	6.30E-07	0	0	1.58E-07	7.69E-07	7.69E-07	**8.40E-03**	**3.68E-02**
Selenium Compounds		1.61E-05	1.53E-08	8.59E-08	0	0	1.86E-07	3.36E-07	9.52E-08	2.57E-06	1.13E-06	3.79E-06	9.96E-07	8.64E-05	2.27E-05	1.83E-06	1.97E-06	1.58E-06	0	0	3.94E-07	1.92E-06	1.92E-06	**1.40E-04**	**6.12E-04**
Total HAPs (lb/hr)		**8.22E-04**	**1.39E-05**	**2.60E-04**	**4.16E-03**	**5.56E-05**	**5.63E-04**	**3.06E-04**	**8.66E-05**	**2.34E-04**	**1.03E-04**	**2.20**		**15.21**		**5.22E-04**	**5.63E-04**	**4.50E-04**	**3.43E-06**	**3.43E-06**	**1.13E-04**	**5.50E-04**	**5.50E-04**	**17.41**	
Total HAPs (tons/yr)		**3.60E-03**	**6.10E-05**	**1.14E-03**	**1.82E-02**	**2.43E-04**	**2.46E-03**	**1.34E-03**	**3.79E-04**	**1.03E-03**	**4.52E-04**	**9.63**		**66.60**		**2.29E-03**	**2.47E-03**	**1.97E-03**	**1.50E-05**	**1.50E-05**	**4.93E-04**	**2.41E-03**	**2.41E-03**		**76.26**

Notes:

[1] Assume 5% of the natural gas combustion emissions exit through the hood exhaust and 95% exit through the waste gas stack.
[2] Arsenic emissions from emission units EU013 and EU014 are assumed to be equal to 71.3 ppb (by wgt) per ton of pellets produced (per Jiang paper). Emissions = 71.3 (ppb) * Pellet Production Rate (st/hr) * 2000 lb/ton * Percent of PM emitted from the Hood Exhaust or Windbox Stack (5% or 95%)
[3] Chromium emissions from emission units EU013 and EU014 are assumed to be equal to 62 ppb (by wgt) per ton of pellets produced (per Jiang paper). Emissions = 62 (ppb) * Pellet Production Rate (st/hr) * 2000 lb/ton * Percent of PM emitted from the Hood Exhaust or Windbox Stack (5% or 95%)
[4] Cobalt emissions from emission units EU013 and EU014 are assumed to be equal to 1.12 ppb (by wgt) per ton of pellets produced (per Jiang paper). Emissions = 62 (ppb) * Pellet Production Rate (st/hr) * 2000 lb/ton * Percent of PM emitted from the Hood Exhaust or Windbox Stack (5% or 95%)
[5] Formaldehyde emissions from emission units EU013 and EU014 are assumed to be equal to 0.00029 per ton of pellets produced (based on Hibbtac results). Emissions = 0.00029 lb/st * Pellet Production Rate (st/hr) * Percent of PM emitted from the Hood Exhaust or Windbox Stack (5% or 95%)
[6] Hydrogen chloride emissions are assumed to be equal to 0.00442 per ton of pellets produced (based on Hibbtac results). Emissions = 0.00442 lb/st * Pellet Production Rate (st/hr) * Percent of PM emitted from the Hood Exhaust or Windbox Stack (5% or 95%)
[7] The hydrogen fluoride emissions have been assumed to be equal to the emission rate of total fluorides (as calculated on the Criteria table) times the weight ratio of 20/19 (HF/F).
[8] The hood exhaust exceeds the temperature where mercury is typically released, so 36% of the mercury is assumed to exit through the hood exhaust and 64% through the windbox stack. Emissions = Material Concentration (%) * Pellet Production Rate (st/hr) * Percent of PM emitted from the Hood Exhaust or Windbox Stack (36% or 64%)
[9] Nickel emissions are assumed to be equal to 9.25 ppb (by wgt) per ton of pellets produced (per Jiang paper). Emissions = 9.25 (ppb) * Pellet Production Rate (st/hr) * 2000 lb/ton * Percent of PM emitted from the Hood Exhaust or Windbox Stack (5% or 95%)

References:

Jiang, H., Arkly, S., and Wickman, T (2000) Mercury emissions from taconite concentrate pellets - stack testing results from facilities in Minnesota. Presented at USEPA conference "Assessing and managing mercury from historic and current mining activities". San Francisco, November 28-30, 18 pages.

Appendix A: Emission Calculations
Hazardous Air Pollutants
Natural Gas Combustion

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Pollutant Name	Combustion Emission Factors		Emission Unit ID:	EU009	EU010	EU013	EU014	EU017	EU018	EU021	Subtotal (lb/hr)	Subtotal (tons/yr)
			Stack/Vent ID:	SV009	SV010	SV013A[3]	SV013B[3]	SV016	SV017	NA		
	EF Natural Gas Reciprocating Engine[1] (lb/MMBtu)	EF Natural Gas Combustion[2] (lb/MMcf)	Material Type:	Combustion	Combustion	Combustion	Combustion	Engine	Engine	Combustion		
			MMBtu/hr (natural gas):	1.70	19.00	21.80	414.20	4.65	2.25	7.00		
			MMcf/hr(natural gas):	0.002	0.02	0.02	0.41	0.03	0.02	0.05		
Acetaldehyde	8.36E-03			0	0	0	0	3.88E-02	1.88E-02	0	**5.77E-02**	**2.53E-01**
Acrolein	5.14E-03			0	0	0	0	2.39E-02	1.16E-02	0	**3.54E-02**	**1.55E-01**
Arsenic Compounds		2.0E-04		3.33E-07	3.73E-06	4.27E-06	8.12E-05	0	0	9.80E-06	**9.93E-05**	**4.35E-04**
Benzene	4.40E-04	2.1E-03		3.50E-06	3.91E-05	4.49E-05	8.53E-04	2.04E-03	9.90E-04	1.03E-04	**4.08E-03**	**1.79E-02**
Beryllium Compounds		1.2E-05		2.00E-08	2.24E-07	2.56E-07	4.87E-06	0	0	5.88E-07	**5.96E-06**	**2.61E-05**
1,3-Butadiene	2.67E-04			0	0	0	0	1.24E-03	6.01E-04	0	**1.84E-03**	**8.07E-03**
Cadmium Compounds		1.1E-03		1.83E-06	2.05E-05	2.35E-05	4.47E-04	0	0	5.39E-05	**5.46E-04**	**2.39E-03**
Carbon Tetrachloride	3.67E-05			0	0	0	0	1.71E-04	8.26E-05	0	**2.53E-04**	**1.11E-03**
Chlorobenzene	3.04E-05			0	0	0	0	1.41E-04	6.84E-05	0	**2.10E-04**	**9.18E-04**
Chloroform	2.85E-05			0	0	0	0	1.32E-04	6.41E-05	0	**1.97E-04**	**8.61E-04**
Chromium Compounds		1.4E-03		2.33E-06	2.61E-05	2.99E-05	5.69E-04	0	0	6.86E-05	**6.95E-04**	**3.05E-03**
Cobalt Compounds		8.4E-05		1.40E-07	1.56E-06	1.80E-06	3.41E-05	0	0	4.12E-06	**4.17E-05**	**1.83E-04**
Dichlorobenzene		1.2E-03		2.00E-06	2.24E-05	2.56E-05	4.87E-04	0	0	5.88E-05	**5.96E-04**	**2.61E-03**
1,3-Dichloropropene	2.64E-05			0	0	0	0	1.23E-04	5.94E-05	0	**1.82E-04**	**7.97E-04**
Ethylbenzene	3.97E-05			0	0	0	0	1.84E-04	8.93E-05	0	**2.74E-04**	**1.20E-03**
Ethylene Dibromide	4.43E-05			0	0	0	0	2.06E-04	9.97E-05	0	**3.06E-04**	**1.34E-03**
Formaldehyde	5.28E-02	7.5E-02		1.25E-04	1.40E-03	see note[4]	see note[4]	2.45E-01	1.19E-01	3.68E-03	**3.69E-01**	**1.62E+00**
Hexane	1.11E-03	1.8E+00		3.00E-03	3.35E-02	3.85E-02	7.31E-01	5.16E-03	2.50E-03	8.82E-02	**9.02E-01**	**3.95E+00**
Lead		0.0005		8.33E-07	9.31E-06	1.07E-05	2.03E-04	0	0	2.45E-05	**2.48E-04**	**1.09E-03**
Manganese Compounds		3.8E-04		6.33E-07	7.08E-06	8.12E-06	1.54E-04	0	0	1.86E-05	**1.89E-04**	**8.27E-04**
Mercury Compounds		2.6E-04		4.33E-07	4.84E-06	5.56E-06	1.06E-04	0	0	1.27E-05	**1.29E-04**	**5.66E-04**
Methanol	2.50E-03			0	0	0	0	1.16E-02	5.63E-03	0	**1.72E-02**	**7.55E-02**
Methylene Chloride	2.00E-05			0	0	0	0	9.29E-05	4.50E-05	0	**1.38E-04**	**6.04E-04**
Naphthalene	7.44E-05	6.1E-04		1.02E-06	1.14E-05	1.30E-05	2.48E-04	3.46E-04	1.67E-04	2.99E-05	**8.16E-04**	**3.57E-03**
Nickel Compounds		2.1E-03		3.50E-06	3.91E-05	4.49E-05	8.53E-04	0	0	1.03E-04	**1.04E-03**	**4.57E-03**
PAH	2.69E-05			0	0	0	0	1.25E-04	6.05E-05	0	**1.86E-04**	**8.13E-04**
Phenol	2.40E-05			0	0	0	0	1.12E-04	5.40E-05	0	**1.66E-04**	**7.25E-04**
Selenium Compounds		2.4E-05		4.00E-08	4.47E-07	5.13E-07	9.75E-06	0	0	1.18E-06	**1.19E-05**	**5.22E-05**
Styrene	2.36E-05			0	0	0	0	1.10E-04	5.31E-05	0	**1.63E-04**	**7.13E-04**
Toluene	4.08E-04	3.4E-03		5.67E-06	6.33E-05	7.27E-05	1.38E-03	1.90E-03	9.18E-04	1.67E-04	**4.50E-03**	**1.97E-02**
1,1,2-Trichloroethane	3.18E-05			0	0	0	0	1.48E-04	7.16E-05	0	**2.19E-04**	**9.61E-04**
2,2,4-Trimethylpentane	2.50E-04			0	0	0	0	1.16E-03	5.63E-04	0	**1.72E-03**	**7.55E-03**
Xylene	1.84E-04			0	0	0	0	8.55E-04	4.14E-04	0	**1.27E-03**	**5.56E-03**
Vinyl Chloride	1.49E-05			0	0	0	0	6.92E-05	3.35E-05	0	**1.03E-04**	**4.50E-04**
Polycyclic Organic Material	2.72E-04	8.8E-05		1.47E-07	1.64E-06	1.89E-06	3.58E-05	1.26E-03	6.12E-04	4.32E-06	**1.92E-03**	**8.41E-03**
Acenaphthene	1.25E-06	1.8E-06		3.00E-09	3.35E-08	3.85E-08	7.31E-07	5.81E-06	2.81E-06	8.82E-08	**9.51E-06**	**4.17E-05**
Acenaphthylene	5.53E-06	1.8E-06		3.00E-09	3.35E-08	3.85E-08	7.31E-07	2.57E-05	1.24E-05	8.82E-08	**3.90E-05**	**1.71E-04**
Anthracene		2.4E-06		4.00E-09	4.47E-08	5.13E-08	9.75E-07	0	0	1.18E-07	**1.19E-06**	**5.22E-06**
Benz(a)anthracene		1.8E-06		3.00E-09	3.35E-08	3.85E-08	7.31E-07	0	0	8.82E-08	**8.94E-07**	**3.92E-06**
Benzo(a)pyrene		1.2E-06		2.00E-09	2.24E-08	2.56E-08	4.87E-07	0	0	5.88E-08	**5.96E-07**	**2.61E-06**
Benzo(b)fluoranthene	1.66E-07	1.8E-06		3.00E-09	3.35E-08	3.85E-08	7.31E-07	7.71E-07	3.74E-07	8.82E-08	**2.04E-06**	**8.93E-06**
Benzo(g,h,i)perylene	4.14E-07	1.2E-06		2.00E-09	2.24E-08	2.56E-08	4.87E-07	1.92E-06	9.32E-07	5.88E-08	**3.45E-06**	**1.51E-05**
Benzo(k)fluoranthene		1.8E-06		3.00E-09	3.35E-08	3.85E-08	7.31E-07	0	0	8.82E-08	**8.94E-07**	**3.92E-06**
Biphenyl	2.12E-04			0	0	0	0	9.85E-04	4.77E-04	0	**1.46E-03**	**6.40E-03**
Chrysene	6.93E-07	1.8E-06		3.00E-09	3.35E-08	3.85E-08	7.31E-07	3.22E-06	1.56E-06	8.82E-08	**5.67E-06**	**2.48E-05**
Dibenz(a,h)anthracene		1.2E-06		2.00E-09	2.24E-08	2.56E-08	4.87E-07	0	0	5.88E-08	**5.96E-07**	**2.61E-06**
Dimethylbenz(a)anthracene, 7,12-		1.6E-05		2.67E-08	2.98E-07	3.42E-07	6.50E-06	0	0	7.84E-07	**7.95E-06**	**3.48E-05**
Fluoranthene	1.11E-06	3.0E-06		5.00E-09	5.59E-08	6.41E-08	1.22E-06	5.16E-06	2.50E-06	1.47E-07	**9.15E-06**	**4.01E-05**
Fluorene	5.67E-06	2.8E-06		4.67E-09	5.22E-08	5.98E-08	1.14E-06	2.63E-05	1.28E-05	1.37E-07	**4.05E-05**	**1.77E-04**
Indeno(1,2,3-cd)pyrene	3.75E-07	1.8E-06		3.00E-09	3.35E-08	3.85E-08	7.31E-07	1.74E-06	8.44E-07	8.82E-08	**3.48E-06**	**1.52E-05**
Methylchloranthrene, 3-		1.8E-06		3.00E-09	3.35E-08	3.85E-08	7.31E-07	0	0	8.82E-08	**8.94E-07**	**3.92E-06**
Methylnapthalene, 2-	3.32E-05	2.4E-05		4.00E-08	4.47E-07	5.13E-07	9.75E-06	1.54E-04	7.47E-05	1.18E-06	**2.41E-04**	**1.06E-03**
Phenanthrene	1.04E-05	1.7E-05		2.83E-08	3.17E-07	3.63E-07	6.90E-06	4.83E-05	2.34E-05	8.33E-07	**8.02E-05**	**3.51E-04**
Pyrene	1.36E-06	5.0E-06		8.33E-09	9.31E-08	1.07E-07	2.03E-06	6.32E-06	3.06E-06	2.45E-07	**1.19E-05**	**5.20E-05**
Total HAPs (lb/hr)				**0.003**	**0.04**	**0.04**	**0.74**	**0.34**	**0.16**	**0.09**	**1.40**	
Total HAPs (tons/yr)				**0.01**	**0.15**	**0.17**	**3.23**	**1.47**	**0.71**	**0.41**		**6.15**

Notes:
[1] The emission factors for natural gas-fired reciprocating engines (4-stroke, lean-burn) are from AP-42, 10/96, Table 3.2-2.
[2] The emission factors for natural gas combustion are from AP-42, 7/98, Tables 1.4-2, 1.4-3, and 1.4-4.
[3] Assume 5% of the natural gas combustion emissions exit through the hood exhaust (SV013A) and 95% exit through the windbox stack (SV013B).
[4] Formaldehyde emissions have been calculated as part of the Non-Combustion units.

Appendix A: Emission Calculations
Greenhouse Gas Emissions
Coke Breeze Scenario

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Unit ID #	Emission Unit Name	Pollutant	Maximum Rate (units/hr)	Maximum Rate (units/yr)	Units	Emission Factor	Emission Factor Units	Ref.	Potential to Emit (short tons/yr)	Global Warming Potential (GWP) [1]	Potential to Emit (short tons CO2-e/yr)
Induration Furnace Emissions											
EU013 / EU014	Furnace Hood Exhaust / Furnace Windbox Exhaust	CO_2	436	3,819,360	MMBtu	53.02	kg/MMBtu	[2]	223,218	1	223,218
EU013 / EU014	Furnace Hood Exhaust / Furnace Windbox Exhaust	CH_4	436	3,819,360	MMBtu	1.0E-03	kg/MMBtu	[2]	4.21	21	88
EU013 / EU014	Furnace Hood Exhaust / Furnace Windbox Exhaust	N_2O	436	3,819,360	MMBtu	1.0E-04	kg/MMBtu	[2]	0.42	310	131
---	Concentrate	CO_2	---	3,122,136	mt concentrate	0.006	mt/mt concentrate	[3]	20,178	1	20,178
---	Limestone	CO_2	---	249,269	mt limestone	0.44	mt/mt limestone	[4]	120,898	1	120,898
---	Dolomite	CO_2	---	138,084	mt dolomite	0.48	mt/mt dolomite	[4]	73,061	1	73,061
---	Coke Breeze	CO_2	---	53,799	mt coke	3.66	mt CO_2 / mt C	[5]	217,311	1	217,311
---	Soda Ash	CO_2	---	13,988	mt soda ash	0.41	mt/mt soda ash	[4]	6,322	1	6,322
Stationary Combustion Emissions											
EU010	Ground Limestone/Dolomite Additive System Air Heater	CO_2	19.0	166,440	MMBtu	53.02	kg/MMBtu	[2]	9,727	1	9,727
EU010	Ground Limestone/Dolomite Additive System Air Heater	CH_4	19.0	166,440	MMBtu	1.0E-03	kg/MMBtu	[2]	1.83E-01	21	3.9
EU010	Ground Limestone/Dolomite Additive System Air Heater	N_2O	19.0	166,440	MMBtu	1.0E-04	kg/MMBtu	[2]	1.83E-02	310	5.7
EU017	Emergency Generator - Natural Gas	CO_2	4.65	2,323	MMBtu	53.02	kg/MMBtu	[2]	136	1	136
EU017	Emergency Generator - Natural Gas	CH_4	4.65	2,323	MMBtu	1.0E-03	kg/MMBtu	[2]	2.56E-03	21	0.1
EU017	Emergency Generator - Natural Gas	N_2O	4.65	2,323	MMBtu	1.0E-04	kg/MMBtu	[2]	2.56E-04	310	0.1
EU018	Fire Water Pump - Natural Gas	CO_2	2.25	1,125	MMBtu	53.02	kg/MMBtu	[2]	66	1	66
EU018	Fire Water Pump - Natural Gas	CH_4	2.25	1,125	MMBtu	1.0E-03	kg/MMBtu	[2]	1.24E-03	21	0.03
EU018	Fire Water Pump - Natural Gas	N_2O	2.25	1,125	MMBtu	1.0E-04	kg/MMBtu	[2]	1.24E-04	310	0.04
EU021	Space Heaters	CO_2	7.0	61,320	MMBtu	53.02	kg/MMBtu	[2]	3,584	1	3,584
EU021	Space Heaters	CH_4	7.0	61,320	MMBtu	1.0E-03	kg/MMBtu	[2]	0.07	21	1.4
EU021	Space Heaters	N_2O	7.0	61,320	MMBtu	1.0E-04	kg/MMBtu	[2]	6.76E-03	310	2.1
EU009	Coke Breeze Additive System Air Heater	CO_2	1.7	14,892	MMBtu	53.02	kg/MMBtu	[2]	870	1	870
EU009	Coke Breeze Additive System Air Heater	CH_4	1.7	14,892	MMBtu	1.0E-03	kg/MMBtu	[2]	0.02	21	0.3
EU009	Coke Breeze Additive System Air Heater	N_2O	1.7	14,892	MMBtu	1.0E-04	kg/MMBtu	[2]	1.64E-03	310	0.5

TOTAL DIRECT	CO_2	EMISSIONS	675,372	
TOTAL DIRECT	CH_4	EMISSIONS	4.48	
TOTAL DIRECT	N_2O	EMISSIONS	0.45	
TOTAL DIRECT	GHG	EMISSIONS (tons CO_2-equivalents)		675,605

Notes:

a. Emissions are calculated using the MPCA's General Guidance for Carbon Footprint Development in Environmental Review (July 2008) and emission factors from The Climate Registry (TCR) General Reporting Protocol (GRP) version 1.1 (May 2008).
b. The bentonite and organic binder do not contain any carbon fraction.
c. mt (metric tonne) = 1000 kg = 2204.6 lbs = 1.1023 short tons

References:

[1] Global Warming Potential values are from Table A-1 of 40 CFR 98.
[2] Emission factors in Table C-1 and Table C-2 of 40 CFR 98 for natural gas.
[3] When using carbon fractions, the assumption is made that all carbon is oxidized to CO_2.

Carbon fraction:		Source:
Concentrate	0.0016	Midland Research Center analysis obtained from 1998 Minnesota Iron & Steel pilot study.

[4] Limestone, dolomite, and soda ash emission factors are from WRI/WBCSD GHG Protocol Iron & Steel Sector Worksheet, Table 4, January 2008. Worksheet from http://www.ghgprotocol.org.
[5] Assume coke breeze is 100% carbon and that all of it converts to CO_2 in the furnace. Molecular weights: C = 12.01 lb/lb-mol; CO_2 = 44.01 lb/lb-mol to give a molar conversion factor from C to CO_2 = 3.66 g CO_2/g C.

Appendix A: Emission Calculations
Process Inputs

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Throughputs

Material / Process	Annual Capacities			Operating Hours	Calculated Hourly Rate	Max. Rate Increase	Maximum Hourly Rate for Permitting			Maximum Annual Rate for Permitting		
	metric tonnes/yr	short tons/yr	long tons/yr	hours/year	metric tonnes/hr	%	metric tonnes/hr	short tons/hr	long tons/hr	metric tonnes/yr	short tons/yr	long tons/yr
Oxide Pellets / Pelletizer	3,000,000	3,306,900	2,952,589	8060	372	10	409.4	451.3	403.0	3,586,600	3,953,510	3,529,919

Material	% of Material	Basis Material or Product	Production Rates for Permitting				Notes
			metric tonnes/yr	short tons/yr	metric tonnes/hr	short tons/hr	
Concentrate	87.05%	Oxide Pellets	3,122,136	3,441,530	356.4	392.9	Balance with additives
Concentrate to Stockpile	100%	Concentrate Required	3,122,136	3,441,530	356.4	392.9	Assume all concentrate goes to stockpile.
Limestone	6.95%	Oxide Pellets	249,269	274,769	---	66.7	Annual - Jacobs Process Description & Design Basis June 2012. Hourly - Assume max of 100 tph truck delivery of additives, limestone:dolomite is about 2:1 (per Mike Twite call 6/11/12 @ 15:45)
Bentonite Binder	0.65%	Oxide Pellets	23,313	25,698	---	---	Jacobs Process Description & Design Basis June 2012
Organic Binder (Alcotac)	0.26%	Oxide Pellets	9,325	10,279	---	---	Bentonite can be replaced with a binder and soda ash mixture that is 2 parts organic binder and 3 parts soda ash.
Soda Ash	0.39%	Oxide Pellets	13,988	15,419	---	---	Bentonite can be replaced with a binder and soda ash mixture that is 2 parts organic binder and 3 parts soda ash.
Dolomite Binder	3.85%	Oxide Pellets	138,084	152,210	---	33.3	Annual - Jacobs Process Description & Design Basis June 2012. Hourly - Assume max of 100 tph truck delivery of additives, limestone:dolomite is about 2:1 (per Mike Twite call 6/11/12 @ 15:45)
Coke Breeze	1.50%	Oxide Pellets	53,799	59,303	---	6.8	Jacobs Process Description & Design Basis June 2012
Oxide Product Stockpile	100%	Oxide Pellets	3,586,600	3,953,510	409.4	451.3	Assume all oxide pellets go to stockpile. Maximum hourly rate onto the pile is that of the oxide pellet rate production
Oxide Product Railcar Loading	100%	Oxide Pellets	3,586,600	3,953,510	409.4	451.3	Assume all oxide pellets go to railcar loading. Maximum hourly rate onto the pile is that of the oxide pellet rate production

Natural Gas Usage

EU Description	EU ID	MMscf/hr	MMscf/yr	Nm3/mt	MMBtu/hr	MMBtu/yr	Notes
Furnace Hood Exhaust	EU013	0.43	3744.47	28	436	3,819,360	Total installed burner capacity - Induration Furnace
Furnace Windbox Exhaust	EU014						
Space Heaters	EU021	0.0069	60	---	7	61,320	Barr estimate of 7 space heaters needed for the pelletizing area, each rated at 1 MMBtu/hr.
Ground Limestone/Dolomite Additive System Air Heater	EU010	0.02	163	---	19	166,440	
Coke Breeze Additive System Air Heater	EU009	0.0017	15	---	1.7	14,892	

NOTE: Nm^3 are at 0°C (32°F) and natural gas ft^3 are at 60°F (industry std). Temperature corrected conversion = 37.324 ft^3 per Nm^3
Heating Value (HHV): 1020 MMBtu/MMscf

Natural Gas Usage - Internal Combustion Engines

EU Description	EU ID	kW	hp	MMBtu/hr	hr/yr	MMBtu/yr	Notes
Emergency Generator - Natural Gas	EU017	462	620	1.575	500	788	Jacobs section 2.6.3 & performance info for CAT C-15 genset
Fire Water Pump - Natural Gas	EU018	228	300	0.763	500	381	Magnetation's Pellet Plant EU-CE Descriptions 6.4.12

Coke Breeze Combustion

EU Description	EU ID	BTU/lb	MMBtu/hr	MMBtu/yr	Notes
Hardening Furnace	EU013 & EU014	12,000	162	1,423,264	Coke breeze heat content from Mike Twite email sent 4/11/12 to LLS

Notes:
The emergency generator has a maximum capacity not to exceed 620 hp.
1 hp (mechanical) = 2,542.5 Btu/hr (AP-42, Appendix A, page A-13)

Methodology:
Calculated Hourly Rate = Annual Capacity / Plant Operating Hours (8,060 hours/yr)
Maximum Hourly Rate for Permitting = Calculated Hourly Rate * Max. Rate Increase
Maximum Annual Rate for Permitting = Maximum Hourly Rate for Permitting * 8,760 hours/yr

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

BACT Limits & Stack Parameters

Stack ID	Emission Unit ID	Description		Magnetation Stack Flow* (acfm)	Magnetation Stack Flow* (dcfm)	Stack Temp (ºF)	Stack Moisture (%)	Stack Pressure (psi)	PM Assumed Grain Loading (gr/dscf)	$PM_{10}/PM_{2.5}$ Assumed Grain Loading (gr/dscf)
SV001	EU001	Iron Concentrate Unloading & Storage Area	EU001a	60,000	55,140	77	2.0%	14.02	0.0020	0.0020
SV004	EU004	Coke Breeze Unloading & Storage Area	EU004b	2,720	2,500	77	2.0%	14.02	0.0020	0.0020
N/A	EU005	Bentonite Unloading & Storage Area	EU005	2,720	2,500	77	2.0%	14.02	0.0020	0.0020
N/A	EU006	Organic Binder Unloading & Storage Area	EU006	2,720	2,500	77	2.0%	14.02	0.0020	0.0020
N/A	EU007	Soda Ash Unloading & Storage Area	EU007	2,720	2,500	77	2.0%	14.02	0.0020	0.0020
N/A	EU008	Bentonite Additive System	EU008	2,720	2,500	77	2.0%	14.02	0.0020	0.0020
SV009	EU009	Coke Breeze Additive System	EU009	5,985	5,500	77	2.0%	14.02	0.0020	0.0020
N/A	EU025	Limestone and Dolomite Grinding Mill Bin Area	EU025b	14,000	12,866	77	2.0%	14.02	0.0020	0.0020
SV010	EU010	Ground Limestone and Dolomite Additive System	EU010	24,000	18,506	180	2.0%	14.02	0.0020	0.0020
N/A	EU011	Mixing Area Material Handling System	EU011	21,763	20,000	77	2.0%	14.02	0.0020	0.0020
SV012	EU012	Hearth Layer Bin System	EU012	10,000	8,813	100	2.0%	14.02	0.0020	0.0020
SV013A	EU013	Furnace Hood Exhaust	EU013	434,116	295,062	246	4.7%	14.02	0.0040	0.0080
SV013B	EU014	Furnace Windbox Exhaust	EU014	487,070	353,620	156	11.2%	14.02	0.0040	0.0080
SV014	EU015	Furnace Discharge System	EU015	54,000	42,639	165	2.0%	14.02	0.0020	0.0020
N/A	EU016	Hearth Layer Separation System	EU016	50,000	45,950	77	2.0%	14.02	0.0020	0.0020
SV018	EU019	Oxide Pellet Storage & Unloading System	EU019	40,000	36,760	77	2.0%	14.02	0.0020	0.0020
N/A	EU020	WBE Lime Storage Area	EU020	1,088	1,000	77	2.0%	14.02	0.0020	0.0020
N/A	EU022	WBE Residual Product Loading Area	EU022	1,088	1,000	77	2.0%	14.02	0.0020	0.0020
N/A	EU026	Recycled Dust Storage Area	EU026	10,000	9,190	77	2.0%	14.02	0.0020	0.0020

* Calculated stack flows assume a standard temperture and pressure (STP) of 68°F and 14.7 psi.

Baghouse Control Efficiency & Hours of Operation

99	% is the assumed control efficiency for all material handling baghouses. This value is used to calculate uncontrolled emissions from BACT stacks.
8760	Hours per year assumed for calculating annual emissions from hourly emissions

Pelletizing Furnace

NO_x rates assume 7.5% and 92.5% of total emissions for the SV013A and SV013B respectively.

Windbox Exhaust

Pollutant	BACT Limit	Units
SO_2	5	ppm
F	10.00	mg/Nm^3

Cooling Tower

4,600	Circulation Flow Rate (gal/min)
0.001%	Total Drift (% of the Circulating Flow)
6,009	Total Dissolved Solids (ppm)
8.346	Density of Water (lb/gal)
0.138	lb/hr
0.61	tons/yr

Appendix A: Emission Calculations
Emission Factors

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Stack ID	EU ID	Emission Unit Description	Pollutant	Emission Factor	EF Units	Emission Factor References / Assumptions / Equations
fugitives - building	EU002a	Iron Concentrate Transfer & Storage Area (pile) (4 drop points)	PM	0.01	lb/st iron	AP-42 5th Ed, Section 11.24 Table 2 - Metallic Minerals Procesing; High Moisture Ore - Material Handling and Transfer - All Minerals Except Bauxite (SCC 3-03-024-04)
			PM_{10}	0.004	lb/st iron	AP-42 5th Ed, Section 11.24 Table 2 - Metallic Minerals Procesing; High Moisture Ore - Material Handling and Transfer - All Minerals Except Bauxite (SCC 3-03-024-04)
			$PM_{2.5}$	0.004	lb/st iron	$PM_{2.5} = PM_{10}$
fugitives - atmosphere	EU002a	Limestone Unloading	PM	1.6E-05	lb/st limestone	$PM = PM_{10}$
			PM_{10}	1.6E-05	lb/st limestone	AP-42 5th Ed, Section 11.19.2 Table 2 - Crushed Stone Procesing (including limestone and dolomite); Truck Unloading - Fragmented Stone (SCC 3-05-020-31)
			$PM_{2.5}$	1.6E-05	lb/st limestone	$PM_{2.5} = PM_{10}$
fugitives - building	EU002b	Limestone Reclaim	PM	0.0030	lb/st limestone	AP-42 5th Ed, Section 11.19.2 Table 2 - Crushed Stone Procesing (including limestone and dolomite); Conveyor Transfer Point - uncontrolled (SCC 3-05-020-06)
			PM_{10}	0.00110	lb/st limestone	AP-42 5th Ed, Section 11.19.2 Table 2 - Crushed Stone Procesing (including limestone and dolomite); Conveyor Transfer Point - uncontrolled (SCC 3-05-020-06)
			$PM_{2.5}$	0.00110	lb/st limestone	$PM_{2.5} = PM_{10}$
fugitives - atmosphere	EU003a	Dolomite Unloading	PM	1.6E-05	lb/st dolomite	$PM = PM_{10}$
			PM_{10}	1.6E-05	lb/st dolomite	AP-42 5th Ed, Section 11.19.2 Table 2 - Crushed Stone Procesing (including limestone and dolomite); Truck Unloading - Fragmented Stone (SCC 3-05-020-31)
			$PM_{2.5}$	1.6E-05	lb/st dolomite	$PM_{2.5} = PM_{10}$
fugitives - building	EU003b	Dolomite Reclaim	PM	0.0030	lb/st dolomite	AP-42 5th Ed, Section 11.19.2 Table 2 - Crushed Stone Procesing (including limestone and dolomite); Conveyor Transfer Point - uncontrolled (SCC 3-05-020-06)
			PM_{10}	0.00110	lb/st dolomite	AP-42 5th Ed, Section 11.19.2 Table 2 - Crushed Stone Procesing (including limestone and dolomite); Conveyor Transfer Point - uncontrolled (SCC 3-05-020-06)
			$PM_{2.5}$	0.00110	lb/st dolomite	$PM_{2.5} = PM_{10}$
fugitives - atmosphere	EU004a	Coke Breeze Unloading & Storage Area	PM	0.00011	lb/st coke breeze	AP-42 5th Ed, Section 12.5 Table 12.5-4 - Pile formation: Coal
			PM_{10}	0.000052	lb/st coke breeze	AP-42 5th Ed, Section 12.5 Table 12.5-4 - Pile formation: Coal
			$PM_{2.5}$	0.000015	lb/st coke breeze	AP-42 5th Ed, Section 12.5 Table 12.5-4 - Pile formation: Coal
fugitives - atmosphere	EU025a	Limestone/Dolomite Grinding Mill Bin Area	PM	0.0030	lb/st aggregate	AP-42 5th Ed, Section 11.19.2 Table 2 - Crushed Stone Procesing (including limestone and dolomite); Conveyor Transfer Point - uncontrolled (SCC 3-05-020-06)
			PM_{10}	0.00110	lb/st aggregate	AP-42 5th Ed, Section 11.19.2 Table 2 - Crushed Stone Procesing (including limestone and dolomite); Conveyor Transfer Point - uncontrolled (SCC 3-05-020-06)
			$PM_{2.5}$	0.00110	lb/st aggregate	$PM_{2.5} = PM_{10}$
SV013A	EU013	Furnace Hood Exhaust	SO_2	0.015	lb/st pellets	Assumes greenball sulfur concentration of 0.014% and pellet sulfur concentration of 0.009%, so that 0.005% by weight of sulfur is released from the pellets in the furnace. Also assumes that the sulfur leaves the furnace as SO_2. Assume 7.5% exits the Hood Exhaust (based on the NO_x emissions ratio of the Hood Exhaust and the Windbox Exhaust). SO_2 = 0.005% * 2000 lb/st * 1.998 [convert S to SO_2] * 7.5% (exiting through the Hood Exhaust)
			SO_2	2.218	lb/st coke breeze	Assume that all sulfur is released from the coke breeze in the furnace and that the sulfur leaves the furnace as SO_2. Sulfur data from testing results listed in Mike Twite's email sent 3/20/12 - 0.74 wt% is maximum. Assume 7.5% exits the Hood Exhaust (based on the NO_x emissions ratio of the Hood Exhaust and the Windbox Exhaust). SO_2 = 0.74% * 2000 lb/st * 1.998 [convert S to SO_2] * 7.5% (exiting through the Hood Exhaust)
			NO_x	0.019	lb/MMBtu	Based on burner design. Assume 7.5% exits the Hood Exhaust (based on the vendor provided NO_x ratio between the Hood Exhaust and the Windbox Exhaust). NO_x = 0.25 lb/MMBtu * 7.5% (exiting through the Hood Exhaust)
			CO	0.0018	lb/st pellets	Based on Hibbtac results. Assume 7.5% exits the Hood Exhaust (based on the vendor provided NO_x ratio between the Hood Exhaust and the Windbox Exhaust). CO = 10 lb/hr ÷ 410 short ton of oxide pellets produced/hr * 7.5% (exiting through the Hood Exhaust)
			VOC	0.0009	lb/st pellets	Based on Hibbtac results (reported as propane). Assume 7.5% exits the Hood Exhaust (based on the vendor provided NO_x ratio between the Hood Exhaust and the Windbox Exhaust). VOC = 4.8 lb/hr ÷ 410 short ton of oxide pellets produced/hr * 7.5% (exiting through the Hood Exhaust)
			Pb	0.00039	lb/st pellets	Based on Hibbtac results. Assume 95% wet scrubber control efficiency to back calculate uncontrolled from Hibbtac test results. Assume the total Pb emissions divided equally between the Hood Exhaust and Waste Gas stack, similar to PM and assumes that lead is mainly particulate-based. Pb = 0.016 lb/hr ÷ 410 short ton of oxide pellets produced/hr ÷ (1 - 95% control efficiency) * 50% (evenly divided between stacks)
			H_2SO_4	0.00012	lb/st pellets	Based on 'Estimating Sulfuric Acid Aerosol Emissions from Coal-Fired Power Plants' US-DOE, March 1998. SO_3/SO_2 ratio ranges from 0.0011 to 0.0067, max used. H_2SO_4 = lb SO_2/short ton pellets * 0.0067 * 1.23 [H_2SO_4/SO_3]
			Fluorides	0.0044	lb/st pellets	Emission factor based on chemical analysis of fluoride in green balls and fired pellets. Information provided by MPCA (Hongming) and analysed by Barr (BSB). UCL of 43.8 ppm used. Assume 5% exits the hood exhaust and 95% exits the waste gas stack (based on reference to MPCA comment). F = 43.8 lb F/1,000,000 lb pellets * 2,000 lb/st * 5% (exiting the Hood Exhaust)
SV013B	EU014	Furnace Windbox Exhaust	SO_2	0.185	lb/st pellets	Assumes greenball sulfur concentration of 0.014% and pellet sulfur concentration of 0.009%; therefore, 0.005% by weight of sulfur is released from the pellets in the furnace. Assume that the sulfur leaves the furnace as SO_2. Assume 92.5% exits the Windbox Exhaust (based on the NO_x emissions ratio of the Hood Exhaust and the Windbox Exhaust). SO_2 = 0.005% * 2000 lb/st * 1.998 [convert S to SO_2] * 92.5% (exiting through the Windbox Exhaust)
			SO_2	27.353	lb/st coke breeze	Assume that all sulfur is released from the coke breeze in the furnace and that the sulfur leaves the furnace as SO_2. Sulfur data from testing results listed in Mike Twite's email sent 3/20/12 - 0.74 wt% is maximum. Assume 92.5% exits the Windbox Exhaust (based on the NO_x emissions ratio of the Hood Exhaust and the Windbox Exhaust). SO_2 = 0.74% * 2000 lb/st * 1.998 [convert S to SO_2] * 92.5% (exiting through the Windbox Exhaust)
			SO_2	19.61	lb/hr	Assume controlled concentration of 5 ppm for BACT. Air parameters: molar weight as 68°F and 29.92 in Hg = 24.04 L/g-mol, air flow = 353,620 dcfm, stack moisture = 11.2%. Controlled SO_2 = 5 ft^3 SO_2/1,000,000 ft^3 air * 0.028 m^3/ft^3 * 1000 L/m^3 ÷ 24.04 L/g-mol * 2.2 x 10^{-3} lb-mol/g-mol * 64.064 lb SO_2/lb-mol SO_2 * 353,620 dcfm ÷ (1 - 0.112) * 60 min/hr
			NO_x	0.231	lb/MMBtu	Based on burner design. Assume 92.5% exits the Windbox Exhaust (based on the vendor provided NO_x ratio between the Hood Exhaust and Windbox Exhaust). NO_x = 0.25 lb/MMBtu * 92.5% (exiting through the Windbox Exhaust)
			CO	0.0226	lb/st pellets	Based on Hibbtac results. Assume 92.5% exits the Windbox Exhaust (based on the vendor provided NO_x ratio between the Hood Exhaust and Windbox Exhaust). CO = 10 lb/hr ÷ 410 short ton of oxide pellets produced/hr * 92.5% (exiting through the Windbox Exhaust)
			VOC	0.0108	lb/st pellets	Based on Hibbtac results (reported as propane). Assume 92.5% exits the Windbox Exhaust (based on the vendor provided NO_x ratio between the Hood Exhaust and Windbox Exhaust). VOC = 4.8 lb/hr ÷ 410 short ton of oxide pellets produced/hr * 92.5% (exiting through the Windbox Exhaust)
			Pb	0.00039	lb/st pellets	Based on Hibbtac results. Assume 95% wet scrubber control efficiency to back calculate uncontrolled from Hibbtac test results. Assume the total Pb emissions divided equally between the Hood Exhaust and Waste Gas stack, similar to PM and assumes that lead is mainly particulate-based. Pb = 0.016 lb/hr ÷ 410 short ton of oxide pellets produced/hr ÷ (1 - 95% control efficiency) * 50% (evenly divided between stacks)
			H_2SO_4	0.0015	lb/st pellets	Based on 'Estimating Sulfuric Acid Aerosol Emissions from Coal-Fired Power Plants' US-DOE, March 1998. SO_3/SO_2 ratio ranges from 0.0011 to 0.0067, max used. H_2SO_4 = lb SO_2/short ton pellets X 0.0067 X 1.23 [H_2SO_4/SO_3]
			Fluorides	0.0832	lb/st pellets	Emission factor based on chemical analysis of fluoride in green balls and fired pellets. Information provided by MPCA (Hongming) and analysed by Barr (BSB). UCL of 43.8 ppm used. Assume 5% exits the hood exhaust and 95% exits the waste gas stack (based on reference to MPCA comment). F = 43.8 lb F/1,000,000 lb pellets * 2,000 lb/st * 95% (exiting the Waste Gas stack)

Appendix A: Emission Calculations
Emission Factors

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

SV016	EU017	Emergency Generator - Natural Gas	PM	9.91E-03	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			PM_{10}	7.71E-05	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			$PM_{2.5}$	7.71E-05	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			SO_2	5.88E-04	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			NO_x	4.08E+00	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			CO	3.17E-01	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			VOC	1.18E-01	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			Fluorides	6.95E-06	lb/MMBtu	Sum of fluoride containing pollutants from AP-42 Table 3.2-2.
SV017	EU018	Fire Water Pump - Natural Gas	PM	9.91E-03	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			PM_{10}	7.71E-05	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			$PM_{2.5}$	7.71E-05	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			SO_2	5.88E-04	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			NO_x	4.08E+00	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			CO	3.17E-01	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			VOC	1.18E-01	lb/MMBtu	4-stroke lean-burn engine combustion emission factors from AP-42 Table 3.2-2.
			Fluorides	6.95E-06	lb/MMBtu	Sum of fluoride containing pollutants from AP-42 Table 3.2-2.
NA	EU021	Space Heaters	PM	7.6	lb/MMscf	Emission factors from AP-42 Tables 1.4-1 and 1.4-2
			PM_{10}	7.6	lb/MMscf	Per AP-42, assume $PM_{2.5} = PM_{10} = PM$
			$PM_{2.5}$	7.6	lb/MMscf	Per AP-42, assume $PM_{2.5} = PM_{10} = PM$
			CO	84	lb/MMscf	Table 1.4-1 (Small Boiler, Controlled - Low NOx Burners)
			SO_2	0.6	lb/MMscf	Table 1.4-2
			VOC	5.5	lb/MMscf	Table 1.4-2
			NO_x	50	lb/MMscf	Table 1.4-1 (Small Boiler, Controlled - Low NOx Burners)
			Fluorides	9.40E-06	lb/MMscf	Sum of fluoride containing pollutants from AP-42 Table 1.4-3.
SV010	EU010	Ground Limestone/Dolomite Additive System Air Heater	PM	7.6	lb/MMscf	Emission factors from AP-42 Tables 1.4-1 and 1.4-2
			PM_{10}	7.6	lb/MMscf	Per AP-42, assume $PM_{2.5} = PM_{10} = PM$
			$PM_{2.5}$	7.6	lb/MMscf	Per AP-42, assume $PM_{2.5} = PM_{10} = PM$
			CO	84	lb/MMscf	Table 1.4-1 (Small Boiler, Controlled - Low NOx Burners)
			SO_2	0.6	lb/MMscf	Table 1.4-2
			VOC	5.5	lb/MMscf	Table 1.4-2
			NO_x	50	lb/MMscf	Table 1.4-1 (Small Boiler, Controlled - Low NOx Burners)
			Fluorides	9.40E-06	lb/MMscf	Sum of fluoride containing pollutants from AP-42 Table 1.4-3.
SV009	EU009	Coke Breeze Additive System Air Heater	PM	7.6	lb/MMscf	Emission factors from AP-42 Tables 1.4-1 and 1.4-2
			PM_{10}	7.6	lb/MMscf	Per AP-42, assume $PM_{2.5} = PM_{10} = PM$
			$PM_{2.5}$	7.6	lb/MMscf	Per AP-42, assume $PM_{2.5} = PM_{10} = PM$
			CO	84	lb/MMscf	Table 1.4-1 (Small Boiler, Controlled - Low NOx Burners)
			SO_2	0.6	lb/MMscf	Table 1.4-2
			VOC	5.5	lb/MMscf	Table 1.4-2
			NO_x	50	lb/MMscf	Table 1.4-1 (Small Boiler, Controlled - Low NOx Burners)
			Fluorides	9.40E-06	lb/MMscf	Sum of fluoride containing pollutants from AP-42 Table 1.4-3.
NA	IA	Iron Ore Wet Grinding and Filter Cake Production	PM	0.025	lb/st pellets	AP-42 5th Ed, Section 11.3 Table 11.3-1 - Brick Manufacturing Operations; Grinding and screening operations - processing wet material (SCC 3-05-003-02)
			PM_{10}	0.0023	lb/st pellets	AP-42 5th Ed, Section 11.3 Table 11.3-1 - Brick Manufacturing Operations; Grinding and screening operations - processing wet material (SCC 3-05-003-02)
			$PM_{2.5}$	0.0023	lb/st pellets	$PM_{2.5} = PM_{10}$
NA	IA	Greenball Production System	PM	0.025	lb/st pellets	AP-42 5th Ed, Section 11.3 Table 11.3-1 - Brick Manufacturing Operations; Grinding and screening operations - processing wet material (SCC 3-05-003-02)
			PM_{10}	0.0023	lb/st pellets	AP-42 5th Ed, Section 11.3 Table 11.3-1 - Brick Manufacturing Operations; Grinding and screening operations - processing wet material (SCC 3-05-003-02)
			$PM_{2.5}$	0.0023	lb/st pellets	$PM_{2.5} = PM_{10}$

Appendix A: Emission Calculations
Raw Material
Composition Data

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Pollutant Name	Iron Ore Concentrate	Limestone (CaCO3)	Dolomite Binder	Coke Breeze	Bentonite Binder	Organic Binder (Alcotac)	Soda Ash (Na_2CO_3)	Greenball	Pellet	Lime (CaO)	Residual Product[1]	Recycled Dust[2]	Filter Cake[3]
	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)	(wt. %)
Antimony Compounds[4]	5.00E-04	1.25E-05						5.00E-04					5.00E-04
Arsenic Compounds	7.00E-04	2.00E-04		5.00E-03			1.00E-05	4.31E-04	6.00E-05			6.00E-05	4.31E-04
Beryllium Compounds	2.80E-05	3.00E-05						2.20E-04	5.40E-05			5.40E-05	2.20E-04
Cadmium Compounds	1.20E-04	7.00E-06		2.90E-04				1.00E-04	5.00E-05			5.00E-05	1.00E-04
Chlorine[5]	1.00E-03			1.10E-01		9.72E+00	1.30E-01	8.00E-03	4.00E-03			4.00E-03	8.00E-03
Chromium Compounds[6]	1.50E-03	1.75E-04		3.40E-02				2.50E-03	2.70E-03			2.70E-03	2.50E-03
Cobalt Compounds	2.80E-04	8.50E-05						3.50E-04	5.00E-05			5.00E-05	3.50E-04
Flourides[4]	5.00E-03							5.00E-03	5.00E-03			5.00E-03	5.00E-03
Lead	3.30E-03	2.35E-04		1.30E-02			1.00E-04	1.00E-03	2.00E-04			2.00E-04	1.00E-03
Manganese Compounds	7.60E-02	2.63E-02		4.18E-01				5.40E-02	6.40E-02	2.00E-02	2.00E-02	6.40E-02	5.40E-02
Mercury Compounds[7,8]	5.30E-07	6.95E-08		2.08E-07				5.30E-07	7.00E-09			7.00E-09	5.30E-07
Nickel Compounds	1.80E-03	2.70E-04		1.66E-02				5.00E-04	1.00E-04			1.00E-04	5.00E-04
Selenium Compounds	1.70E-03	3.00E-05		1.97E-04				7.50E-04	2.50E-04			2.50E-04	7.50E-04

Notes:

[1] Assume that the composition of the residual product is equal to the composition of the lime because the raw material was not analyzed.
[2] Assume that the composition of the recycled dust is equal to the composition of the pellet because the raw material was not analyzed.
[3] Assume that the composition of the filter cake is equal to the composition of the greenball because the raw material was not analyzed.
[4] Assume that the concentration of the iron ore concentrate and greenball is equal to the concentration of the pellet.
[5] Assume that the chlorine concentration of the organic binder is equal to the sodium chloride concentration less the sodium concentration.
[6] Assume that the chromium compound concentration of the coke breeze is equal to the total chromium concentration.
[7] Assume that the concentration of the iron ore concentrate is equal to the concentration of the greenball.
[8] The mercury concentration of the limestone is calculated as follows: (0.91+0.48)/2 ppb
This is from Northshore Mining limestone (Engesser and Niles 1997), found in "Mercury Mining in Minnesota" 10/15/05 report.

References:

AK Steel Coke Breeze materials spreadsheet from Mike Twite (emailed 4/2/12). If <DL, used DL.
Composition data from 2005 Minnesota Steel pilot plant study
H. Jiang's (10/13/2000) Hg Paper. Speciation (Material Composition) Information, Page 2 of 4; File: Tac_haps
Coke Breeze data from Randal Telesz
Coke Breeze data from AK Steel testing of coke breeze samples collected 3/26/12; mercury is max from Magnetation testing sampled on 3/28/12.

Appendix A: Emissions Calculations
Paved Road Fugitive Emission Calculations

Company Name: Magnetation LLC
Address City IN Zip: 64 East 100 North, Reynolds, IN 47980
Part 70 Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 15, 2013

Type of Truck	Status	Vehicle Weight (tons) [1]	Number of Trips per Day [2]	VMT per Trip (miles) [3]		Weighted Vehicle Weight (tons) [4]	VMT per Day (miles) [5]	Average Vehicle Weight (tons) [6]		PM Emission Factor (lb/VMT) [7]	PM Emission Rate (lb/day) [8]	PM Emission Rate (tons/yr) [9]		PM_{10} Emission Factor (lb/VMT) [7]	PM_{10} Emission Rate (lb/day) [8]	PM_{10} Emission Rate (tons/yr) [9]		$PM_{2.5}$ Emission Factor (lb/VMT) [7]	$PM_{2.5}$ Emission Rate (lb/day) [8]	$PM_{2.5}$ Emission Rate (tons/yr) [9]
CAT 966 Loader	Full	29.65	291.80	0.009		8,650.41	2.763	28.10		2.3978	63.82	11.65		0.4796	12.76	2.33		0.1177	3.13	0.57
	Empty	26.00	291.80	0.009		7,586.80	2.763													
Bentonite (Route 1)	Full	40.00	3.00	0.170		120.00	0.511													
	Empty	19.00	3.00	0.161		57.00	0.483													
Limestone & Dolomite (Route 2)	Full	40.00	48.00	0.142		1,920.00	6.818													
	Empty	19.00	48.00	0.218		912.00	10.455													
Coke Breeze (Route 2)	Full	40.00	7.00	0.142		280.00	0.994													
	Empty	19.00	7.00	0.218		133.00	1.525													
GSA Lime and Waste Haul (Route 5)	Full	40.00	0.38	0.398		15.20	0.151													
	Empty	19.00	0.38	0.398		7.22	0.151													
TOTAL			**700.36**			**19,681.63**	**26.615**													

Notes:
[1] Provided by the source
[2] Provided by the source
[3] Provided by the source
[4] Weighted Vehicle Weight (tons) = Vehicle Weight (tons) x Number of Trips per Day
[5] VMT per Day (miles) = VMT per Trip (miles) x Number of Trips per Day
[6] Average Vehicle Weight (tons) = Σ [Weighted Vehicle Weight (tons)] ÷ Σ (Number of Trips per Day)
[7] Emission factor equation taken from AP-42, Section 13.2.1.3, eq. 2 (published 1/11):

$$E = (k) \times (sL^{0.91}) \times (W^{1.02}) \times (1 - P \div (4 \times N))$$

where:
E = Emission Rate (lb/VMT)
k = 0.011 lb/VMT for PM, 0.0022 lb/VMT for PM_{10}, 0.00054 lb/VMT for $PM_{2.5}$ (Table 13.2-1.1 Particle Size Multipliers for Paved Road Equation)
sL = Silt Loading = 9.7 g/m^2 (AP-42, Section 13.2.1, Table 13.2.1-3 (Iron and Steel Production))
W = Average Vehicle Weight (tons)
P = Number of "Wet" Days with at least 0.254 mm (0.01 in) of Precipitation during the Averaging Period = 120 (AP-42, Section 13.2.1, Figure 13.2.1-2)
N = Number of Days in the Averaging Period = 365
[8] Emission Rate (lb/day) = Emission Factor (lb/VMT) x Σ [VMT per Day (miles)]
[9] Emission Rate (tons/yr) = Emission Rate (lb/day) x 365 days/yr ÷ 2000 lb/ton

Indiana Department of Environmental Management
Office of Air Quality

Appendix B
Best Available Control Technology (BACT) Analysis Determination

Source Background and Description

Source Name:	Magnetation LLC
Source Location:	64 East 100 North, Reynolds, Indiana 47980
County:	White
SIC Code:	1011
Operation Permit No.:	T181-32081-00054
Permit Reviewer:	John Haney

Proposed Project

On July 2, 2012, Magnetation LLC submitted an application to the Indiana Department of Environmental Management (IDEM), Office of Air Quality (OAQ) for a New Source Construction and Part 70 Operating Permit to construct and operate an iron ore pelletizing plant to be located at 64 East 100 North, Reynolds, Indiana. This plant will consist of the following emission units and specifically regulated insignificant activities:

Note: All references to "tons" used throughout this document are short tons (i.e., one short ton equals 2,000 pounds).

(a) One (1) iron concentrate unloading and storage area, identified as EU001, approved in 2013 for construction, with a maximum capacity of 4,950 tons per hour, consisting of the following:

(1) One (1) thaw shed, one (1) rotary rail car dumper, one (1) pedestal mount breaker, two (2) grizzlies, two (2) apron feeders, one (1) dribble conveyor, one (1) breaker, identified as EU001a, using baghouse CE001 as control, exhausting to stack SV001.

(2) One (1) covered conveyor transferring to concentrate storage building which contains, four (4) covered conveyors, four (4) loader hoppers, and a storage pile identified as EU001b, exhausting inside the building.

(b) One (1) limestone unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU002a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU002b, exhausting inside the limestone storage pile enclosure. Under 40 CFR 60, Subpart OOO, the limestone unloading and storage area conveyor is considered an affected facility.

(c) One (1) dolomite unloading and storage area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU003a, exhausting uncontrolled to atmosphere.

(2) One (1) covered conveyor, identified as EU003b, exhausting inside the dolomite storage pile enclosure. Under 40 CFR 60, Subpart OOO, the dolomite unloading and storage area conveyor is considered an affected facility.

(d) One (1) coke breeze unloading and storage area, approved in 2013 for construction, with a maximum capacity of 7 tons per hour, consisting of the following:

(1) One (1) truck unloader, identified as EU004a, exhausting uncontrolled to atmosphere.

(2) One (1) pneumatic conveyance system and one (1) coke breeze grinding mill bin identified as EU004b, with a maximum capacity of 1,100 tons, using baghouse CE004 as control, exhausting to stack SV004.

(e) One (1) bentonite unloading and storage area, identified as EU005, approved in 2013 for construction, consisting of one (1) bentonite storage bin with a maximum capacity of 440 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE005 as control, exhausting inside the building.

(f) One (1) organic binder unloading and storage area, identified as EU006, approved in 2013 for construction, consisting of one (1) organic binder feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE006 as control, exhausting inside the building.

(g) One (1) soda ash unloading and storage area, identified as EU007, approved in 2013 for construction, consisting of one (1) soda ash feed bin with a maximum capacity of 55 tons, with a maximum capacity of 3.0 tons per hour, using bin vent CE007 as control, exhausting inside the building.

(h) One (1) bentonite additive system, identified as EU008, approved in 2013 for construction, consisting of one (1) bentonite feed bin with a maximum capacity of 220 ton, with a maximum capacity of 3.0 tons per hour, using bin vent CE008 as control, exhausting inside the building.

(i) One (1) coke breeze additive system, identified as EU009, approved in 2013 for construction, with a maximum capacity of 16.5 tons per hour, using baghouse CE009 as control, exhausting to stack SV009, consisting of one (1) coke breeze conveyor, one (1) roller mill for coke breeze grinding with a nominal capacity of 11 tons per hour, one (1) product separation cyclone, and one (1) coke breeze bin with a maximum capacity of 220 tons.

(j) One (1) limestone and dolomite grinding mill bin area, approved in 2013 for construction, with a maximum capacity of 495 tons per hour, consisting of the following:

(1) One (1) load hopper, one (1) enclosed vibrating grizzly feeder/screener, and one (1) covered belt feeder, identified as EU025a, exhausting uncontrolled to the atmosphere.

(2) One (1) additive conveyor, one (1) dolomite grinding mill bin with a maximum capacity of 440 tons, and one (1) limestone grinding mill bin with a maximum capacity of 440 tons, identified as EU025b, using baghouse CE023 as control, exhausting inside the building. Under 40 CFR 60, Subpart OOO, these units of the limestone and dolomite grinding mill bin area are considered affected facilities.

(k) One (1) ground limestone and dolomite additive system, identified as EU010, approved in 2013 for construction, with a maximum capacity of 132 tons per hour, using baghouse CE010 as control, exhausting to stack SV010, consisting of the following:

(1) One (1) limestone feed conveyor, one (1) dolomite feed conveyor, one (1) roller mill feed conveyor, one (1) roller mill for limestone and dolomite, one (1) product separation cyclone, and one (1) limestone and dolomite bin with a maximum capacity of 1,100 tons. Under 40 CFR 60, Subpart OOO, these units of the ground limestone and dolomite additive system are considered affected facilities.

(2) One (1) natural gas fired air heater, with a maximum heat input capacity of 19 MMBtu per hour.

(l) One (1) mixing area material handling system, identified as EU011, approved in 2013 for construction, with a maximum capacity of 780 tons per hour, using baghouse CE011 as control, exhausting inside the building, consisting of two (2) filter cake feed conveyors, two (2) mixer feed conveyors, and two (2) mixers.

(m) One (1) hearth layer bin system, identified as EU012, approved in 2013 for construction, with a maximum capacity of 660 tons of iron oxide pellets per hour, using baghouse CE012 as control, exhausting to stack SV012, consisting of two (2) hearth layer conveyors and one (1) hearth layer bin.

(n) One (1) induration machine, approved in 2013 for construction, consisting of one (1) natural gas fired pellet hardening furnace, with a maximum heat input capacity of 436 MMBtu per hour and a maximum throughput rate of 450 tons per hour of iron oxide pellets, equipped with the following:

(1) One (1) furnace hood exhaust, identified as EU013, using hood exhaust baghouse CE013 as control, exhausting to stack SV013A.

(2) One (1) furnace windbox exhaust (WBE), identified as EU014, using one (1) gas suspension absorber (GSA) (CE015) and one (1) WBE baghouse (CE016) as control, exhausting to stack SV013B.

(3) One (1) furnace discharge system, identified as EU015, using baghouse CE017 as control, exhausting to stack SV014, consisting of one (1) dribble conveyor, one (1) discharge hopper, and two (2) discharge vibrating feeders each with a maximum throughput of 1,155 tons per hour.

(4) One (1) induced draft cross flow wet cooling tower, identified as EU024, with a capacity of 4,600 gallons of circulating water per minute and a maximum drift rate of 0.001%, exhausting to stack SV022.

(o) One (1) hearth layer separation system, identified as EU016, approved in 2013 for construction, using baghouse CE018 as control, exhausting inside the building, consisting of the following:

(1) Two (2) product conveyors, identified as P1 and P2, with a maximum capacity of 660 and 770 tons per hour respectively.

(2) Two (2) hearth layer conveyors, identified as HL-1 and HL-2, each with a maximum capacity of 440 tons per hour.

(3) One (1) hearth layer separation bin, one (1) hearth layer separation grizzly, and two (2) reclaim hoppers.

(p) One (1) oxide pellet storage and loadout system, identified as EU019, approved in 2013 for construction, with a maximum capacity of 550 tons per hour, using baghouse CE019 as control, exhausting to stack SV018, consisting of two (2) conveyors, two (2) 8800-ton storage bins, and two (2) 99-ton storage bins.

(q) One (1) WBE lime storage area, identified as EU020, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) lime feed conveyor and one (1) 80 cubic meter lime storage silo, using bin vent CE020 as control, exhausting inside the building.

(r) One (1) WBE residual product loading area, identified as EU022, approved in 2013 for construction, with a maximum capacity of 7.0 tons per hour, consisting of one (1) GSA reactor conveyor, one (1) GSA product conveyor, one (1) WBE conveyor, and one (1) 100 cubic meter storage silo, using bin vent CE021 as control, exhausting inside the building.

(s) One (1) recycled dust storage area, identified as EU026, approved in 2013 for construction, consisting of one (1) 55-ton storage bin, with a maximum capacity of 7.0 tons per hour, using dust recycle baghouse CE024 as control, exhausting inside the building.

Specifically Regulated Insignificant Activities

(a) Natural gas-fired combustion sources with heat input equal to or less than ten million (10,000,000) Btu per hour, including the following:

(1) Seven (7) natural gas fired space heaters, identified as EU021, approved in 2013 for construction, each with a maximum heat input capacity of 1.0 MMBtu per hour. [326 IAC 2-2]

(2) One (1) coke breeze additive system (EU009) natural gas fired air heater, approved in 2013 for construction, with a maximum heat input capacity of 1.7 MMBtu per hour. [326 IAC 2-2]

(b) A petroleum fuel (other than gasoline) dispensing facility, having a storage tank capacity less than or equal to ten thousand five hundred (10,500) gallons, and dispensing three thousand five hundred (3,500) gallons per day or less. [326 IAC 2-2]

(c) Paved roads and parking lots with public access. [326 IAC 2-2] [326 IAC 6-4]

(d) Emergency generators, including the following:

(1) One (1) emergency natural gas generator, identified as EU017, approved in 2013 for construction, with a maximum capacity not to exceed 620 hp, exhausting to stack SV016. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(e) Stationary fire pump engines, including the following:

(1) One (1) backup jockey fire water pump, identified as EU018, approved in 2013 for construction, consisting of one (1) 300 hp natural gas engine, exhausting to stack SV017. [326 IAC 2-2] [40 CFR 60, Subpart JJJJ] [40 CFR 63, Subpart ZZZZ]

(f) Other emission units, not regulated by a NESHAP, with PM_{10}, NO_x, and SO_2 emissions less than five (5) pounds per hour or twenty-five (25) pounds per day, CO emissions less than twenty-five (25) pounds per day, VOC emissions less than three (3) pounds per hour or fifteen (15) pounds per day, lead emissions less than six-tenths (0.6) tons per year or three and twenty-nine hundredths (3.29) pounds per day, and emitting greater than one (1) pound per day but less than five (5) pounds per day or one (1) ton per year of a single HAP, or emitting greater than one (1) pound per day but less than twelve and five tenths (12.5) pounds per day or two and five tenths (2.5) ton per year of any combination of HAPs:

(1) One (1) iron concentrate wet grinding and filter cake production system, approved in 2013 for construction, with a maximum capacity of 700 tons per hour, consisting of three (3) conveyors, and a filter cake feed bin, exhausting uncontrolled into a building. [326 IAC 2-2] [326 IAC 6-3-2]

(2) One (1) greenball production system, approved in 2013 for construction, with a maximum capacity of 900 tons per hour, using a wet spray process as control, consisting of six (6) 110-ton balling disc feed bins, six (6) balling discs, six (6) green pellet roller screens, six (6) shredders, one (1) single deck roller screen, and thirty-one (31) conveyors, exhausting into a building. [326 IAC 2-2] [326 IAC 6-3-2

Requirement for Best Available Control Technology (BACT)

326 IAC 2-2 requires a best available control technology (BACT) review to be performed for the construction of any new major stationary source or the major modification of any existing major stationary source in an area designated as attainment or unclassifiable in 326 IAC 1-4. White County has been designated attainment or unclassifiable for all criteria pollutants. Therefore, if the net emissions increase of any of the pollutants listed in 326 IAC 2-2-1(ww)(1) exceeds the corresponding significant levels, PSD BACT analysis shall be performed.

Each pollutant shall be evaluated separately. A discussion of the emissions units for which PSD BACT analysis has been conducted will be included under each pollutant evaluation.

This modification is subject to BACT analysis for PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, and GHGs because the proposed project has:

(1) Particulate matter (PM) potential to emit greater than 25 tons per year;

(2) Particulate matter with an aerodynamic diameter less than or equal to ten (10) micrometers (PM_{10}) potential to emit greater than 15 tons per year;

(3) Particulate matter with an aerodynamic diameter less than or equal to two-and-a-half (2.5) micrometers ($PM_{2.5}$) potential to emit greater than 10 tons per year;

(4) Sulfur dioxide potential to emit greater than 40 tons per year;

(5) Nitrogen oxides potential to emit greater than 40 tons per year;

(6) Fluorides potential to emit greater than 3 tons per year; and

(7) Greenhouse gases potential to emit greater than 100,000 tons per year CO_2e.

See Appendix A of this TSD for the detailed potential to emit (PTE) calculations.

The following table summarizes the emission units subject to BACT and which pollutants have been evaluated for each emission unit.

Emission Unit		Associated Emission Point (Control Device)	BACT Proposed for Following Pollutants:
Iron Concentrate Unloading	EU001a	SV001 (CE001)	PM, PM_{10}, $PM_{2.5}$, F
Iron Concentrate Transfer & Storage Area	EU001b	**fugitive	PM, PM_{10}, $PM_{2.5}$, F
Limestone Unloading (Truck)	EU002a	fugitive	PM, PM_{10}, $PM_{2.5}$
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	fugitive	PM, PM_{10}, $PM_{2.5}$
Dolomite Unloading (Truck)	EU003a	fugitive	PM, PM_{10}, $PM_{2.5}$
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	fugitive	PM, PM_{10}, $PM_{2.5}$
Coke Breeze Unloading (Truck)	EU004a	fugitive	PM, PM_{10}, $PM_{2.5}$
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	SV004 (CE004)	PM, PM_{10}, $PM_{2.5}$
Bentonite Unloading (Truck) & Storage Area	EU005	** (CE005)	PM, PM_{10}, $PM_{2.5}$
Organic Binder Unloading & Storage Area	EU006	** (CE006)	PM, PM_{10}, $PM_{2.5}$
Soda Ash Unloading & Storage Area	EU007	** (CE007)	PM, PM_{10}, $PM_{2.5}$
Bentonite Additive System	EU008	** (CE008)	PM, PM_{10}, $PM_{2.5}$
Coke Breeze Additive System	EU009	SV009 (CE009)	PM, PM_{10}, $PM_{2.5}$
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener	EU025a	**fugitive	PM, PM_{10}, $PM_{2.5}$
Limestone/Dolomite Grinding Mill Bin Area	EU025b	** (CE023)	PM, PM_{10}, $PM_{2.5}$
Ground Limestone/Dolomite Additive System	EU010	SV010 (CE010)	PM, PM_{10}, $PM_{2.5}$
Ground Limestone/Dolomite Additive System Air Heater	EU010	SV010 (CE010)	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Mixing Area Material Handling System	EU011	** (CE011)	PM, PM_{10}, $PM_{2.5}$, F
Hearth Layer Bin System	EU012	SV012 (CE012)	PM, PM_{10}, $PM_{2.5}$, F
Furnace Hood Exhaust	EU013	SV013A (CE013)	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Furnace Windbox Exhaust (WBE)	EU014	SV013B (CE015, CE016)	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Furnace Discharge System	EU015	SV014 (CE017)	PM, PM_{10}, $PM_{2.5}$, F
Cooling Tower	EU024	SV022	PM, PM_{10}, $PM_{2.5}$
Hearth Layer Separation System	EU016	** (CE018)	PM, PM_{10}, $PM_{2.5}$, F
Oxide Pellet Storage & Unloading System	EU019	SV018 (CE019)	PM, PM_{10}, $PM_{2.5}$, F
WBE Lime Storage Area	EU020	** (CE020)	PM, PM_{10}, $PM_{2.5}$
WBE Residual Product Loading Area	EU022	** (CE021)	PM, PM_{10}, $PM_{2.5}$
Recycled Dust Storage Area	EU026	** (CE024)	PM, PM_{10}, $PM_{2.5}$, F
Space Heaters	EU021	various	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Coke Breeze Additive System Air Heater	EU009	SV009 (CE009)	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Emergency Generator	EU017	SV016	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Fire Water Pump	EU018	SV017	PM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, F, GHGs
Iron Ore Wet Grinding and Filter Cake Production	IA	**fugitive	PM, PM_{10}, $PM_{2.5}$, F
Greenball Production System	IA	**fugitive	PM, PM_{10}, $PM_{2.5}$, F

**This process exhausts inside a building.

Summary of the Best Available Control Technology (BACT) Process

Pursuant to 326 IAC 2-2-1(i), Best Available Control Technology (BACT) is defined as "an emissions limitation, including a visible emissions standard, based on the maximum degree of reduction for each regulated NSR pollutant that would be emitted from any proposed major stationary source or major modification, that the commissioner, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for the source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the pollutant. In no event shall application of best available control technology result in emissions of any pollutant that would exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and 40 CFR Part 61. If the commissioner determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard not feasible, a design, equipment, work practice, operational standard, or combination thereof may be prescribed instead to satisfy the requirements for the application of best available control technology. The standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of the design, equipment, work practice, or operation and shall provide for compliance by means that achieve equivalent results."

Federal guidance on BACT requires an evaluation that follows a “top down” process, consisting of five (5) steps. The Office of Air Quality (OAQ) makes BACT determinations by following the five (5) steps as outlined below.

Step 1: Identify Potential Control Technologies

The first step is to identify potentially “available” control options for each emission unit and for each pollutant under review. Available options should consist of a comprehensive list of those technologies with a potentially practical application to the emissions unit and the regulated pollutant under evaluation. The list should include lowest achievable emission rate (LAER) technologies, innovative technologies, and controls applied to similar source categories. There is no requirement in the State or Federal regulations to require innovative control to be used as BACT.

Step 2: Eliminate Technically Infeasible Options

The second step is to eliminate technically infeasible options from further consideration. To be considered feasible, a technology must be both available and applicable. It is important in this step that any presentation of a technical argument for eliminating a technology from further consideration be clearly documented based on physical, chemical, engineering, and source-specific factors related to safe and successful use of the controls. Innovative control means a control that has not been demonstrated in a commercial application on similar units. Innovative controls are normally given a waiver from the BACT requirements due to the uncertainty of actual control efficiency. Based on this, the OAQ will not evaluate or require any innovative controls for this BACT analysis. Only available and proven control technologies are evaluated. A control technology is considered available when there are sufficient data indicating that the technology results in a reduction in emissions of regulated pollutants.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness

The third step is to rank the technologies not eliminated in Step 2 in order of descending control effectiveness for each pollutant of concern. The ranked alternatives are reviewed in terms of control effectiveness, expected emission rate, expected emission reduction, and environmental, energy, and economic impacts specific to the proposed modification. If the analysis determines that the evaluated alternative is not appropriate as BACT due to any of the impacts, then the next most effective is evaluated. This process is repeated until a control alternative is chosen as

BACT. If the highest ranked technology is proposed as BACT, it is not necessary to perform any further technical or economic evaluation, except for the environmental analyses.

Step 4: Evaluate the Most Effective Controls and Document the Results

The fourth step entails an evaluation of energy, environmental, and economic impacts for determining a final level of control. The evaluation begins with the most stringent control option and continues until a technology under consideration cannot be eliminated based on adverse energy, environmental, or economic impacts.

Step 5: Select BACT

The fifth and final step is to select as BACT the most effective of the remaining technologies under consideration for each pollutant of concern. For the technologies determined to be feasible, there may be several different limits that have been set as BACT for the same control technology. The permitting agency has to choose the most stringent limit as BACT unless the applicant demonstrates in a convincing manner why that limit is not feasible. The final BACT determination would be the technology with the most stringent corresponding limit that is economically feasible. BACT must, at a minimum, be no less stringent than the level of control required by any applicable New Source Performance Standard (NSPS) and National Emissions Standard for Hazardous Air Pollutants (NESHAP) or state regulatory standards applicable to the emission units included in the permits.

This BACT determination is based on the following information:

(1) The EPA RACT/BACT/LAER (RBLC) Clearinghouse;

(2) EPA and State air quality permits;

(3) Communications with control device equipment manufacturers;

(4) The EPA New Source Review website;

(5) Technical books and articles; and

(6) Guidance documents from and communications with state agencies.

Particulate Matter (PM) BACT

The PM BACT analysis is divided into five categories: material handling operations, induration furnace, combustion units, cooling towers, and fugitive emissions.

Step 1 of the BACT process is shown below for this PM BACT analysis describes particulate control devices that are applicable for controlling particulate across a wide range of processes.. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific PM control devices may be discussed in individual BACT analyses.

Step 1: Identify Potential Control Technologies (PM)

Particulate matter (PM) is a complex mixture of small particles and liquid droplets. PM can be made up of a variety of components, including acids, organic chemicals, metals, and soil or dust particles. PM includes any size of filterable particulate. Filterable particulate is the particulate that is emitted directly as a solid or liquid at the stack.

Emissions of particulate matter (PM) are generally controlled with add-on control equipment designed to capture the emissions prior to the time they are exhausted to the atmosphere. In cases where the material being emitted is organic, particulate matter may be controlled through a combustion process. Generally, PM emissions are controlled through one of the following mechanisms:

(1) Mechanical collectors (such as cyclones or multiclones).

(2) Wet scrubbers.

(3) Electrostatic precipitators (ESP).

(4) Fabric filter dust collectors (baghouses).

PM emissions from a combustion process are typically controlled through one of the following mechanisms:

(1) Clean fuels.

(2) Good combustion practices.

(3) Usage limitation.

(4) Catalyzed diesel particulate filter (CDPF).

PM emissions from cooling towers are typically controlled through one of the following mechanisms:

(1) Drift eliminators.

(2) Minimizing total dissolved solids (TDS).

Fugivite PM emissions from paved roads are typically controlled through the use of work practices which include a site-specific Fugitive Dust Control Plan.

The choice of which technology is most appropriate for a specific application depends upon several factors, including particle size to be collected, particle loading, stack gas flow rate, stack gas physical characteristics (e.g., temperature, moisture content, presence of reactive materials), and desired collection efficiency.

Mechanical Collectors (such as Cyclones or Multiclones)

Mechanical collectors use the inertia of the particles for collection. The particulate-laden gas stream enters the control device and is forced to move in a cyclonic manner, which causes the particles to move toward the outside of the vortex. Most of the large-diameter particles enter a hopper below the cyclonic tubes while the gas stream turns and exits the device.

Cyclones are typically used to remove relatively large particles from gas streams. Conventional single cyclones are estimated to control PM at 70-90%, PM_{10} at 30-90%, and $PM_{2.5}$ at 0-40%. High efficiency single cyclones are designed to achieve higher control of smaller particles and multiclones may also achieve higher control of smaller particles. Collection efficiency generally increases with particle size and/or density, inlet duct velocity, cyclone body length, number of gas revolutions in the cyclone, ratio of cyclone body diameter to gas exit diameter, dust loading, and smoothness of the cyclone inner wall. Cyclone efficiency will decrease with increases in gas viscosity, body diameter, gas exit diameter, gas inlet duct area, and gas density.

Cyclones are often used for recovery and recycling of material or as precleaners for more expensive final control devices such as fabric filters or electrostatic precipitators. Cyclones are used for applications such as after spray drying operations in the food and chemical industries; after crushing/grinding/calcining operations in the mineral and chemical industries to collect salable or useful material; for first stage control of PM from sinter plants, roasters, kilns, and furnaces in the metallurgical industries; for catalyst recycling in the fluid-cracking process; and for precleaning fossil-fuel and wood-waste fired industrial and commercial fuel combustion units.

The typical gas flow rates for a single cyclone are 1,060 to 25,400 scfm. Flows that are higher use multiple cyclones in parallel. Inlet gas temperatures are only limited by the material of construction of the cyclone. Cyclones perform more efficiently with higher pollutant loadings, with loadings typically ranging from 1.0 to 100 gr/scf. Cyclones are unable to handle sticky or tacky materials.

Wet Scrubbers

A wet scrubber is an air pollution control device that removes PM from waste gas streams primarily through the impaction, diffusion, interception and/or absorption of the pollutant onto droplets of liquid. The liquid containing the pollutant is then collected for disposal. There are numerous types of wet scrubbers that remove PM, including venturi, impingement and sieve plate, spray towers, mechanically aided, condensation growth, packed beds, ejector, mobile bed, caternary grid, froth tower, oriented fiber pad, and wetted mist eliminators. Collection efficiencies for wet scrubbers vary with the particle size distribution of the waste gas stream. In general, collection efficiency decreases as the PM size decreases. Collection efficiencies also vary with scrubber type. Collection efficiencies range from greater than 99% for venturi scrubbers to 40-60% (or lower) for simple spray towers. Wet scrubbers are smaller and more compact than baghouses or ESPs. They have lower capital costs and comparable operation and maintenance (O&M) costs. Wet scrubbers are particularly useful in the removal of PM with the following characteristics:

(1) Sticky and/or hygroscopic materials (materials that readily absorb water);

(2) Combustible, corrosive and explosive materials;

(3) Particles which are difficult to remove in their dry form;

(4) PM in the presence of soluble gases; and

(5) PM in waste gas streams with high moisture content.

Some applications of wet scrubbers include the following:

- Condensation scrubbers: for controlling fine PM-containing waste-gas streams.

- Fiber-bed scrubbers (wetted-fiber scrubbers or mist eliminators): for controlling aerosol emissions from chemical, plastics, asphalt, sulfuric acid, and surface coating industries; for controlling lubricant mist emission from rotating machinery and storage tanks; and for eliminating visible plume downstream of other control devices.

- Impingement-plate/tray-tower scrubbers: for the food and agriculture industry and at gray and iron foundries. These types of scrubbers may be used to control other pollutants such as SO_2, VOC, and HAPs in other settings.

- Mechanically-aided scrubbers: for food processing paper, pharmaceuticals, chemicals, plastics, tobacco, fiberglass, ceramics, and fertilizer. Processes controlled include dryers, cookers, crushing and grinding operations, spraying, ventilation, and material handling.

- Orifice scrubbers: for food processing and packaging; pharmaceutical processing and packaging; manufacture of chemicals, rubber and plastics, ceramics, and fertilizer. Processes controlled include dryers, cookers, crushing and grinding operations, spraying, ventilation, and material handling.

- Packed-bed/packed-tower wet scrubbers: for the chemical, aluminum, coke and ferroalloy, food and agriculture, and chromium electroplating industries.

- Spray-chamber/spray-tower wet scrubbers: often used as part of a flue gas desulfurization systems, where they are used to control emissions from coal and oil combustion from electric utilities and industrial sources.

- Venturi scrubbers: for controlling PM emissions from utility, industrial, commercial, and institutional boilers fired with coal, oil, wood, and liquid waste; for sources in the chemical, mineral products, wood, pulp and paper, rock products, and asphalt manufacturing industries; for lead, aluminum, iron and steel, and gray iron production industries; for municipal solid waste incinerators. They are typically used where it is necessary to obtain high collection efficiencies for fine PM.

The primary disadvantage of wet scrubbers is that increased collection efficiency comes at the cost of increased pressure drop across the control system. Another disadvantage is that they generate waste in the form of a sludge which requires treatment and/or disposal. Lastly, downstream plume visibility problems can result unless the added moisture is removed from the gas stream.

Electrostatic Precipitators

An electrostatic precipitator (ESP) is a particle control device that uses electrical forces to move the particles out of the flowing gas stream and onto collector plates. The particles are given an electrical charge by forcing them to pass through a corona, a region in which gaseous ions flow. The electrical field that forces the charged particles to the walls comes from electrodes maintained at high voltage in the center of the flow lane.

Once the particles are collected on the plates, they must be removed from the plates without re-entraining them into the gas stream. This is usually accomplished by knocking them loose from the plates, allowing the collected layer of particles to slide down into a hopper from which they are evacuated. Some precipitators remove the particles by intermittent or continuous washing with water.

Dry-type ESPs are primarily used in the electric utility industry and may also be used by the textile industry, pulp and paper facilities, the metallurgical industry, cement and mineral industry, sulfuric acid manufacturing plants, as well as for coke ovens and hazardous waste incinerators. Dust characteristics are a limiting factor for dry-type ESPs. Sticky, moist, high resistivity, flammable, or explosive dusts and particles are not well-suited for dry-type ESPs. Wet ESPs are used in situations for which dry ESPs are not suited, such as when the material to be collected is wet, sticky, flammable, explosive, or has a high resistivity. Wet ESPs are commonly used by the textile industry, pulp and paper facilities, the metallurgical industry, and sulfuric acid manufacturing plants. The limiting factor for wet ESPs is temperature; typically wet ESPs cannot handle operating temperatures exceeding 170°F.

ESP control efficiencies are very high and can range from 95% to 99.9% due to the strong electrical forces applied to small particles and can handle high temperatures (dry ESPs), pressures, and gas flow rates. The composition of the particulate matter is very important because it influences the conductivity within the dust layers on the collection plate. Wet ESPs are effective at collecting sticky particles and mist, help to cool and condition gas streams, and may

provide for control of other aerosolized pollutants in the gas stream. ESPs in general are not suited for use in processes which are highly variable because they are very sensitive to fluctuations in gas stream conditions (flow rates, temperatures, particulate and gas composition, and particulate loadings). They have high capital costs and require large installation space. Dry ESPs are not recommended for removing sticky or moist particles. Wet ESPs can have potential problems with corrosion and they generate a wastewater slurry that must be handled.

Fabric Filtration

A fabric filter unit consists of one or more isolated compartments containing rows of fabric bags in the form of round, flat, or shaped tubes, or pleated cartridges. Particle laden gas passes up (usually) along the surface of the bags then radially through the fabric. Particles are retained on the upstream face of the bags, and the cleaned gas stream is vented to the atmosphere. The filter is operated cyclically, alternating between relatively long periods of filtering and short periods of cleaning. During cleaning, dust that has accumulated on the bags is removed from the fabric surface and deposited in a hopper for subsequent disposal.

Fabric filters collect particles with sizes ranging from submicron to several hundred microns in diameter at efficiencies generally in excess of 99 or 99.9%. The layer of dust, or dust cake, collected on the fabric is primarily responsible for such high efficiency. The cake is a barrier with tortuous pores that trap particles as they travel through the cake. Gas temperatures up to about 500°F, with surges to about 550°F, can be accommodated routinely in some configurations. Most of the energy used to operate the system appears as pressure drop across the bags and associated hardware and ducting.

Fabric filters are used where high efficiency particle collection is required and can be used in most any process where dust is generated and can be collected and ducted to a central location. Limitations are imposed by gas characteristics (temperature and corrosivity) and particle characteristics (primarily stickiness) that affect the fabric or its operation and that cannot be economically accommodated. Important process variables include particle characteristics, gas characteristics, and fabric properties. The most important design parameter is the air- or gas-to-cloth ratio (the amount of gas in ft^3/min that penetrates one ft^2 of fabric) and the usual operating parameter of interest is pressure drop across the filter system. Fabric filters are usually made of woven or (more commonly) needle-punched felts sewn to the desired shape, mounted in a plenum with special hardware, and used across a wide range of dust concentrations.

Fabric filters provide high collection efficiency for both coarse and fine particles and are relatively insensitive to fluctuations in gas stream conditions. Operation is simple and fabric filters are useful for collecting particles with resistivities either too low or too high for collection with ESPs. Fabric filters have limited application for high temperatures and corrosive or moist exhaust.

Catalyzed Diesel Particulate Filter (CDPF)

The particulate matter emissions in exhaust gas is trapped by a ceramic filter and oxidized using a metallic catalyst or a base. The operating temperature ranges between 480 - 570°F. The exhaust gas temperature must be high enough over an extended period of time to allow for filter regeneration.

Fugitive Dust Control Plan

Fugitive dust emissions are particulate emissions which occur from the mechanical disturbance of granular material exposed to the air. These emissions are termed “fugitive” because they are not discharged to the atmosphere in a confined air stream.

A Fugitive Dust Control Plan typically contains a variety of methods for the minimization of these particulates including paving of roads, vacuum sweeping, water spreading, chemical treatment,

and vehicle speed reduction. Each Fugitive Dust Control Plan is site-specific; each source must determine the appropriate combination of controls depending the source location and layout.

(a) Material Handling Operations (PM)

The emissions from the material handling operations are in the form of particulate matter (PM, PM_{10}, and $PM_{2.5}$). Particulate matter emissions are primarily due to the attrition of particles (dust) from the feedstocks, iron oxide pellets, and by-products. This is caused by the abrasion of materials rubbing against each other and the process equipment as they move through the process.

The following new emission units associated with material handling operations are subject to PM BACT requirements:

Particulate Matter Emission Units Associated with Material Handling Operations	
Emission Unit	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Unloading (Truck)	EU002a
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Unloading (Truck)	EU003a
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b
Coke Breeze Unloading (Truck)	EU004a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder	EU025a
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

Existing PM BACT Determinations for Material Handling Operations
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for material handling operations at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

PM BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations: EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	PM: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	PM: Fugitive Dust Control Plan 5% opacity (6-min avg) 1.07 E-03 lb/hr and 2.20 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	PM: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.53 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU004a	PM: Fugitive Dust Control Plan 5% opacity (6-min avg) 7.45 E-04 lb/hr and 3.26 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU001b	PM: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 3.93 lb/hr and 17.21 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage EU002b	PM: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.05 lb/hr and 0.10 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU003a	PM: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.03 lbhr and 0.06 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Transfer): EU025a	PM: Fugitive Dust Control Plan Enclosed conveyor and grizzly, 5% opacity (6-min avg), 0.90 lb/hr and 1.92 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Iron Ore Wet Grinding and Filter Cake Production	PM: 5% opacity (6-min avg.) 0.77 lb/hr and 3.37 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Greenball Production System	PM: 5% opacity (6-min avg.) 0.77 lb/hr and 3.37 tpy	NI	BACT-PSD
Existing PM BACT Determinations - Material Handling Operations					
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Oxide Pellet Stockpile Conveyor Gallery	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.77 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD

PM BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Bin	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 1.40 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Feed	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.12 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Discharge	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 3.30 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Screening and Handling	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 2.90 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Carbon Bin for Mercury Control	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Lime Bin for Scrubber	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Primary Grinding Mill Line 3	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.23 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Grizzly Transfer Tower	PM: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.079 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Dozer Activity at Tailings Basin	PM: Fugitive Dust Control Plan, 5% opacity (6-min avg)	NI	BACT-PSD
		Grading at Tailings Basin	PM: Fugitive Dust Control Plan, 5% opacity (6-min avg)	NI	BACT-PSD
		120K Ton Concentrate Stockpile Loadout	PM: Fugitive Dust Control Plan, 5% opacity (6-min avg)	NI	BACT-PSD
		Oxide Product Loadout to Railcars	PM: Fugitive Dust Control Plan, 5% opacity (6-min avg)	NI	BACT-PSD
		These BACT requirements include daily check for visible emissions during daylight hours while fugitive emission operations are occurring.			
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Bentonite Bin	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.021 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	94%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Intermediate Dry Fuel Silo	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.11 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD

PM BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Prepared Dry Fuel Silo	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.07 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Final Transfer Conveyors and Loadout Conveyor	PM: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Reclaim Conveyor	PM: Baghouse with Leak Detection, 0.002 gr/dscf and 0.31 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Emergency Pellet Conveyor Transfer	PM: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Coal Bin 2	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.14 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Limestone Bin	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Mill Feeder 1	PM: Baghouse with Leak Detection, 0.002 gr/dscf and 0.51 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Lime Bin	PM: Baghouse/Bin Vent, 0.002 gr/dscf and 0.02 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	PIL-102 Iron Ore Pellet Storage Piles (5,512 tons/hr)	Filterable PM: Wet Suppression, 5.61 lb/hr, 13.88 tons/yr	90%	BACT-PSD
Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	PIL-103 Flux Storage Piles (1,323 tons/hr)	Filterable PM: Wet Suppression, 1.98 lb/hr, 2.18 tons/yr	90%	BACT-PSD
		From Process Notes: Flux material includes Limestone and Dolomite			
Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	PIL-104 Pig Iron Storage Piles (1,102 tons/hr)	Filterable PM: Wet Suppression, 0.27 lb/hr, 0.78 tons/yr	NI	BACT-PSD
Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	PIL-107 Coke Breeze Storage Piles (661 tons/hr)	Filterable PM: Wet Suppression, 0.51 lb/hr, 1.27 tons/yr	NI	BACT-PSD
V & M Star: Youngstown, OH	OH-0316/ P0103660 (9/23/2008)	Alloy, Additives, & Flux Handling (134 tons/hr)	PM: Silo Bin Vent Filters, 6% opacity (6-min avg)	NI	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Direct Reduced Iron (DRI) Material Handling	PM: Enclosures/Baghouse, 0.47 lb/hr, 2.06 tons/yr, 0% opacity	NI	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Coal and Iron Ore Unloading	PM: Enclosures/Baghouse, 0.93 lb/hr, 4.07 tons/yr, 0% opacity	NI	BACT-PSD

PM BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
	Permit # 07-00587 (5/6/2008)	Coal and Iron Ore Unloading	PM: Fugitive Dust Control Plan, 6.15 tons/yr	NI	BACT-PSD
	A review of the permit shows that the process consists of a crane partially controlled by a three-sided enclosure transferring material to a hopper which is vented to the baghouse. The remaining emissions from the process are listed as fugitive emissions.				
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Alloy, Flux, Carbon, Limestone, & Coke Handling	PM: Enclosures/Baghouse, 1.4 lb/hr, 6.13 tons/yr, 0% opacity	NI	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Iron Ore Grinding (992 tons/yr)	PM: Baghouse with Cyclones, 1.04 lb/hr, 4.56 tons/yr, 0% opacity	NI	BACT-PSD
	Permit # 07-00587 (5/6/2008)	Iron Ore Handling Line (992 tons/yr)	PM: Fugitive Dust Control Plan, 1.03 tons/yr	NI	BACT-PSD
	A review of the permit shows that only Grinder 4A is controlled by the cyclones and baghouse. The remaining handling units (Grizzly Feeder 5A, Conveyor 6A, and Hopper 4A) are listed as fugitive emissions.				
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Conveyors, Hoppers, Screens to Rotary Hearth Furnace (227 tons/yr)	PM: Baghouse, 1.4 lb/hr, 6.13 tons/yr	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Ore Crushing and Handling	PM: No Control, 0.0025 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
		While the RBLC doesn't list a baghouse as control for PM, a baghouse is required for this process for the control of PM_{10} (filterable), lead, and fluorides.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Additive Handling	PM: Baghouse, 0.0025 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Oxide Pellet Handling	PM: Wet Scrubber, 0.005 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Small Material Loading Bins	PM: Baghouse, 0.0025 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Silos	PM: Baghouse, 0.0025 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Handling	PM: Wet Scrubber, 0.005 gr/dscf, 5% opacity (6-min avg)	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Tertiary Ore Crushing: Crusher Lines 4 & 104 (700 LT/hr)	PM: Fabric Filter, 0.0025 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Nine Concentrate Storage Bins (200 LT/hr each)	PM: Fabric Filter, 0.003 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace Discharge (160 LT/hr each)	PM: Wet Scrubber, 0.005 gr/dscf	NI	BACT-PSD
Mesabi Nugget: Hoyt Lakes, MN	MN-0061/ 13700318-001 (6/26/2005)	Material Transfer Operations (100,000 dscfm)	PM: Fabric Filter, 0.005 gr/dscf, 10% opacity (6-min avg)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Material Handling Operations (PM)

Dry Material Handling
The air streams associated with dry material handling operations are characterized by air streams at or near ambient temperature and moisture content. Such streams would not be expected to contain materials that would be considered to be acidic or corrosive. As such, none of the listed particulate matter control devices were eliminated from consideration for the dry material handling operations because of technical infeasibility.

Raw Material Unloading and Storage Areas
Control devices draw pollutant laden air into themselves through ventilation hoods or other ducted enclosures, which must be close to the pollutant generation point in order to gather the air. The dumping of material from a truck is an irregular process, likely damaging or destroying any hoods near the truck's drop point. As such, stand-alone control devices were eliminated from consideration for the truck unloading areas because of technical infeasibility.

Similarly, when material is dropped from a conveyor onto a storage pile, the emission generation point is not at the conveyor but at the top of the storage pile itself. Since ventilation hoods or other ducted enclosures can not be located close to the actual pollutant generation point, which is constantly changing in size, stand-alone control devices were eliminated from consideration for the storage piles and the loading of storage piles because of technical infeasibility.

Wet Material Handling Operations
The air streams associated with wet material handling operations are characterized by air streams at elevated moisture content. Such streams would be expected to clog and minimize the control efficiency of dry collection systems. As such, fabric filters and cyclones were eliminated from consideration for wet material handling operations because of technical infeasibility.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Material Handling Operations (PM)

The control technologies for dry material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 90%

(4) Cyclones: 70% - 90%

(5) Wet suppression: 50% - 90%

The control technologies for raw material unloading and storage areas are ranked as follows:

(1) Wet suppression: 50% - 90%

(2) Process enclosures: 50% - 90%

The control technologies for wet material handling operations are ranked as follows:

(1) Electrostatic precipitators: 95% - 99.9%+

(2) Wet scrubbers: 70% - 90%

(3) Wet suppression: 50% - 90%

Step 4: Evaluate the Most Effective Controls and Document the Results - Material Handling Operations (PM)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for dry material handling operations at iron ore pelletizing plants is fabric filtration. A few operations are controlled by wet scrubbers or wet suppression. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of PM. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.002 gr/dscf to 0.005 gr/dscf, with most processes being limited at 0.002 gr/dscf, which was determined to be BACT for many types of material handling operations.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material truck unloading at iron ore pelletizing plants is the use of a fugitive dust control plan.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material storage at iron ore pelletizing plants is the use of an enclosure. Inclusion of raw material storage into a fugitive dust control plan is also implemented.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material transfer at iron ore pelletizing plants is enclosures and fabric filtration that are appropriate to the material being handled and that are appropriate for the specific process. Since emission unit EU025a includes the dumping of material from a truck and the dropping of material from one conveyor to another, stand-alone control devices are not technical feasible as stated in Step 2. Therefore, emission unit EU025a (Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener) shall be controlled by the use of a site-specific fugitive dust control plan, enclosures for the Conveyor and Grizzly Feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Based on a review of the U.S. EPA RBLC and other Indiana permits, there is no primary control used for wet material handling operations (Iron Ore Wet Grinding and Filter Cake Production and Greenball Production) at iron ore pelletizing plants. In researching taconite ore processing (AP-42, Chapter 11.23.3), it specifically states that “because the ore remains wet, PM emissions are insignificant for the rest of the process until the dry stage of induration”. Additionally, these processes are generating less than ten tons per year each, and any type of control device for wet material (such as an electrostatic precipitator or wet scrubber) would be economically infeasible.

BACT Proposal

(a) Material Handling Group 1 Emission Units:

Group 1 Emission Units	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011

Group 1 Emission Units	
Description	Unit No.
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026

BACT for the Material Handling Group 1 emission units has been proposed to be the use of baghouses or bin vent filters with a grain loading of 0.002 gr/dscf and an appropriate pound per hour limitation.

(b) Material Handling Group 2 Emission Units (Raw Material Unloading):

Group 2 Emission Units	
Description	Unit No.
Limestone Unloading (Truck)	EU002a
Dolomite Unloading (Truck)	EU003a
Coke Breeze Unloading (Truck)	EU004a

BACT for the Material Handling Group 2 emission units has been proposed to be the use of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and an appropriate pound per hour and ton per year limitation.

(c) Material Handling Group 3 Emission Units (Raw Material Storage):

Group 3 Emission Units	
Description	Unit No.
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b

BACT for the Material Handling Group 3 emission units has been proposed to be the use of a site-specific fugitive dust control plan, the use of enclosures, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(d) Material Handling Group 4 Emission Units (Raw Material Transfer):

Group 4 Emission Units	
Description	Unit No.
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener	EU025a

BACT for the Material Handling Group 4 emission units has been proposed to be the use of a site-specific fugitive dust control plan, enclosures for the Conveyor and Grizzly Feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(e) Material Handling Group 5 Emission Units:

Group 5 Emission Units	
Description	Unit No.
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

BACT for the Material Handling Group 5 emission units has been proposed to be that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Step 5: Select BACT - Material Handling Operations (PM)

The proposed BACT for PM meets the most stringent BACT found in the RBLC for material handling operations. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM BACT for the above Material Handling Operations is given in the BACT Conclusion for PM.

(b) <u>Induration Furnaces (PM)</u>

Particulate matter emissions are primarily due to the attrition of particles (dust) from the iron oxide pellets. This is caused by the abrasion of pellets rubbing against each other and the process equipment as the pellets move through the induration furnace. Particulate matter is emitted from both the waste gas and hood exhaust vents.

The waste gas also contains a small about of condensable particulate matter. The condensable particulates are primarily inorganic compounds like sulfates, acid gases, chlorides, and fluorides which are generated as a byproduct of pellet induration. The waste gas may also contain volatile organic compounds, which are products of incomplete natural gas combustion.

The following new emission units associated with the induration furnaces are subject to PM BACT requirements:

Particulate Matter Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust (WBE)	EU014	SV013B

Clean Fuels

Recent court and regulatory agency determinations have held that “clean fuels” must be considered as one of the emission control options in a BACT analysis. The fuels analysis will be based on pollutant emissions directly associated with the use of a particular fuel. Emissions from a specific fuel may be related to the inherent properties of the fuel (e.g., sulfur content) or by the nature of the combustion process and will be accounted for based on the uncontrolled pollutant emission factors for each fuel.

Historically EPA policy has held that a facility need not consider emission control options which would fundamentally “re-define” the proposed project. For example, a coal-fired power plant would not need to consider installation of a natural gas-fired turbine as BACT for emissions control as an alternative to the proposed coal-fired plant. However, recent court decisions have

held that clean fuels must be considered in a BACT review. So, for example, natural gas must be considered as an alternative fuel for a coal-fired boiler application (a turbine option is still excluded).

Good Combustion Practices

The organic particulate matter emissions are caused through incomplete combustion. When fuel and air are not well mixed in the combustion zone, low oxygen regions form in the fuel injection plume that cause unburned fuel to pyrolize at the high engine temperature and form soot. Soot formation can be minimized by improving the fuel air mixing through enhanced fuel injection systems, air management systems, combustion system designs, and pre-mixed diesel combustion.

Existing PM BACT Determinations for Induration Furnaces

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

PM BACT Determinations – Induration Furnace					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 tons/hr pellets)	PM: Baghouse, 0.004 gr/dscf, 10.12 lb/hr, 5% opacity (6-min avg)	NI	BACT-PSD
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 tons/hr pellets)	PM: Baghouse, 0.004 gr/dscf, 12.12 lb/hr, 5% opacity (6-min avg)	NI	BACT-PSD
Existing PM BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**PM: Fabric Filter with Leak Detection, 0.004 gr/dscf and 27.00 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)**	**NI**	**BACT-PSD**
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**PM: Fabric Filter with Leak Detection, 0.004 gr/dscf and 18.00 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)**	**NI**	**BACT-PSD**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 1 (450 tons/hr pellets)	PM: Dry ESP, 0.006 gr/dscf and 10.50 lb/hr (3-hr rolling avg), 1% opacity (6-min avg)	99.9%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 2 (450 tons/hr pellets)	PM: Dry ESP, 0.006 gr/dscf and 7.10 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Furnace Hood Exhaust (624 st/hr pellets)	PM: Wet Scrubber, 0.006 gr/dscf and 23.00 lb/hr (3-hr rolling avg), 10% opacity (6-min avg)	93%	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Furnace Waste Gas (624 st/hr pellets)	PM: Wet Scrubber, 0.006 gr/dscf and 17.00 lb/hr (3-hr rolling avg), 10% opacity (6-min avg)	NI	BACT-PSD

PM BACT Determinations – Induration Furnace					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace 5 Hood Exhaust (Waste Gas #501, #502, #503) (160 LT/hr pellets)	PM: Wet ESP, 0.01 gr/dscf, 0.18 lb/MMBtu	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (PM)

Historically, baghouses have been deemed technically infeasible in iron induration furnaces due to the temperature limitations of the filter bag material. This is a concern primarily during malfunctions which result in high temperature excursions within the induration furnace. The straight grate induration furnace which Magnetation is proposing has features which can mitigate the effects of high temperature excursions which are not present in the grate/kiln design. The following is a description of those mitigating features that make a baghouse feasible on the Magnetation furnace:

- The traveling grate in a straight-grate furnace is not as susceptible to temperature swings as a grate/kiln. This is because a grate/kiln has one main burner while a traveling grate furnace has many individual gas burners. In Magnetation's case, multiple burners of varying size will be installed. This allows much more flexibility in temperature control within a straight grate furnace.

- A straight-grate furnace has the capability to divert gases from the hood exhaust stream into the firing zone for additional cooling via the tempering air stream to prevent high temperatures from damaging filter bags in waste gas service. The air in this stream is from the outlet of the second cooler and it has a much lower temperature than the firing zone gases. Additional cooling can be provided by drawing in ambient air via the air intake damper on the second cooler duct.

- A baghouse on the waste gas stream would receive exhaust gas after the proposed gas suspension absorber (see the SO_2 BACT determinations for furnace hood exhausts and furnace waste gas exhausts). Lime slurry and water are added in the absorber for SO_2 control. The evaporation of this water is a significant source of cooling, thus significantly reducing the potential for high temperature from reaching the waste gas baghouse.

- A baghouse on the hood exhaust would receive exhaust gas from the drying zone of the furnace where temperatures are low to begin with (<500°F) and the risk of temperature spiking very remote, and the risk of temperature spiking can be mitigated by adding the ability to introduce outside tempering air.

- Filter bags made with fiberglass and PTFE membrane coatings can withstand operating temperatures up to 500°F.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (PM)

The control technologies for material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 99%+

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnaces (PM)

Based on a review of the U.S. EPA RBLC, the primary control used for induration furnaces is dry capture, either using fabric filtration or a dry ESP. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of PM. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.006 gr/dscf to 0.01 gr/dscf.

BACT Proposal – Induration Furnace (PM)

BACT for the PM emissions from the induration furnace has been proposed to be controlled through the use of a baghouse with a maximum outlet concentration of 0.004 gr/dscf, an appropriate pound per hour limitation, and that the opacity shall not exceed five percent (5%) on a six (6) minute average.

Step 5: Select BACT - Induration Furnace (PM)

The proposed BACT for PM meets the most stringent BACT found in the RBLC for induration furnaces. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM BACT for the induration furnace is given in the BACT Conclusion for PM.

(c) <u>Combustion Units (PM)</u>

The following emission units associated with combustion processes are subject to PM BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 MMBtu/hr total)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

Clean Fuels

Recent court and regulatory agency determinations have held that “clean fuels” must be considered as one of the emission control options in a BACT analysis. The fuels analysis will be based on pollutant emissions directly associated with the use of a particular fuel. Emissions from a specific fuel may be related to the inherent properties of the fuel (e.g., sulfur content) or by the nature of the combustion process and will be accounted for based on the uncontrolled pollutant emission factors for each fuel.

Historically EPA policy has held that a facility need not consider emission control options which would fundamentally “re-define” the proposed project. For example, a coal-fired power plant would not need to consider installation of a natural gas-fired turbine as BACT for emissions control as an alternative to the proposed coal-fired plant. However, recent court decisions have

held that clean fuels must be considered in a BACT review. So, for example, natural gas must be considered as an alternative fuel for a coal-fired boiler application (a turbine option is still excluded).

Good Combustion Practices

The organic particulate matter emissions are caused through incomplete combustion. When fuel and air are not well mixed in the combustion zone, low oxygen regions form in the fuel injection plume that cause unburned fuel to pyrolize at the high engine temperature and form soot. Soot formation can be minimized by improving the fuel air mixing through enhanced fuel injection systems, air management systems, combustion system designs, and pre-mixed diesel combustion.

(1) Natural Gas Fired Emergency Generator (PM)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (PM)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these PM BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to December 2013 for natural gas fired generators only used for emergency purposes.

PM BACT Determinations - Emergency Generator					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	PM: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing PM BACT Determinations - Emergency Generators					
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	TSP: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (860 hp)	TPM: Use of pipeline quality natural gas, 0.34 g/hp-hr (0.44 g/kw-hr)	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	PM: Use of pipeline quality natural gas, 0.54 g/kw-hr, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	PM: Use of pipeline quality natural gas, 0.20 g/kw-hr, 0.44 lb/hr, 0.04 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (PM)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (PM)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (PM)

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the emergency generator.

The natural gas fired emergency generator (EU017) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour and/or pounds per hour of PM. Grams per kilowatt-hour is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed generator. Additionally under 326 IAC 2-7, an emergency generator is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired generators in the same size category.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (PM)

A detailed PM BACT for the natural gas fired emergency generator is given in the BACT Conclusion for PM.

(2) Natural Gas Fired Fire Pump (PM)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (PM)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these PM BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

PM BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	PM: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing PM BACT Determinations – Emergency Generators					
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	TSP: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (860 hp)	TPM: Use of pipeline quality natural gas, 0.34 g/hp-hr (0.44 g/kw-hr)	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	PM: Use of pipeline quality natural gas, 0.54 g/kw-hr, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	PM: Use of pipeline quality natural gas, 0.20 g/kw-hr, 0.44 lb/hr, 0.04 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (PM)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (PM)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (PM)

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the fire pump.

The natural gas fired fire pump (EU018) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission

limitations in terms of grams per kilowatt-hour and/or pounds per hour of PM. Grams per kilowatt-hour is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency fire pump is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired fire pumps in the same size category.

Step 5: Select BACT - Natural Gas Fired Fire Pump (PM)

A detailed PM BACT for the natural gas fired fire pump is given in the BACT Conclusion for PM.

(3) Natural Gas Fired Space Heaters and Air Heaters (PM)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (PM)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these PM BACT determinations as provided by the RBLC. The search was limited to entries from January 2006 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

PM BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	PM: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	PM: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	PM: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Existing PM BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	TPM: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
City of Victorville: Victorville, CA	CA-1191/ SE 07-02 (3/11/2010)	Auxiliary Heater (40 MMBtu/hr)	TPM: Use of pipeline quality natural gas, 1000 hours/year, 0.20 gr/100 dscf	NI	BACT-PSD
Pryor Plant Chemical : Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	TPM: 0.15 lb/hr	NI	BACT-PSD

PM BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	ASU Regen Heater SRC13 (0.1 MMBtu/hr)	PM: Good combustion practices, 20% opacity	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	Gasifier Heaters SRC14 & SRC15 (25 MMBtu/hr)	PM: Good combustion practices, 20% opacity	NI	BACT-PSD
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	TPM: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	TPM: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (PM)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (PM)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (PM)

Based on a review of the RBLC, add-on control devices are generally not used for controlling particulate emissions from natural gas fired space heaters or air heaters. Most facilities express emission limitations in terms of pounds per hour of PM. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. Emission limits for PM (when converted for comparison) varied from 0.0072 lb/MMBtu to 0.0075 lb/MMBtu.

BACT has been proposed to be the restricted use of only natural gas and the use of good combustion practices along with an emission limit, which is 0.0072 lb/MMBtu for each of the proposed heaters.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (PM)

A detailed PM BACT for natural gas fired heaters is given in the BACT Conclusion for PM.

(d) <u>Cooling Towers (PM)</u>

Particulate matter emissions are primarily due to the dissipation of heat loads from plant condensate to the atmosphere. Some of the liquid water may be entrained in the air stream and

can be carried out of the tower as "drift" droplets. As the droplet evaporates in the atmosphere, any suspended or dissolved water will solidify as particulate matter.

The following new emission units associated with the cooling towers are subject to PM BACT requirements:

Particulate Matter Emission Units Associated with the Cooling Tower		
Emission Unit		Associated Emission Point
Description	Unit No.	
Cooling Tower	EU024	SV022

Drift Eliminators

Cooling towers are a source of particulate matter emissions from the small amount of water mist that is entrained with the cooling air as “drift”. The cooling water contains small amounts of dissolved solids which become particulate emissions once the water mist evaporates. To reduce the drift from cooling towers, drift eliminators are typically incorporated into the tower design to remove as many droplets as practical from the air stream before exiting the tower.

Particulate matter emissions occur from cooling towers when suspended solids contained in water used in the cooling tower becomes airborne as the water is circulated and cooled. Drift eliminators contain packing which is used to limit the amount of this particulate matter which becomes airborne during the cooling process. As mist passes through the packing, the particles in the air contact and adhere to the surface of the packing. As condensed water flows down this packing, these particles are removed.

Total Dissolved Solids

The minimization of the total dissolved solids (TDS) of the water entering the cooling tower prior to the entrainment of the air reduces the amount of particulate emitted to atmosphere.

Existing PM BACT Determinations for Cooling Towers
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for cooling towers at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries), as well as various sources with cooling towers of comparable size, from January 2004 to January 2013.

PM BACT Determinations – Cooling Tower					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Cooling Tower EU024 (4,600 gpm)	Filterable PM: Drift eliminator with a maximum drift rate of 0.001% of the circulating water flow rate, use of cooling water with less than 6,009 milligrams per liter TDS concentration, 0.138 lb/hr, 10% opacity (6-min avg)	NI	BACT-PSD

PM BACT Determinations – Cooling Tower					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Existing PM BACT Determinations – Cooling Towers					
V & M Star: Youngstown, OH	OH-0344/ P0107088 (1/27/2011)	Cooling Water Towers (2) and Contact Water (1,372,000 gpm)	PM: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 10% opacity (6-min avg)	NI	Other Case-by-Case
			This BACT is listed under the pollutant Visbile Emissions.		
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Melt Shop Spray Contact Cooling Tower (198,360 gpm)	TPM: 0.22 lb/hr, 0.96 tons/yr, 10% opacity (6-min avg)	NI	BACT-PSD
			Process Notes: Cooling tower with 0.005% drift rate and a maximum TDS content of 2,650 mg/L		
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Rolling Mill Contact Cooling Tower (225,000 gpm)	TPM: 0.46 lb/hr, 2.01 tons/yr, 10% opacity (6-min avg)	NI	BACT-PSD
			Process Notes: Cooling tower with 0.005% drift rate and a maximum TDS content of 2,650 mg/L		
Consolidated Environmental Management Inc. – Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	TWR-101: Blast Furnace Cooling Tower	Filterable PM: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration	NI	BACT-PSD
Consolidated Environmental Management Inc. – Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	TWR-102: Iron Solidification Cooling Tower	Filterable PM: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.042 lb/hr, 0.18 tons/yr	NI	BACT-PSD
Consolidated Environmental Management Inc. – Nucor Steel Louisiana: Convent, LA	LA-0239/ PSD-LA-740 (5/24/2010)	TWR-103: Air Separation Plant Cooling Tower	Filterable PM: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.026 lb/hr, 0.11 tons/yr	NI	BACT-PSD
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Pipe Mill Cooling Tower (1,800,000 gpm)	PM: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 10% opacity (6-min avg)	NI	Other Case-by-Case
			This BACT is listed under the pollutant Visible Emissions.		

PM BACT Determinations – Cooling Tower					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Melt Shop Cooling Tower (3,000,000 gpm)	PM: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 10% opacity (6-min avg)	NI	Other Case-by-Case
			This BACT is listed under the pollutant Visible Emissions.		
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Cooling Towers (12) (1,440,000 gpm)	PM: Drift Eliminators, 3.42 lb/hr and 14.99 tons/yr (combined)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Cooling Tower	PM: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 20% opacity (6-min avg)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Cooling Towers (PM)

No technologies were eliminated from consideration because of technical infeasibility for cooling towers.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Cooling Towers (PM)

The control technologies for cooling towers are ranked as follows:

(1) Drift eliminators.

(2) Minimization of total dissolved solids (TDS).

Step 4: Evaluate the Most Effective Controls and Document the Results – Cooling Tower (PM)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for cooling towers at iron ore pelletizing plants is drift eliminators. Most facilities express emission limitations in terms of maximum drift rate and an associated pound per hour limitation. However, all of the cooling towers listed in the RBLC for the pollutant PM are not comparable to the one proposed by Magnetation due to size differences; therefore, a second review of the RBLC was performed for similarly sized cooling towers under the pollutant PM_{10}. The only cooling tower in the range of the proposed cooling tower with a listed drift rate is located at Entergy New Orleans, Inc. (Michoud Electric Plant). The drift rate is 0.001%.

BACT Proposal

BACT has been proposed to be the use of drift eliminators with a maximum drift rate of 0.001%, use of cooling water with less than 6,009 milligrams per liter TDS concentration, and an appropriate pound per hour limitation. The basis for the TDS concentration is documented in the RBLC PM_{10} BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

Step 5: Select BACT – Cooling Tower (PM)

The proposed BACT for PM meets the most stringent BACT found in the RBLC for cooling towers of comparable size. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM BACT for the cooling tower is given in the BACT Conclusion for PM.

(e) <u>Fugitive Dust Emissions (PM) from Paved Roads</u>

Fugitive dust emissions will be generated from vehicles traveling over plant roads.

Existing BACT Determinations - Fugitive Dust Emissions (PM)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for fugitive dust emissions from paved roads at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2005 to January 2013.

PM BACT Determinations: Fugitive Dust Emissions					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fugitive Dust Emissions from Paved Roads	PM: Vacuum sweeping and water flushing as necessary, speed reduction plan, in accordance with the required fugitive dust control plan	NI	BACT-PSD
Existing PM BACT Determinations: Fugitive Dust Emissions					
V & M Star: Youngstown, OH	OH-0344/ P0107088 (1/27/2011)	Paved/Unpaved Roadways and Parking Areas	PM: Control measures (watering, sweeping, chemical stabilization, or suppressants), 38.30 tons/yr total PM	NI	BACT-PSD
			PM: Control measures (watering, sweeping, chemical stabilization, or suppressants), 0% opacity, no visible emissions except for 3 minutes during any 60-minute period	NI	Other Case-by-Case
				Note: This RBLC listing is listed under the pollutant Visible Emissions.	
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Roadways (8,375 VMT/yr)	PM: Control measures (watering, resurfacing, chemical stabilization, or speed reduction), 30.64 tons/yr total PM	NI	BACT-PSD
			PM: Control measures (watering, resurfacing, chemical stabilization, or speed reduction), 0% opacity, no visible emissions except for 3 minutes during any 60-minute period	NI	Other Case-by-Case
				Note: This RBLC listing is listed under the pollutant Visible Emissions.	
Sun Coke Energy, Inc.: Middletown, OH	OH-0332/ P0104768 (2/9/2010)	Roadways and Parking Areas	PM: Control measures, 1.08 tons/yr total PM	NI	BACT-PSD
			PM: Control measures, 0% opacity, no visible emissions except for 1	NI	LAER

PM BACT Determinations: Fugitive Dust Emissions					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
			minute during any 60-minute period	Note: This RBLC listing is listed under the pollutant Visible Emissions.	
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Roadways and Parking Areas	Filterable PM: Control measures, 62.60 tons/yr	NI	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Paved Roadways and Parking Areas	PM: Control measures (wet suppressants, watering, speed reduction, and vacuuming/sweeping), 153.40 tons/yr	NI	BACT-PSD
			PM: Control measures (wet suppressants, watering, speed reduction, and vacuuming/sweeping), 0% opacity, no visible emissions except for 1 minute during any 60-minute period	NI	Other Case-by-Case
				Note: This RBLC listing is listed under the pollutant Visible Emissions.	
Suncoke (Gateway Energy & Coke): Granite City, IL	IL-0109/ 06070020 (3/13/2008)	Roads, Parking Areas, Other Open Areas	Filterable PM: Work practices (paving, fugitive dust control program)	NI	BACT-PSD
Mesabi Nugget: Hoyt Lakes, MN	MN-0061/ 13700318-001 (6/26/2005)	Fugitives from Paved Roads	PM: Fugitive dust control plan, 5% opacity	NI	BACT-PSD
Auburn Nugget: Butler, IN	IN-0119/ 033-19475-00092 (5/31/2005)	Roads	PM: Fugitive dust control plan, 10% opacity	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Fugitive Dust Emissions (PM)

Fugitive dust emissions will be generated from vehicles traveling over plant roads. Typical particulate control devices such as fabric filtration, mechanical collectors, wet scrubbers, and ESPs are not technically feasible for the control of fugitive dust emissions because, by definition, fugitive emissions cannot be reasonable routed through a single point of exhaust. Therefore, these control devices will not be considered further for fugitive dust emissions.

Since the inclusions of opacity readings as limits were considered under LAER or other case-by-case basis and not as part of a BACT determination, the taking of opacity readings will not be considered further for fugitive dust emissions.

A review of the U.S. EPA RBLC shows that fugitive dust emissions from roads at other iron ore beneficiating plants, steel mills, and steel foundries are controlled through the paving of roads and then through the use of wetting agents or controlling the accumulation of dusty material on the roads. Removal of the accumulation of silt on the roadways can be accomplished various mechanical means including sweeping or vacuuming. Fugitive dust control plans are also typically implemented.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Fugitive Dust Emissions (PM)

The most effective control for fugitive dust emissions from roadways is paving of the roads and the implementation of a site-specific Fugitive Dust Control Plan.

Step 4: Evaluate the Most Effective Controls and Document the Results - Fugitive Dust Emissions (PM)

Based on a review of the RBLC, the most stringent BACT for fugitive dust control of roads is development, implementation and maintenance of a site specific Fugitive Dust Control Plan.

BACT Proposal

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Step 5: Select BACT - Fugitive Dust Emissions (PM)

BACT shall be the development, maintenance, and implementation of a site-specific fugitive dust control plan. Since the source is required to meet the most stringent BACT for fugitive emissions from paved roads, no further evaluation of these operations is required and an economic, energy, or environmental impact analysis is not required as part of the BACT evaluation for these operations.

A detailed PM BACT for fugitive dust emissions is given in the BACT Conclusion for PM.

BACT Conclusion for PM

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for PM emissions shall be as follows:

(a) Material Handling Operations

The material handling operations shall be limited as follows:

(1) PM emissions from the following emission units (EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, and EU026) shall be controlled by fabric filter dust collectors and shall not exceed the associated emission limits listed in the following table:

Emission Unit		Control	PM Limit (gr/dscf)	PM Limit (lb/hr)
Description	(Unit ID)			
Iron Concentrate Unloading	EU001a	Baghouse CE001	0.002	0.95
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	Baghouse CE004	0.002	0.0429
Bentonite Unloading (Truck) & Storage Area	EU005	Bin Vent CE005	0.002	0.0429
Organic Binder Unloading & Storage Area	EU006	Bin Vent CE006	0.002	0.0429
Soda Ash Unloading & Storage Area	EU007	Bin Vent CE007	0.002	0.0429
Bentonite Additive System	EU008	Bin Vent CE008	0.002	0.0429
Coke Breeze Additive System	EU009	Baghouse CE009	0.002	0.09
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse CE023	0.002	0.22

Emission Unit		Control	PM Limit (gr/dscf)	PM Limit (lb/hr)
Description	(Unit ID)			
Ground Limestone and Dolomite Additive System	EU010	Baghouse CE010	0.002	0.32
Mixing Area Material Handling System	EU011	Baghouse CE011	0.002	0.34
Hearth Layer Bin System	EU012	Baghouse CE012	0.002	0.15
Furnace Discharge System	EU015	Baghouse CE017	0.002	0.73
Hearth Layer Separation System	EU016	Baghouse CE018	0.002	0.79
Oxide Pellet Storage & Unloading System	EU019	Baghouse CE019	0.002	0.63
WBE Lime Storage Area	EU020	Bin Vent CE020	0.002	0.02
WBE Residual Product Loading Area	EU022	Bin Vent CE021	0.002	0.02
Recycled Dust Storage Area	EU026	Baghouse CE024	0.002	0.16

(2) PM emissions from the following emission units (EU002a, EU003a, and EU004a) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM	5.53 E-04	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM	7.45 E-04	3.26 E-03

(3) PM emissions from the following emission units (EU001b, EU002b and EU003b) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, by enclosures, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Iron Concentrate Transfer and Storage Area	EU001b	PM	3.93	17.21
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	PM	0.05	0.10
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	PM	0.03	0.06

(4) PM emissions from the following emission unit (EU025a) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control

plan, by enclosures, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Limestone/Dolomite Hopper, Belt Feeder & Grizzly Feeder/Screener	PM	0.90	1.92

(5) The Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System opacity material shall not exceed five percent (5%) on a six (6) minute average and shall not exceed the emission limits listed in the following table:.

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Iron Ore Wet Grinding and Filter Cake Production	PM	0.77	3.37
Greenball Production System	PM	0.77	3.37

(b) Induration Furnace

The induration furnace operations shall be limited as follows:

PM emissions from the Furnace Hood Exhaust (EU013) and the Furnace Windbox Exhaust (EU014) shall be controlled by fabric filter dust collectors and shall not exceed the emission limits listed in the following table:

Emission Unit		Control	PM Limit (gr/dscf)	PM Limit (lb/hr)	Opacity (6-min avg)
Description	Unit No.				
Furnace Hood Exhaust	EU013	Baghouse CE013	0.004	10.12*	5%
Furnace Windbox Exhaust	EU014	Baghouse CE016	0.004	12.12*	5%

*The PM limits include process emissions and combustion emissions.

(c) Combustion Units

The combustion units shall be limited as follows:

(1) PM emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(2) PM emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(3) PM emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 0.0072 lb/MMBtu.

(d) Cooling Tower

The cooling tower emissions shall be controlled through the use of drift eliminators with a maximum drift rate of 0.001%, the use of cooling water with less than 6,009 milligrams per liter

TDS concentration, and a 0.138 pound per hour limitation. The basis for the TDS concentration is documented in the RBLC PM_{10} BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

(e) Fugitive Dust Emissions from Paved Roads

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (PSD BACT) with regards to PM.

Particulate Matter Less than 10 Microns (PM_{10}) BACT

The PM_{10} BACT analysis is divided into five categories: material handling operations, induration furnaces, combustion units, cooling towers, and fugitive emissions.

Step 1 of the BACT process is shown below for this PM_{10} BACT analysis to describe general particulate control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific PM_{10} control devices may be discussed in individual BACT analyses. A summary of the PM_{10} BACT determinations is provided at the end of this section.

Step 1: Identify Potential Control Technologies (PM_{10})

Particulate matter less than 10 microns (PM_{10}) is a subset of PM that includes particulate with a diameter of 10 micrometers or less. PM_{10} may be referred to as coarse particles and can cause health and environmental problems.

Particulate is typically measured as filterable or condensable particulate. Filterable particulate is emitted directly as solid or liquid at the stack, whereas condensable particulate is in the vapor phase at the stack and condenses upon cooling in the ambient air to form solid or liquid particulate. Filterable particulate may be PM, PM_{10}, or $PM_{2.5}$. Condensable particulate exists mostly as $PM_{2.5}$, but PM_{10} may also include a condensable portion. Combustion processes and industrial processes involving heat tend to form both filterable and condensable particulate. Industrial processes that don't involve heat and moisture typically only produce filterable particulate.

The control technologies for emissions of PM_{10} are generally going to be similar as those for PM. These technologies (mechanical collectors, wet scrubber, electrostatic precipitators, and fabric filter dust collectors) are discussed in the PM BACT analysis.

(a) <u>Material Handling Operations (PM_{10})</u>

The emissions from the material handling operations are in the form of particulate matter (PM, PM_{10}, and $PM_{2.5}$). Particulate matter emissions are primarily due to the attrition of particles (dust) from the feedstocks, iron oxide pellets, and by-products. This is caused by the abrasion of materials rubbing against each other and the process equipment as they move through the process.

The following new emission units associated with material handling operations are subject to PM_{10} BACT requirements:

PM_{10} Emission Units Associated with Material Handling Operations	
Emission Unit	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Unloading (Truck)	EU002a
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Unloading (Truck)	EU003a
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b
Coke Breeze Unloading (Truck)	EU004a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder	EU025a
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

Existing PM_{10} BACT Determinations for Material Handling Operations

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for material handling operations at iron ore pelletizing plants. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

PM_{10} BACT Determinations - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations: EU001, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	PM_{10}: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.53 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD

PM_{10} BACT Determinations - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	PM_{10}: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.53 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU004a	PM_{10}: Fugitive Dust Control Plan 5% opacity (6-min avg) 3.52 E-04 lb/hr and 1.54 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU001b	PM_{10}: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 1.57 lb/hr and 6.88 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage EU002b	PM_{10}: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.02 lb/hr and 0.04 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU003a	PM_{10}: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.01 lb/hr and 0.02 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Transfer): EU025a	PM_{10}: Enclosed conveyor and grizzly, 5% opacity (6-min avg) 0.33 lb/hr and 0.70 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Iron Ore Wet Grinding and Filter Cake Production	PM_{10}: 5% opacity (6-min avg) 0.07 lb/hr and 0.31 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Greenball Production System	PM_{10}: 5% opacity (6-min avg) 0.07 lb/hr and 0.31 tpy	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Material Handling Operations					
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Oxide Pellet Stockpile Conveyor Gallery	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.77 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Bin	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 1.40 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Feed	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.12 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Discharge	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 3.30 lb/hr (3-hr rolling avg)	NI	BACT-PSD

PM_{10} BACT Determinations - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Screening and Handling	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 2.90 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Carbon Bin for Mercury Control	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Lime Bin for Scrubber	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Primary Grinding Mill Line 3	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.23 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Grizzly Transfer Tower	Filterable PM_{10}: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.079 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Dozer Activity at Tailings Basin	PM_{10}: Fugitive Dust Control Plan	NI	BACT-PSD
		Grading at Tailings Basin	PM_{10}: Fugitive Dust Control Plan	NI	BACT-PSD
		120K Ton Concentrate Stockpile Loadout	PM_{10}: Fugitive Dust Control Plan	NI	BACT-PSD
		Oxide Product Loadout to Railcars	PM_{10}: Fugitive Dust Control Plan	NI	BACT-PSD
		These BACTs are listed under the pollutant Visible Emissions. The BACT determination (Table 1-12) states the limit is the use of the Fugitive Dust Control Plan.			
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Bentonite Bin	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	94%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Intermediate Dry Fuel Silo	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.11 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Prepared Dry Fuel Silo	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.07 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Final Transfer Conveyors and Loadout Conveyor	Filterable PM_{10}: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD

PM_{10} BACT Determinations - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Reclaim Conveyor	Filterable PM_{10}: Baghouse with Leak Detection, 0.002 gr/dscf and 0.31 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Emergency Pellet Conveyor Transfer	Filterable PM_{10}: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Coal Bin 2	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.14 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Limestone Bin	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Mill Feeder 1	Filterable PM_{10}: Baghouse with Leak Detection, 0.002 gr/dscf and 0.51 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Lime Bin	Filterable PM_{10}: Baghouse/Bin Vent, 0.002 gr/dscf and 0.02 lb/hr (3-hr rolling avg)	95%	BACT-PSD
V & M Star: Youngstown, OH	OH-0316 (9/23/2008)	Alloy, Additives, & Flux Handling (134 tons/hr)	Filterable PM_{10}: Silo Bin Vent Filters, 0.11 lb/hr, 0.33 tons/yr	NI	BACT-PSD
Mid American Steel Rolling Mill: Madill, OK	OK-0128/ 2003-106-C (M-1)(PSD) (9/8/2008)	Storage Silos (3) (Lime, Carbon, Baghouse Catch)	Filterable PM_{10}: Baghouses, 0.005 gr/dscf, 0.03 lb/hr/silo	99.9%	BACT-PSD
Mid American Steel Rolling Mill: Madill, OK	OK-0128/ 2003-106-C (M-1)(PSD) (9/8/2008)	Slag Processing	Filterable PM_{10}: Unit Must Process Wet Material	99.9%	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Direct Reduced Iron (DRI) Material Handling	PM_{10}: No control, 0.56 tons/yr	NI	LAER
		Coal and Iron Ore Unloading	PM_{10}: No control, 0.99 tons/yr	NI	BACT-PSD
		Alloy, Flux, Carbon, Limestone, & Coke Handling	PM_{10}: No control, 2.10 tons/yr	NI	BACT-PSD
		Iron Ore Grinding (992 tons/yr)	PM_{10}: No control, 0.40 tons/yr	NI	BACT-PSD
		Conveyors, Hoppers, Screens to Rotary Hearth Furnace (227 tons/yr)	PM_{10}: No control, 1.88 tons/yr	NI	BACT-PSD
		These BACTs are listed under the pollutant Particulate Matter, Fugitive.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Ore Crushing and Handling	Filterable PM_{10}: Baghouse, 0.0025 gr/dscf	NI	BACT-PSD

PM_{10} BACT Determinations - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Additive Handling	Filterable PM_{10}: Baghouse, 0.0025 gr/dscf	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Oxide Pellet Handling	Filterable PM_{10}: Wet Scrubber, 0.005 gr/dscf	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Small Material Loading Bins (Lime, Limestone, Carbon, Fluorospar, Bauxite)	Filterable PM_{10}: No Control, 0.0025 gr/dscf	NI	BACT-PSD
		While the RBLC doesn't list a baghouse as control for PM_{10}, a baghouse is required for this process for the control of PM.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Handling	Filterable PM_{10}: Wet Scrubber, 0.005 gr/dscf	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0090/ 1139-AOP-R6 (4/3/2006)	Slag Processing	Filterable PM_{10}: Water Sprays, 1.5 lb/hr, 2.2 tons/yr	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0090/ 1139-AOP-R6 (4/3/2006)	Miscellaneous Dust Sources (Scale Removal, Scale Breaker, Chromate Spray, Lime Silo)	Filterable PM_{10}: Fabric Filter, 0.003 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Tertiary Ore Crushing: Crusher Lines 4 & 104 (700 LT/hr)	Filterable PM_{10}: Fabric Filter, 0.0025 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Nine Concentrate Storage Bins (200 LT/hr each)	Filterable PM_{10}: Fabric Filter, 0.003 gr/dscf	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace Discharge (160 LT/hr each)	Filterable PM_{10}: Fabric Filter, 0.01 gr/dscf, 0.18 lb/MMBtu	NI	BACT-PSD
Mesabi Nugget: Hoyt Lakes, MN	MN-0061/ 13700318-001 (6/26/2005)	Material Transfer Operations (100,000 dscfm)	Filterable PM_{10}: Fabric Filter, 0.005 gr/dscf	98%	BACT-PSD
Bluewater Project: Osceola, AR	AR-0077/ 2062-AOP-R0 (7/22/2004)	Material Handling Silos	Filterable PM_{10}: Fabric Filters, 0.01 gr/dscf	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0078/ 1139-AOP-R5 (6/9/2003)	Material Handling	Filterable PM_{10}: Fabric Filter, 0.01 gr/dscf	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0078/ 1139-AOP-R5 (6/9/2003)	Lime Silo	Filterable PM_{10}: Fabric Filter, 0.005 gr/dscf, 0.1 lb/hr, 0.1 tons/yr	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0078/ 1139-AOP-R5 (6/9/2003)	Carbon Silo	Filterable PM_{10}: Fabric Filter, 0.01 gr/dscf, 0.1 lb/hr, 0.5 tons/yr	NI	BACT-PSD
Nucor Steel: Blytheville, AR	AR-0078/ 1139-AOP-R5 (6/9/2003)	Slag Processing	Filterable PM_{10}: Use of Wet Material, 1.8 lb/hr, 4.1 tons/yr	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Material Handling Operations (PM_{10})

Dry Material Handling

The air streams associated with dry material handling operations are characterized by air streams at or near ambient temperature and moisture content. Such streams would not be expected to

contain materials that would be considered to be acidic or corrosive. As such, none of the listed particulate matter control devices were eliminated from consideration for the dry material handling operations because of technical infeasibility.

Raw Material Unloading and Storage Areas
Control devices draw pollutant laden air into themselves through ventilation hoods or other ducted enclosures, which must be close to the pollutant generation point in order to gather the air. The dumping of material from a truck is an irregular process, likely damaging or destroying any hoods near the truck's drop point. As such, stand-alone control devices were eliminated from consideration for the truck unloading areas because of technical infeasibility.

Similarly, when material is dropped from a conveyor onto a storage pile, the emission generation point is not at the conveyor but at the top of the storage pile itself. Since ventilation hoods or other ducted enclosures can not be located close to the actual pollutant generation point, which is constantly changing in size, stand-alone control devices were eliminated from consideration for the storage piles and the loading of storage piles because of technical infeasibility.

Wet Material Handling Operations
The air streams associated with wet material handling operations are characterized by air streams at elevated moisture content. Such streams would be expected to clog and minimize the control efficiency of dry collection systems. As such, fabric filters and cyclones were eliminated from consideration for wet material handling operations because of technical infeasibility.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Material Handling Operations (PM_{10})

The control technologies for dry material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 90%

(4) Cyclones: 70% - 90%

(5) Wet suppression: 50% - 90%

The control technologies for truck unloading areas are ranked as follows:

(1) Wet suppression: 50% - 90%

(2) Process enclosures: 50% - 90%

The control technologies for wet material handling operations are ranked as follows:

(1) Electrostatic precipitators: 95% - 99.9%+

(2) Wet Scrubbers: 70% - 90%

(3) Wet Suppression: 50% - 90%

Step 4: Evaluate the Most Effective Controls and Document the Results - Material Handling Operations (PM_{10})

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for dry material handling operations at iron ore pelletizing plants is fabric filtration. A few operations are controlled by wet scrubbers or wet suppression. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of PM_{10}. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.002 gr/dscf to 0.005 gr/dscf, with most processes being limited at 0.002 gr/dscf, which was determined to be BACT for many types of material handling operations.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material truck unloading at iron ore pelletizing plants is the use of a fugitive dust control plan.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material storage at iron ore pelletizing plants is the use of an enclosure. Inclusion of raw material storage into a fugitive dust control plan can also be implemented.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material transfer at iron ore pelletizing plants is enclosures and fabric filtration that are appropriate to the material being handled and that are appropriate for the specific process. Since emission unit EU025a includes the dumping of material from a truck and the dropping of material from one conveyor to another, stand-alone control devices are not technical feasible as stated in Step 2. Therefore, emission unit EU025a (Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener) shall be controlled by the use of a site-specific fugitive dust control plan, enclosures for the Conveyor and Grizzly Feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Based on a review of the U.S. EPA RBLC and other Indiana permits, there is no primary control used for wet material handling operations (Iron Ore Wet Grinding and Filter Cake Production and Greenball Production) at iron ore pelletizing plants. In researching taconite ore processing (AP-42, Chapter 11.23.3), it specifically states that “because the ore remains wet, PM emissions are insignificant for the rest of the process until the dry stage of induration”. Additionally, these processes are generating less than ten tons per year each, and any type of control device for wet material (such as an electrostatic precipitator or wet scrubber) would be economically infeasible.

BACT Proposal

(a) Material Handling Group 1 Emission Units:

Group 1 Emission Units	
Description	Unit No.
Iron Concentrate Unloading & Storage Area	EU001
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012

Group 1 Emission Units	
Description	Unit No.
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026

BACT for the Material Handling Group 1 emission units has been proposed to be the use of baghouses or bin vent filters with a grain loading of 0.002 gr/dscf and an appropriate pound per hour limitation.

(b) Material Handling Group 2 Emission Units (Raw Material Unloading):

Group 2 Emission Units	
Description	Unit No.
Limestone Unloading (Truck)	EU002a
Dolomite Unloading (Truck)	EU003a
Coke Breeze Unloading (Truck)	EU004a

BACT for the Material Handling Group 2 emission units has been proposed to be the use of a site-specfic fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and an appropriate pound per hour and ton per year limitation.

(c) Material Handling Group 3 Emission Units (Raw Material Storage):

Group 3 Emission Units	
Description	Unit No.
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b

BACT for the Material Handling Group 3 emission units has been proposed to be the use of a site-specfic fugitive dust control plan, of enclosures, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(d) Material Handling Group 4 Emission Units (Raw Material Transfer):

Group 4 Emission Units	
Description	Unit No.
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener	EU025a

BACT for the Material Handling Group 4 emission units has been proposed to be the use of a site-specfic fugitive dust control plan, enclosures, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(e) Material Handling Group 5 Emission Units:

Group 5 Emission Units	
Description	Unit No.
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

BACT for the Material Handling Group 5 emission units has been proposed to be that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Step 5: Select BACT - Material Handling Operations (PM_{10})

The proposed BACT for PM_{10} meets the most stringent BACT found in the RBLC for material handling operations. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM_{10} BACT for the above Material Handling Operations is given in the BACT Conclusion for PM_{10}.

(b) <u>Induration Furnace (PM_{10})</u>

Particulate matter emissions are primarily due to the attrition of particles (dust) from the iron oxide pellets. This is caused by the abrasion of pellets rubbing against each other and the process equipment as the pellets move through the induration furnace. Particulate matter is emitted from both the waste gas and hood exhaust vents.

The waste gas also contains a small about of condensable particulate matter. The condensable particulates are primarily inorganic compounds like sulfates, acid gases, chlorides, and fluorides which are generated as a byproduct of pellet induration. The waste gas may also contain volatile organic compounds, which are products of incomplete natural gas combustion.

The following new emission units associated with the induration furnace are subject to PM_{10} BACT requirements:

Particulate Matter Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust	EU014	SV013B

Existing PM_{10} BACT Determinations for Induration Furnaces
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2002 to January 2012.

Existing PM_{10} BACT Determinations – Induration Furnaces					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 tons/hr pellets)	PM_{10}: Baghouse, 0.008 gr/dscf, 20.23 lb/hr	NI	BACT-PSD
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 tons/hr pellets)	PM_{10}: Baghouse, 0.008 gr/dscf, 24.25 lb/hr	NI	BACT-PSD
Existing PM10 BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**Filterable PM_{10}: Fabric Filter with Leak Detection, 0.008 gr/dscf and 54.00 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**Filterable PM_{10}: Fabric Filter with Leak Detection, 0.008 gr/dscf and 37.00 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 1 (450 t/hr pellets)	Filterable PM_{10}: Dry ESP, 0.012 gr/dscf and 21.00 lb/hr (3-hr rolling avg)	99%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 2 (450 t/hr pellets)	Filterable PM_{10}: Dry ESP, 0.012 gr/dscf and 14.20 lb/hr (3-hr rolling avg)	95%	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Indurating Furnace - Hood Exhaust (624 st/hr pellets)	PM_{10}: Wet Scrubber, 0.012 gr/dscf, 47 lb/hr	86%	BACT-PSD
		Pollutant Notes from PM Pollutant listing: PM_{10} includes condensible fraction.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Indurating Furnace - Waste Gas (624 st/hr pellets)	Filterable PM_{10}: Wet Scrubber, 0.012 gr/dscf, 33 lb/hr	90%	BACT-PSD
		Pollutant Notes: PM_{10} includes condensible fraction.			
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace 5 Hood Exhaust (Waste Gas #501, #502, #503) (160 LT/hr pellets)	Filterable PM_{10}: HE Wet Scrubber, 0.005 gr/dscf	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (PM_{10})

Historically, baghouses have been deemed technically infeasible in iron induration furnaces due to the temperature limitations of the filter bag material. This is a concern primarily during malfunctions which result in high temperature excursions within the induration furnace. The straight grate induration furnace which Magnetation is proposing has features which can mitigate the effects of high temperature excursions which are not present in the grate/kiln design. The following is a description of those mitigating features that make a baghouse feasible on the Magnetation furnace:

- The traveling grate in a straight-grate furnace is not as susceptible to temperature swings as a grate/kiln. This is because a grate/kiln has one main burner while a traveling grate furnace has many individual gas burners. In Magnetation's case, multiple burners of varying size will be installed. This allows much more flexibility in temperature control within a straight grate furnace.

- A straight-grate furnace has the capability to divert gases from the hood exhaust stream into the firing zone for additional cooling via the tempering air stream to prevent high temperatures from damaging filter bags in waste gas service. The air in this stream is from the outlet of the second cooler and it has a much lower temperature than the firing zone gases. Additional cooling can be provided by drawing in ambient air via the air intake damper on the second cooler duct.

- A baghouse on the waste gas stream would receive exhaust gas after the proposed gas suspension absorber (see the SO_2 BACT determinations for furnace hood exhausts and furnace waste gas exhausts). Lime slurry and water are added in the absorber for SO_2 control. The evaporation of this water is a significant source of cooling, thus significantly reducing the potential for high temperature from reaching the waste gas baghouse.

- A baghouse on the hood exhaust would receive exhaust gas from the drying zone of the furnace where temperatures are low to begin with (<500°F) and the risk of temperature spiking very remote, and the risk of temperature spiking can be mitigated by adding the ability to introduce outside tempering air.

- Filter bags made with fiberglass and PTFE membrane coatings can withstand operating temperatures up to 500°F.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (PM_{10})

The control technologies for material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 99%+

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (PM_{10})

Based on a review of the U.S. EPA RBLC, the primary control used for induration furnaces is dry capture, either using fabric filtration or a dry ESP. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of PM_{10}. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.005 gr/dscf to 0.012 gr/dscf for a wet scrubber and from 0.008 gr/dscf to 0.012 gr/dscf for a baghouse.

The most stringent BACT for waste gas/windbox exhausts from the table above is for Cleveland - Cliffs, Inc. in Silver Bay, MN. BACT for the PM_{10} emissions from the induration furnace at this source is control through the use of a high-efficiency wet scrubber with a maximum outlet concentration of 0.005 gr/dscf. However, this induration furnace has a maximum throughput of 160 long tons of pellets per year whereas the proposed induration furnace has a maximum throughput of 450 tons of pellets; hence, the furnace at Cleveland - Cliffs, Inc. is not comparable in size with the proposed furnace. Therefore, the PM_{10} limits specified for Cleveland - Cliffs, Inc. will not be considered as BACT for Magnetation LLC.

BACT Proposal – Induration Furnace (PM_{10})

BACT for the PM_{10} emissions from the induration furnace has been proposed to be controlled through the use of a baghouse with a maximum outlet concentration of 0.008 gr/dscf and an appropriate pound per hour limitation.

Step 5: Select BACT - Induration Furnace (PM_{10})

The proposed BACT for PM_{10} meets the most stringent BACT found in the RBLC for induration furnaces controlled with a baghouse. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM_{10} BACT for the Induration Furnace is given in the BACT Conclusion for PM_{10}.

(c) Combustion Units (PM_{10})

The following emission units associated with combustion processes are subject to PM_{10} BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (PM_{10})
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (PM_{10})
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to December 2013 for natural gas fired generators only used for emergency purposes.

PM_{10} BACT Determinations - Emergency Generator					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	PM_{10}: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	TPM_{10}: Certified to meet NSPS Subpart JJJJ, proper combustion design, 0.01 lb/MMBtu	NI	BACT-PSD
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	TPM_{10}: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD

PM_{10} BACT Determinations - Emergency Generator					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (860 hp)	TPM_{10}: Use of pipeline quality natural gas, 0.34 g/hp-hr (0.44 g/kw-hr)	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	Filterable PM_{10}: Use of pipeline quality natural gas, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	Filterable PM_{10}: Use of pipeline quality natural gas, 0.44 lb/hr, 0.04 tons/yr, 200 hours/yr	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
Dominion Cove Point: Lusby, MD	MD-0036/ CPCN 9055 (3/10/2006)	Emergency Generator 770 kw (1,085 bhp)	Filterable PM_{10}: Use of low sulfur natural gas, good combustion practices, proper O&M Plan, 0.0099 lb/MMBtu, 200 hours/yr	NI	BACT-PSD
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	Filterable PM_{10}: 0.152 g/bhp-hr (0.20 g/kw-hr)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generators (PM_{10})

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generators (PM_{10})

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (PM_{10})

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the emergency generator.

The natural gas fired emergency generator (EU017) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour and/or pounds per hour of PM_{10}. Grams per kilowatt-hour is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The

emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM_{10} standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency generator is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired generators in the same size category.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (PM_{10})

A detailed PM_{10} BACT for the natural gas fired emergency generator is given in the BACT Conclusion for PM_{10}.

(2) Natural Gas Fired Fire Pump (PM_{10})
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (PM_{10})
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

PM_{10} BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	PM_{10}: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	TPM_{10}: Certified to meet NSPS Subpart JJJJ, proper combustion design, 0.01 lb/MMBtu	NI	BACT-PSD
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	TPM_{10}: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (860 hp)	TPM_{10}: Use of pipeline quality natural gas, 0.34 g/hp-hr (0.44 g/kw-hr)	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	Filterable PM_{10}: Use of pipeline quality natural gas, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	Filterable PM_{10}: Use of pipeline quality natural gas, 0.44 lb/hr, 0.04 tons/yr, 200 hours/yr	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

PM_{10} BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Dominion Cove Point: Lusby, MD	MD-0036/ CPCN 9055 (3/10/2006)	Emergency Generator 770 kw (1,085 bhp)	Filterable PM_{10}: Use of low sulfur natural gas, good combustion practices, proper O&M Plan, 0.0099 lb/MMBtu, 200 hours/yr	NI	BACT-PSD
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	Filterable PM_{10}: 0.152 g/bhp-hr (0.20 g/kw-hr)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (PM_{10})

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (PM_{10})

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (PM_{10})

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the fire pump.

The natural gas fired fire pump (EU018) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour and/or pounds per hour of PM_{10}. Grams per kilowatt-hour is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM_{10} standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency fire pump is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be

included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired fire pumps in the same size category.

Step 5: Select BACT - Natural Gas Fired Fire Pump (PM_{10})

A detailed PM_{10} BACT for the natural gas fired fire pump is given in the BACT Conclusion for PM_{10}.

(3) Natural Gas Fired Space Heaters and Air Heaters (PM_{10})
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC. The search was limited to entries from January 2006 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

PM_{10} BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	PM_{10}: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	PM_{10}: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	PM_{10}: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Existing PM_{10} BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	TPM_{10}: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
Pryor Plant Chemical : Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	TPM_{10}: 0.15 lb/hr	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	ASU Regen Heater SRC13 (0.1 MMBtu/hr)	Filterable PM_{10}: Good combustion practices	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P.2008.0066 (2/10/2009)	Gasifier Heaters SRC14 & SRC15 (25 MMBtu/hr)	Filterable PM_{10}: Good combustion practices	NI	BACT-PSD
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	Filterable PM_{10}: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	Filterable PM_{10}: 0.15 lb/hr, 0.66 tons/yr	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitation

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})

Based on a review of the RBLC, add-on control devices are generally not used for controlling particulate emissions from natural gas fired space heaters or air heaters. Most facilities express emission limitations in terms of pounds per hour of PM_{10}. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. Emission limits for PM_{10} (when converted for comparison) varied from 0.0072 lb/MMBtu to 0.0075 lb/MMBtu.

BACT for the natural gas fired heaters has been proposed to be the restricted use of only natural gas and the use of good combustion practices along with an emission limit, which is 0.0072 lb/MMBtu for each of the proposed heaters.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (PM_{10})

A detailed PM_{10} BACT for natural gas fired heaters is given in the BACT Conclusion for PM_{10}.

(d) <u>Cooling Towers (PM_{10})</u>

Particulate matter emissions are primarily due to the dissipation of heat loads from plant condensate to the atmosphere. Some of the liquid water may be entrained in the air stream and can be carried out of the tower as "drift" droplets. As the droplet evaporates in the atmosphere, any suspended or dissolved water will solidify as particulate matter.

The following new emission units associated with the cooling tower are subject to PM_{10}BACT requirements:

Particulate Matter Emission Units Associated with the Cooling Tower		
Emission Unit		Associated Emission Point
Description	Unit No.	
Cooling Tower	EU024	SV022

Existing PM_{10} BACT Determinations for Cooling Towers
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for cooling towers at iron ore pelletizing plants. The table below summarizes these PM_{10} BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and

3325 (steel foundries), as well as various sources with cooling towers of comparable size, from January 2004 to January 2013.

PM_{10} BACT Determinations – Cooling Tower					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Cooling Tower EU024 (4,600 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.001% of the circulating water flow rate, use of cooling water with less than 6,009 milligrams per liter TDS concentration, 0.138 lb/hr	NI	BACT-PSD
Existing PM_{10} BACT Determinations – Cooling Towers					
Crawford Renewable Energy: Carbondale, PA	PA-0275/ 20-305A (10/24/2011)	Material Handling, Plant Roadways, and Cooling Tower (92,500 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.003% of the circulating water flow rate, use of cooling water with less than 1,115 milligrams per liter TDS concentration	NI	BACT-PSD
Consolidated Environmental Management Inc. - Nucor: Convent, LA	LA-0248/ PSD-LA-751 (1/27/2011)	DRI-113: DRI Unit #1 Process Water Cooling Tower (26,857 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.11 lb/hr, 0.40 tons/yr	NI	BACT-PSD
Consolidated Environmental Management Inc. - Nucor: Convent, LA	LA-0248/ PSD-LA-751 (1/27/2011)	DRI-213: DRI Unit #2 Process Water Cooling Tower (26,857 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.11 lb/hr, 0.40 tons/yr	NI	BACT-PSD
Consolidated Environmental Management Inc. - Nucor: Convent, LA	LA-0248/ PSD-LA-751 (1/27/2011)	DRI-114: DRI Unit #1 Clean Water Cooling Tower (17,611 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.07 lb/hr, 0.29 tons/yr	NI	BACT-PSD
Consolidated Environmental Management Inc. - Nucor: Convent, LA	LA-0248/ PSD-LA-751 (1/27/2011)	DRI-214: DRI Unit #2 Clean Water Cooling Tower (17,611 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.0005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.07 lb/hr, 0.29 tons/yr	NI	BACT-PSD

PM_{10} BACT Determinations – Cooling Tower					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
V & M Star: Youngstown, OH	OH-0344/ P0107088 (1/27/2011)	Cooling Water Towers (2) and Contact Water (1,372,000 gpm)	TPM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 0.572 lb/hr, 2.51 tons/yr	NI	Other Case-by-Case
Osceola Steel Co.: Adel, GA	GA-0142/ 3312-075-0024-P-01-0 (12/29/2010)	Cooling Towers CT1, CT21, CT22, and CT23	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration	NI	BACT-PSD
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Pipe Mill Cooling Tower (1,800,000 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, use of cooling water with less than 1,000 milligrams per liter TDS concentration, 0.75 lb/hr, 3.29 tons/yr	NI	BACT-PSD
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Melt Shop Cooling Tower (3,000,000 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate, 1.25 lb/hr, 5.48 tons/yr	NI	BACT-PSD
Mid American Steel and Wire Company: Madill, OK	OK-0128/ 2003-106-C (M-1) PSD (9/8/2008)	Cooling Towers (3) (3,000 gpm)	Filterable PM_{10}: High efficiency drift eliminators	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Cooling Tower	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.005% of the circulating water flow rate	NI	BACT-PSD
Marathon Petroleum: Garyville, LA	LA-0211/ PSD-LA-719 (12/27/2006)	Cooling Tower Nos. 1 & 2 (24-08 & 32-08) and Hydrogen Plant Cooling Tower (53-08) (30,000 gpm; 96,250 gpm; and 2,500 gpm respectively)	Filterable PM_{10}: High efficiency drift eliminators with a maximum drift rate of 0.005% of the circulating water flow rate	NI	BACT-PSD
Entergy New Orleans, Inc. (Michoud Electric Plant): New Orleans, LA	LA-0191/ PSD-LA-700 (10/12/2004)	Cooling Tower (1,728 gpm)	Filterable PM_{10}: Drift eliminator with a maximum drift rate of 0.001% of the circulating water flow rate, 0.052 lb/hr, 0.205 tons/yr	NI	BACT-PSD
	Note: 0.052 lb/hr * 1000000 ppm / (8.346 lb/gal * 1728 gpm * 60 min/hr * 0.001%) = 6,009 ppm TDS				

Step 2: Eliminate Technically Infeasible Options – Cooling Towers (PM_{10})

No technologies were eliminated from consideration because of technical infeasibility for cooling towers.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Cooling Towers (PM_{10})

The control technologies for cooling towers are ranked as follows:

(1) Drift eliminators.

(2) Minimization of total dissolved solids (TDS).

Step 4: Evaluate the Most Effective Controls and Document the Results – Cooling Tower (PM_{10})

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for cooling towers at iron ore pelletizing plants is drift eliminators. Most facilities express emission limitations in terms of maximum drift rate and an associated pound per hour limitation. The only cooling tower in the range of the proposed cooling tower with a listed drift rate is located at Entergy New Orleans, Inc. (Michoud Electric Plant). The drift rate is 0.001%. Although the RBLC lists cooling towers with lower drift rates, the cooling towers are not comparable to the one proposed by Magnetation due to the size differences.

BACT Proposal

BACT has been proposed to be the use of drift eliminators with a maximum drift rate of 0.001%, use of cooling water with less than 6,009 milligrams per liter TDS concentration, and an appropriate pound per hour limitation. The basis for the TDS concentration is documented in the above RBLC BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

Step 5: Select BACT – Cooling Tower (PM_{10})

The proposed BACT for PM_{10} meets the most stringent BACT found in the RBLC for cooling towers of comparable size. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed PM_{10} BACT for the cooling tower is given in the BACT Conclusion for PM_{10}.

(e) Fugitive Dust Emissions (PM_{10}) from Paved Roads

Fugitive dust emissions will be generated from vehicles traveling over plant roads.

Existing BACT Determinations - Fugitive Dust Emissions (PM_{10})
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for fugitive dust emissions from paved roads at iron ore pelletizing plants. The table below summarizes these PM BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2005 to January 2013.

PM_{10} BACT Determinations: Fugitive Dust Emissions					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fugitive Dust Emissions from Paved Roads	PM_{10}: Vacuum sweeping and water flushing as necessary, speed reduction plan, in accordance with the required fugitive dust control plan	NI	BACT-PSD

PM_{10} BACT Determinations: Fugitive Dust Emissions					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Existing PM_{10} BACT Determinations: Fugitive Dust Emissions					
V & M Star: Youngstown, OH	OH-0344/ P0107088 (1/27/2011)	Paved/Unpaved Roadways and Parking Areas	PM_{10}: Control measures (watering, sweeping, chemical stabilization, or suppressants), 7.70 tons/yr	NI	BACT-PSD
			Emission limit from Fugitive PM Pollutant listing		
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Roadways (8,375 VMT/yr)	PM_{10}: Control measures (watering, resurfacing, chemical stabilization, or speed reduction), 5.93 tons/yr	NI	BACT-PSD
			Emission limit from Fugitive PM Pollutant listing		
Sun Coke Energy, Inc.: Middletown, OH	OH-0332/ P0104768 (2/9/2010)	Roadways and Parking Areas	PM_{10}: Control measures, 0.21 tons/yr	NI	BACT-PSD
			Emission limit from Fugitive PM Pollutant listing		
V & M Star: Youngstown, OH	OH-0328/ P0103995 (4/10/2009)	Roadways and Parking Areas	Filterable PM_{10}: Control measures, 12.40 tons/yr	NI	BACT-PSD
Suncoke (Gateway Energy & Coke): Granite City, IL	IL-0109/ 06070020 (3/13/2008)	Roads, Parking Areas, Other Open Areas	Filterable PM_{10}: Work practices (paving, fugitive dust control program)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Fugitive Dust Emissions (PM_{10})

Fugitive dust emissions will be generated from vehicles traveling over plant roads. Typical particulate control devices such as fabric filtration, mechanical collectors, wet scrubbers, and ESPs are not technically feasible for the control of fugitive dust emissions because, by definition, fugitive emissions cannot be reasonable routed through a single point of exhaust. Therefore, these control devices will not be considered further for fugitive dust emissions.

Since the inclusions of opacity readings as limits were considered under LAER or other case-by-case basis and not as part of a BACT determination, the taking of opacity readings will not be considered further for fugitive dust emissions.

A review of the U.S. EPA RBLC shows that fugitive dust emissions from roads at other iron ore beneficiating plants, steel mills, and steel foundries are controlled through the paving of roads and then through the use of wetting agents or controlling the accumulation of dusty material on the roads. Removal of the accumulation of silt on the roadways can be accomplished by either sweeping or vacuuming the silt from the roads. Fugitive dust control plans are also typically implemented.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Fugitive Dust Emissions (PM_{10})

The most effective control for fugitive dust emissions from roadways is paving of the roads and the implementation of a site-specific Fugitive Dust Control Plan.

Step 4: Evaluate the Most Effective Controls and Document the Results - Fugitive Dust Emissions (PM_{10})

Based on a review of the RBLC, the most stringent BACT for fugitive dust control of roads is development, implementation and maintenance of a site specific Fugitive Dust Control Plan.

BACT Proposal

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Step 5: Select BACT - Fugitive Dust Emissions (PM_{10})

BACT shall be the development, maintenance, and implementation of a site-specific fugitive dust control plan. Since the source is required to meet the most stringent BACT for fugitive emissions from paved roads, no further evaluation of these operations is required and an economic, energy, or environmental impact analysis is not required as part of the BACT evaluation for these operations.

A detailed PM_{10} BACT for fugitive dust emissions is given in the BACT Conclusion for PM_{10}.

BACT Conclusion for PM_{10}

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for PM_{10} emissions shall be as follows:

(a) Material Handling Operations

The material handling operations shall be limited as follows:

(1) PM emissions from the following emission units (EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, and EU026) shall be controlled by fabric filter dust collectors and shall not exceed the associated emission limits listed in the following table:

Emission Unit		Control	PM_{10} Limit (gr/dscf)	PM_{10} Limit (lb/hr)
Description	(Unit ID)			
Iron Concentrate Unloading	EU001a	Baghouse CE001	0.002	0.95
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	Baghouse CE004	0.002	0.0429
Bentonite Unloading (Truck) & Storage Area	EU005	Bin Vent CE005	0.002	0.0429
Organic Binder Unloading & Storage Area	EU006	Bin Vent CE006	0.002	0.0429
Soda Ash Unloading & Storage Area	EU007	Bin Vent CE007	0.002	0.0429
Bentonite Additive System	EU008	Bin Vent CE008	0.002	0.0429
Coke Breeze Additive System	EU009	Baghouse CE009	0.002	0.09
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse CE023	0.002	0.22
Ground Limestone and Dolomite Additive System	EU010	Baghouse CE010	0.002	0.32

Emission Unit		Control	PM_{10} Limit (gr/dscf)	PM_{10} Limit (lb/hr)
Description	(Unit ID)			
Mixing Area Material Handling System	EU011	Baghouse CE011	0.002	0.34
Hearth Layer Bin System	EU012	Baghouse CE012	0.002	0.15
Furnace Discharge System	EU015	Baghouse CE017	0.002	0.73
Hearth Layer Separation System	EU016	Baghouse CE017	0.002	0.79
Oxide Pellet Storage & Unloading System	EU019	Baghouse CE019	0.002	0.63
WBE Lime Storage Area	EU020	Bin Vent CE020	0.002	0.02
WBE Residual Product Loading Area	EU022	Bin Vent CE021	0.002	0.02
Recycled Dust Storage Area	EU026	Baghouse CE024	0.002	0.16

(2) PM_{10} emissions from the following emission units (EU002a, EU003a, and EU004a) shall be controlled through the development, implementation, and maintenance of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	PM_{10}*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	PM_{10}*	5.53 E-04	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	PM_{10}*	3.52 E-04	1.54 E-03

*PM_{10} includes both filterable and condensible PM_{10}.

(3) PM_{10} emissions from the following emission units (EU001b, EU002b, and EU003b) shall be controlled through the development, implementation, and maintenance of a site-specific fugitive dust control plan, by enclosures, that the opacity shall not exceed five percent (5%) on a six-minute average, and the following:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Iron Concentrate Transfer and Storage Area	EU001b	PM_{10}*	1.57	6.88
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	PM_{10}*	0.02	0.04
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	PM_{10}*	0.01	0.02

*PM_{10} includes both filterable and condensible PM_{10}.

(4) PM_{10} emissions from the following emission unit (EU025a) shall be controlled through the development, implementation, and maintenance of a site-specific fugitive dust control plan, by enclosures and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Limestone/Dolomite Hopper, Belt Feeder & Grizzly Feeder/Screener	PM_{10}*	0.33	0.70

*PM_{10} includes both filterable and condensible PM_{10}.

(5) The Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System opacity material shall not exceed five percent (5%) on a six (6) minute average and shall not exceed the limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Iron Ore Wet Grinding and Filter Cake Production	PM_{10}*	0.07	0.31
Greenball Production System	PM_{10}*	0.07	0.31

*PM_{10} includes both filterable and condensible PM_{10}.

(b) Induration Furnace

The induration furnace operations shall be limited as follows:

PM_{10} emissions from the Furnace Hood Exhaust (EU013) and the Furnace Windbox Exhaust (EU014) shall be controlled by fabric filter dust collectors and shall not exceed the emission limits listed in the following table:

Emission Unit		Control	PM_{10} Limit (gr/dscf)	PM_{10} Limit (lb/hr)	Opacity (6-min avg)
Description	Unit No.				
Furnace Hood Exhaust	EU013	Baghouse CE013	0.008	20.23*	5%
Furnace Windbox Exhaust	EU014	Baghouse CE016	0.008	24.25*	5%

*The PM_{10} limits include process emissions and combustion emissions.

(c) Combustion Units

The combustion units shall be limited as follows:

(1) PM_{10} emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(2) PM_{10} emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(3) PM_{10} emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 0.0072 lb/MMBtu.

(d) Cooling Tower

The cooling tower emissions shall be controlled through the use of drift eliminators with a maximum drift rate of 0.001%, the use of cooling water with less than 6,009 milligrams per liter TDS concentration, and a 0.138 pound per hour limitation. The basis for the TDS concentration

is documented in the RBLC PM_{10} BACT determination table for cooling towers with the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

(e) Fugitive Dust Emissions from Paved Roads

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (PSD BACT) with regards to PM_{10}.

Particulate Matter Less than 2.5 Microns ($PM_{2.5}$) BACT

The $PM_{2.5}$ BACT analysis is divided into five categories: material handling operations, induration furnaces, combustion units, cooling towers, and fugitive emissions.

Step 1 of the BACT process is shown below for this $PM_{2.5}$ BACT analysis to describe general particulate control devices. A discussion of $PM_{2.5}$ is then given as applicable to each of the categories of processes.

$PM_{2.5}$ Discussion

$PM_{2.5}$ is particulate matter that is 2.5 micrometers in diameter or smaller, otherwise known as fine particles. This subset of particulate matter is believed to pose a greater health threat than larger particles because the small size allows for deeper penetration into the lungs. They also remain suspended in the air for longer times and can travel farther distances than larger particles. These particles exist in solid, liquid, or gaseous form and are a result of combustion processes and various industrial processes. Fine particulate can be emitted either directly from the source (primary particles) or formed secondarily (secondary particulate) in the atmosphere from precursors such as SO_2, NO_x, VOC, NH_3, and VOCs that react in the atmosphere with condensable particulate matter.

Particulate is typically measured as filterable or condensable particulate. Filterable particulate is emitted directly as solid or liquid at the stack, whereas condensable particulate is in the vapor phase at the stack and condenses upon cooling in the ambient air to form solid or liquid particulate. Filterable particulate may be PM, PM_{10}, or $PM_{2.5}$. Condensable particulate exists mostly as $PM_{2.5}$ and can be a significant fraction of total $PM_{2.5}$. Combustion processes and industrial processes involving heat tend to form both filterable and condensable particulate. Industrial processes that don't involve heat and moisture typically only produce filterable particulate.

Step 1: Identify Potential Control Technologies ($PM_{2.5}$)

Data on the nature and amount of $PM_{2.5}$, specifically the condensable fraction, from various sources is limited. This may be in part due to the fact that $PM_{2.5}$ has not been directly regulated often and that accurate testing of the condensable fraction has proven to be challenging. Discussions of particulate control technologies in the literature do not usually include control efficiencies achievable for $PM_{2.5}$ and if they do, they tend to only include the filterable fraction of $PM_{2.5}$. In addition, the RBLC does not contain extensive entries for $PM_{2.5}$ (filterable or total) in comparison to the number of entries for PM and PM_{10}.

This $PM_{2.5}$ BACT review will use available information and best engineering judgment to evaluate the $PM_{2.5}$ BACT for the required facilities as part of this modification in light of the PM and PM_{10} BACT determinations. The main considerations will be evaluating the portions of filterable and condensable $PM_{2.5}$ from each unit and determining whether or not the existing PM and PM_{10} BACT determinations are also BACT for $PM_{2.5}$.

The control technologies for emissions of filterable $PM_{2.5}$ are generally going to be similar as those for PM and PM_{10}. However, due to the nature of the fine particles and the potentially high fraction of condensable particulate, some controls may be more effective at controlling PM and PM_{10} than $PM_{2.5}$. For example, a baghouse is not going to be as effective at controlling $PM_{2.5}$ that exists in a condensable phase as it is for controlling PM, which exists only as filterable particulate, and PM_{10} which may exist as larger filterable particulate and a condensable fraction. Current EPA approved test methods do not distinguish between condensable particle size.

Traditional particulate collection devices: mechanical collectors, wet scrubbers, electrostatic precipitators, and fabric filter dust collectors are discussed in the PM BACT analysis. Additional comments related to the control of $PM_{2.5}$ are included here along with other potential control technologies geared toward $PM_{2.5}$ control.

Mechanical Collectors (e.g. cyclones or multiclones)
Mechanical collectors have low capital and maintenance costs (due to lack of moving parts) and are good at removing larger particles and at pre-cleaning exhaust streams. However, mechanical collectors are not as efficient at controlling fine particles since inertial and gravitational forces are not as effective for the low mass of fine particles, and these types of control devices would likely have little impact on controlling condensable particulate. They may be viable as a pre-collection device for $PM_{2.5}$ as they would allow for time for a heated exhaust stream to cool and for gaseous fractions to condense and be controlled by another downstream device.

Electrostatic Precipitators
Electrostatic precipitators can treat large volumes of exhaust over a wide range of temperatures and are efficient for controlling even smaller particles. A dry ESP would be effective for controlling filterable $PM_{2.5}$, but would do little to control condensable particulate. For exhaust streams with condensable particulate, increased collection may be achieved through lowering the exhaust temperature; however, this may lead to condensation on the ESP collection plates, leading to corrosion. High resistivity particles may need to be conditioned prior to being treated by a dry ESP. Dry ESPs are also more sensitive to changes in particulate loading and characteristics than fabric filters.

Wet ESPs, however, are very effective at controlling both the filterable and condensable fractions of particulate. Collection efficiency may drop for particles in the range of 0.1 to 1 microns, however, for both dry and wet ESPs. Typically, wet ESPs cannot handle exhaust temperatures exceeding 170°F and may suffer clogging problems due to build up of fine particles on the high voltage and collection electrodes. Wet ESPs may be used as a polishing unit after another particulate control device for further $PM_{2.5}$ removal.

Fabric Filters
Fabric filters offer particulate control for a wide variety of particle sizes. The fabric itself is responsible for some filtration, but the filter cake that forms on the fabric acts as a highly efficient filter. Fabric filters can handle a variety of types of dusts and airflows, but are typically limited to dry exhaust streams, as moist or sticky conditions can cause clogging or blinding of the fabric. Blinding can also occur if large quantities of fine particles are present. Typical fabric filters are easily degraded at high temperatures, although there are special fabrics that can withstand higher temperatures. Fabric filters can be very efficient at collecting fine particles; however, fabric filters never really achieve a steady state of particle collection because when cleaning is necessary, part of the filter cake that helps to filter the fine particles is removed. In addition, if high air-to-cloth ratios are present, smaller particles may migrate through the filter cake and get re-entrained in the exhaust gas stream. Fabric filters are primarily used for controlling filterable particulate; however, some condensable particulate may be controlled. One study found that changing the material of the bag in a fabric filter system from a felt bag to a membrane bag did not change the overall particulate control, but changed the fraction of filterable and condensable particulate controlled[1]. The felt bag was much more effective at controlling the condensable portion of

particulate, whereas the membrane bag was more effective at controlling the filterable portion of particulate. It was theorized that this was due to the lack of cake retention on the membrane filter.

[1]McMenus, Michael, Robert E. Snyder and Kevin E. Redinger, "Impact of Fabric Filter Media and SDA Operations on Multi-Pollutant Emissions", *EPRI-DOE-EPA-AWMA Combined Power Plant Air Pollutant Control Mega Symposium*, Baltimore, MD, 2006

Wet Scrubbers

Wet scrubbers have many applications for particulate (and gaseous pollutant) control and can handle almost any kind of exhaust, including flammable, explosive, moist, or sticky dusts. Along with particulate, they can also handle mists or gases. Conventional scrubbers may not be suitable for particulate less than 1 micron in diameter; however, scrubbers such as venturi, condensation, and charged scrubbers are capable of removing fine particles at higher efficiencies. Higher control efficiencies of submicron particles require increased power consumption, however. Wet scrubbers can achieve higher levels of control for condensable PM than dry control technology because the scrubbers help to condense the condensable fraction during particulate removal.

Advanced Hybrid™ Filter Technology

Advanced Hybrid™ filter technology combines electrostatic precipitation with fabric filtration. The configuration of the control device involves alternating rows of ESP components and filter bags. Exhaust gas enters an ESP zone, which removes most of the particulate. A perforated collecting plate then allows the gas flow to pass to a filter bag zone. The ESP zones help to also capture filter dust cake when the filter bag is pulsed clean. The collecting plates and discharge electrodes are periodically cleaned by rapping methods. This type of technology has been applied to the coal-fired power plant industry with an overall particulate capture efficiency of 99.99%. While this may prove to be an effective control for $PM_{2.5}$, it has not been demonstrated in the iron ore pelletizing industry. Therefore, it will not be considered further in this evaluation.

Cloud Chamber System

This emergent technology involves multiple steps. The exhaust gas enters a pre-conditioning chamber, where coarse particles are removed by spray impaction and fine and ultra-fine particles are grown through agglomeration and coagulation. The gas then enters the first cloud generation vessel, where positively charged droplets are used to capture fine particles that are simultaneously scrubbed. The gas flow then continues to a second cloud generation vessel, where negatively charged droplets are used to capture a substantial portion of the remaining fine, ultra-fine, and condensable particulate. Captured particles are removed from the bottom of the system as a low-volume slurry.

This type of system can handle exhaust temperatures of up to 2500 °F, high particulates loadings, and changes in flow volume. Particle solubility, reactivity, and resistivity do not affect performance. This type of control has been used for controlling particulates from glass melting furnaces. One study indicated control of 95%+ for filterable particulate and 90%+ for total particulate (including condensable particulate). Other tests conducted by the manufacturer indicated removal of total particulates in excess of 99%. The manufacturer indicates that this type of control could be used for other applications such as large stationary diesel engines, fiber optic manufacturing, solar panel fabrication, syn-gas cleaning, asphalt shingle manufacturing, solid fuel industrial boilers, oil and gas fired boilers, waste incinerators, abrasive production, smelters and foundries, chemical manufacturing, curing ovens, dryers, rotary kilns, plastics manufacturing, sulfuric and nitric acid production, and more. While this may prove to be an effective control for $PM_{2.5}$, it has not been demonstrated in the iron ore pelletizing industry. Therefore, it will not be considered further in this evaluation.

The table below shows control efficiencies for $PM_{2.5}$ as found in the literature. When the fraction of $PM_{2.5}$ wasn't specified, it was assumed that the control efficiency was given for filterable $PM_{2.5}$.

$PM_{2.5}$ Control Efficiencies as Found in the Literature							
Control Device Description	PM2.5-FIL		PM-CON		PM2.5-PRI		Source
	Min	Max	Min	Max	Min	Max	
Single Cyclone		10%					[1]
Single Cyclone	60%	75%					[2] (assumed filterable)
Single Cyclone	20%	70%					[3]
Single Cyclone	5%	45%					[4]
Multiple Cyclones		80%					[1]
Multiple Cyclones	80%	90%					[2] (assumed filterable)
Multiple Cyclones	10%	65%					[4]
Wet Scrubber - High Efficiency, Venturi Scrubber	80%	90%	10%	40%	45%	68%	[5]
Wet Scrubber - High Efficiency, Venturi Scrubber		90%					[1]
Wet Scrubber - High Efficiency, Venturi Scrubber	80%	90%					[2] (assumed filterable)
Wet Scrubber - High Efficiency, Venturi Scrubber	50%	99%					[6]
Wet Scrubber - Gas Atomized Venturi Scrubber	90%	99.99%					[7] (assumed filterable)
Wet Scrubber - VenturiPak™		99.5%		99%			[8]
Wet Scrubber - Venturi Scrubber (100 in water pressure drop)	90%	99.9%					[4]
Wet Scrubber - Venturi Scrubber (20 in water pressure drop)	20%	99.0%					[4]
Wet Flue Gas Desulfurization		80.0%		80%			[4a]
Ionizing Venturi Scrubber	87%	99.0%					[4]
Electrostatic Scrubber	90%	98.0%					[4]
Dry Electrostatic Precipitator	80%	95%	10%	60%	24%	67%	[5]
Dry Electrostatic Precipitator		95%					[1]
Dry Electrostatic Precipitator	90%	99.2%					[2] (assumed filterable)
Dry Electrostatic Precipitator	96%	99.2%					[9] (assumed filterable)
Dry Electrostatic Precipitator					75%	90%	[10]
Dry Electrostatic Precipitator	96%	99.5%					[4]
Dry Electrostatic Precipitator		99.6%		0%			[4a]
Fabric Filter	30%	60%	10%	60%	14%	60%	[5]
Fabric Filter		99%					[1]
Fabric Filter	93.4%	99.3%					[2] (assumed filterable)
Fabric Filter	99.6%	99.9%					[6]
Fabric Filter	99.0%	99.8%					[4]
Fabric Filter					90%	94%	[10]
Fabric Filter with specialty filters		99.5%		30%			[4a]
Wet ESP				90%			[5] (sulfuric acid aerosol)
Wet ESP					80%	99%	[11]
Wet ESP	90.0%	99.2%					[12] (assumed filterable)

$PM_{2.5}$ Control Efficiencies as Found in the Literature							
Control Device Description	PM2.5-FIL		PM-CON		PM2.5-PRI		Source
	Min	Max	Min	Max	Min	Max	
Wet ESP	97.0%	99.0%					[4]
Wet ESP					86%	92%	[10]
Wet ESP		96.0%		90%			[4a]
Cloud Chamber System	95.0%				90%	99+%	[13]

[1] U.S. EPA, *AP-42, Fifth Edition, Compilation of Air Pollutant Emission Factors*, Appendix B.2, Table B.2-3, September 1996: http://www.epa.gov/ttn/chief/ap42/appendix/appb-2.pdf

[2] EC/R Incorporated, *Stationary Source Control Techniques Document for Fine Particulate Matter*, EPA Contract No. 68-D-98-026, Chapel Hill, NC, 1998: http://www.epa.gov/ttn/oarpg/t1/reports/pmctd.pdf

[3] EPA-452/F-03-005, EPA Air Pollution Control Technology Fact Sheet: Cyclones, 2003: http://www.epa.gov/ttn/catc/dir1/fcyclon.pdf

[4] Perry, Robert H. and Don W. Green, *Perry's Chemical Engineers' Handbook*, Seventh Edition, McGraw Hill, 1997.

[4a] Southern Montana Electric Generation and Transmission Cooperative Highwood Generating Station, Air Quality Permit #3423-01, Montana Department of Environmental Quality Permitting and Compliance Division, November 26, 2008.

[5] E.H. Pechan & Associates, Inc., "Evaluation of Potential PM2.5 Reductions by Improving Performance of Control Devices: PM2.5 Emission Estimates", Final Report, Springfield, VA, September 27, 2005: http://www.epa.gov/pm/measures/pm25_emission_estimates_2007.pdf

[6] U.S. EPA, *EPA Air Pollution Control Cost Manual*, Sixth Edition (EPA 452/B-02-001): http://epa.gov/ttn/catc/products.html#cccinfo

[7] Bionomic Industries Inc., Gas Atomized Venturi Scrubber: http://www.bionomicind.com/

[8] EnviroCare, VenturiPak™: http://www.envirocare.com/files/ENVIRO-J141_R8.pdf

[9] EPA-452/F-03-028, EPA Air Pollution Control Technology Fact Sheet: Dry Electrostatic Precipitator - Wire-Plate Type, 2003: http://www.epa.gov/ttn/catc/dir1/fdespwpl.pdf

[10] Louisville Gas & Electric Company Trimble County Generating Station, Final Revised Statement of Basis, Commonwealth of Kentucky Division for Air Quality, Permit No. V-08-001 R2, January 28, 2010: http://www.air.ky.gov/NR/rdonlyres/E363916B-AE4F-4824-A2B4-1C88D8C22C95/0/V08001R2Basis_12810.pdf

[11] Bologa, A., H.-R. Paur, H. Seifert, and K. Woletz, "Novel Wet Electrostatic Precipitator for Sub-Micron Particles": http://www.dustconf.com/CLIENT/DUSTCONF/UPLOAD/S11/BOLOGA_D.PDF

[12] EPA-452/F-03-030, EPA Air Pollution Control Technology Fact Sheet: Wet Electrostatic Precipitator - Wire-Plate Type, 2003: http://www.epa.gov/ttn/catc/dir1/fwespwpl.pdf

[13] Moss, Kevin, Tri-Mer Corp., Special Report/Glass Manufacturing: Capturing Particulate, *Ceramic Industry*, October 1, 2007: http://www.ceramicindustry.com/Articles/Glass/BNP_GUID_9-5-2006_A_10000000000000177501

(a) Material Handling Operations ($PM_{2.5}$)

The emissions from the material handling operations are in the form of particulate matter (PM, PM_{10}, and $PM_{2.5}$). Particulate matter emissions are primarily due to the attrition of particles (dust) from the feedstocks, iron oxide pellets, and by-products. This is caused by the abrasion of materials rubbing against each other and the process equipment as they move through the process.

The following new emission units associated with material handling operations are subject to $PM_{2.5}$ BACT requirements:

Particulate Matter Emission Units Associated with Material Handling Operations	
Emission Unit	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Unloading (Truck)	EU002a
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Unloading (Truck)	EU003a
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b
Coke Breeze Unloading (Truck)	EU004a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder	EU025a
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

Existing $PM_{2.5}$ BACT Determinations for Material Handling Operations

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for material handling operations at iron ore pelletizing plants. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations: EU001, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, EU026	$PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf, lb/hr limits	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU002a	$PM_{2.5}$: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.53 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU003a	$PM_{2.5}$: Fugitive Dust Control Plan 5% opacity (6-min avg) 5.53 E-04 lb/hr and 1.22 E-03 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Truck Unloading): EU004a	$PM_{2.5}$: Fugitive Dust Control Plan 5% opacity (6-min avg) 1.02 E-04 lb/hr and 4.45 E-04 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU001b	$PM_{2.5}$: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 1.57 lb/hr and 6.88 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage EU002b	$PM_{2.5}$: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.02 lb/hr and 0.04 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Storage): EU003a	$PM_{2.5}$: Fugitive Dust Control Plan Enclosure, 5% opacity (6-min avg) 0.01 lb/hr and 0.02 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Raw Material Transfer): EU025a	$PM_{2.5}$: Enclosed conveyor and grizzly, 5% opacity (6-min avg) 0.33 lb/hr and 0.70 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Iron Ore Wet Grinding and Filter Cake Production	$PM_{2.5}$: 5% opacity (6-min avg) 0.07 lb/hr and 0.31 tpy	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Greenball Production System	$PM_{2.5}$: 5% opacity (6-min avg) 0.07 lb/hr and 0.31 tpy	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations - Material Handling Operations					
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Oxide Pellet Stockpile Conveyor Gallery	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.77 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Bin	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 1.40 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Hearth Layer Feed	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.12 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Discharge	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 3.30 lb/hr (3-hr rolling avg)	NI	BACT-PSD

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Pellet Screening and Handling	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 2.90 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Carbon Bin for Mercury Control	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Lime Bin for Scrubber	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.017 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Primary Grinding Mill Line 3	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.23 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Grizzly Transfer Tower	Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.002 gr/dscf and 0.079 lb/hr (3-hr rolling avg)	NI	BACT-PSD
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Dozer Activity at Tailings Basin	$PM_{2.5}$: Fugitive Dust Control Plan	NI	BACT-PSD
		Grading at Tailings Basin	$PM_{2.5}$: Fugitive Dust Control Plan	NI	BACT-PSD
		120K Ton Concentrate Stockpile Loadout	$PM_{2.5}$: Fugitive Dust Control Plan	NI	BACT-PSD
		Oxide Product Loadout to Railcars	$PM_{2.5}$: Fugitive Dust Control Plan	NI	BACT-PSD
		These BACTs are listed under the pollutant Visible Emissions. The BACT determination (Table 1-12) states the limit is the use of the Fugitive Dust Control Plan.			
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Bentonite Bin	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.021 lb/hr (3-hr rolling avg), 5% opacity (6-min avg)	94%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Intermediate Dry Fuel Silo	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.11 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Alternative Fuels Prepared Dry Fuel Silo	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.07 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Final Transfer Conveyors and Loadout Conveyor	Filterable $PM_{2.5}$: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD

$PM_{2.5}$ BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Reclaim Conveyor	Filterable $PM_{2.5}$: Baghouse with Leak Detection, 0.002 gr/dscf and 0.31 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Emergency Pellet Conveyor Transfer	Filterable $PM_{2.5}$: Baghouse with Leak Detection, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Coal Bin 2	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.14 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Limestone Bin	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.21 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Mill Feeder 1	Filterable $PM_{2.5}$: Baghouse with Leak Detection, 0.002 gr/dscf and 0.51 lb/hr (3-hr rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Lime Bin	Filterable $PM_{2.5}$: Baghouse/Bin Vent, 0.002 gr/dscf and 0.02 lb/hr (3-hr rolling avg)	95%	BACT-PSD
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Direct Reduced Iron (DRI) Material Handling	Filterable $PM_{2.5}$: Enclosures/Baghouse, 0.47 lb/hr, 2.05 tons/yr	NI	LAER
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Coal and Iron Ore Unloading	Filterable $PM_{2.5}$: Enclosures/Baghouse, 0.0022 gr/dscf, 0.93 lb/hr, 4.07 tons/yr	NI	LAER
	A review of the permit shows that the process consists of a crane partially controlled by a three-sided enclosure transferring material to a hopper which is vented to the baghouse. The remaining emissions from the process are listed as fugitive emissions.				
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Alloy, Flux, Carbon, Limestone, & Coke Handling	Filterable $PM_{2.5}$: Enclosures/Baghouse, 0.0022 gr/dscf, 1.4 lb/hr, 6.13 tons/yr	NI	LAER
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Iron Ore Grinding (992 tons/yr)	Filterable $PM_{2.5}$: Baghouse with Cyclones, 0.0022 gr/dscf, 1.04 lb/hr, 4.56 tons/yr	99%	LAER
	A review of the permit shows that only Grinder 4A is controlled by the cyclones and baghouse. The remaining handling units (Grizzly Feeder 5A, Conveyor 6A, and Hopper 4A) are listed as fugitive emissions.				
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Conveyors, Hoppers, Screens to Rotary Hearth Furnace (227 tons/yr)	Filterable $PM_{2.5}$: Baghouse, 0.0022 gr/dscf, 1.4 lb/hr, 6.13 tons/yr	NI	LAER

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options - Material Handling Operations ($PM_{2.5}$)

Dry Material Handling
The air streams associated with dry material handling operations are characterized by air streams at or near ambient temperature and moisture content. Such streams would not be expected to contain materials that would be considered to be acidic or corrosive. As such, none of the listed particulate matter control devices were eliminated from consideration for the dry material handling operations because of technical infeasibility.

Raw Material Unloading and Storage Areas
Control devices draw pollutant laden air into themselves through ventilation hoods or other ducted enclosures, which must be close to the pollutant generation point in order to gather the air. The dumping of material from a truck is an irregular process, likely damaging or destroying any hoods near the truck's drop point. As such, stand-alone control devices were eliminated from consideration for the truck unloading areas because of technical infeasibility.

Similarly, when material is dropped from a conveyor onto a storage pile, the emission generation point is not at the conveyor but at the top of the storage pile itself. Since ventilation hoods or other ducted enclosures can not be located close to the actual pollutant generation point, which is constantly changing in size, stand-alone control devices were eliminated from consideration for the storage piles and the loading of storage piles because of technical infeasibility.

Wet Material Handling Operations
The air streams associated with wet material handling operations are characterized by air streams at elevated moisture content. Such streams would be expected to clog and minimize the control efficiency of dry collection systems. As such, fabric filters and cyclones were eliminated from consideration for wet material handling operations because of technical infeasibility.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Material Handling Operations ($PM_{2.5}$)

The control technologies for dry material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 30% - 99.9%

(2) Wet scrubbers: 20% - 99.9%

(3) Electrostatic precipitators: 80% - 99.6%

(4) Cyclones: 5% - 90%

(5) Wet suppression: 50% - 90%

The control technologies for truck unloading areas are ranked as follows:

(1) Wet suppression: 50% - 90%

(2) Process enclosures: 50% - 90%

The control technologies for wet material handling operations are ranked as follows:

(1) Wet scrubbers: 20% - 99.9%

(2) Electrostatic precipitators: 80% - 99.6%

(3) Wet suppression: 50% - 90%

Step 4: Evaluate the Most Effective Controls and Document the Results - Material Handling Operations ($PM_{2.5}$)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for dry material handling operations at iron ore pelletizing plants is fabric filtration. A few operations are controlled by wet scrubbers or wet suppression. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of $PM_{2.5}$. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.002 gr/dscf to 0.005 gr/dscf, with most processes being limited at 0.002 gr/dscf, which was determined to be BACT for many types of material handling operations.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material truck unloading at iron ore pelletizing plants is the use of a fugitive dust control plan.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material storage at iron ore pelletizing plants is the use of an enclosure. Inclusion of raw material storage into a fugitive dust control plan can also be implemented.

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for raw material transfer at iron ore pelletizing plants is enclosures and fabric filtration that are appropriate to the material being handled and that are appropriate for the specific process. Since emission unit EU025a includes the dumping of material from a truck and the dropping of material from one conveyor to another, stand-alone control devices are not technical feasible as stated in Step 2. Therefore, emission unit EU025a (Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener) shall be controlled by the use of a site-specific fugitive dust control plan, enclosures for the Conveyor and Grizzly Feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Based on a review of the U.S. EPA RBLC and other Indiana permits, there is no primary control used for wet material handling operations (Iron Ore Wet Grinding and Filter Cake Production and Greenball Production) at iron ore pelletizing plants. In researching taconite ore processing (AP-42, Chapter 11.23.3), it specifically states that “because the ore remains wet, PM emissions are insignificant for the rest of the process until the dry stage of induration”. Additionally, these processes are generating less than ten tons per year each, and any type of control device for wet material (such as an electrostatic precipitator or wet scrubber) would be economically infeasible.

BACT Proposal

(a) Material Handling Group 1 Emission Units:

Group 1 Emission Units	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b
Bentonite Unloading (Truck) & Storage Area	EU005
Organic Binder Unloading & Storage Area	EU006
Soda Ash Unloading & Storage Area	EU007
Bentonite Additive System	EU008
Coke Breeze Additive System	EU009
Limestone and Dolomite Grinding Mill Bin Area	EU025b
Ground Limestone and Dolomite Additive System	EU010
Mixing Area Material Handling System	EU011

Group 1 Emission Units	
Description	Unit No.
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
WBE Lime Storage Area	EU020
WBE Residual Product Loading Area	EU022
Recycled Dust Storage Area	EU026

BACT for the Material Handling Group 1 emission units has been proposed to be the use of baghouses or bin vent filters with a grain loading of 0.002 gr/dscf and an appropriate pound per hour limitation.

(b) Material Handling Group 2 Emission Units (Raw Material Unloading):

Group 2 Emission Units	
Description	Unit No.
Limestone Unloading (Truck)	EU002a
Dolomite Unloading (Truck)	EU003a
Coke Breeze Unloading (Truck)	EU004a

BACT for the Material Handling Group 2 emission units has been proposed to be the use of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and an appropriate pound per hour and ton per year limitation.

(c) Material Handling Group 3 Emission Units (Raw Material Storage):

Group 3 Emission Units	
Description	Unit No.
Iron Concentrate Transfer & Storage Area	EU001b
Limestone Conveyor & Enclosed Storage (Pile)	EU002b
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b

BACT for the Material Handling Group 3 emission units has been proposed to be the use of a site-specific fugitive dust control plan , the use of enclosures, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(d) Material Handling Group 4 Emission Units (Raw Material Transfer):

Group 4 Emission Units	
Description	Unit No.
Limestone/Dolomite Hopper, Belt Feeder, Grizzly Feeder/Screener	EU025a

BACT for the Material Handling Group 4 emission units has been proposed to be the use of a site-specific fugitive dust control plan, enclosed conveyor and grizzly feeder, that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

(e) Material Handling Group 5 Emission Units:

Group 5 Emission Units	
Description	Unit No.
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

BACT for the Material Handling Group 5 emission units has been proposed to be that the opacity from each process shall not exceed five percent (5%) on a six (6) minute average, and an appropriate pound per hour and ton per year limitation.

Step 5: Select BACT - Material Handling Operations ($PM_{2.5}$)

The proposed BACT for $PM_{2.5}$ meets the most stringent BACT found in the RBLC for material handling operations. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed $PM_{2.5}$ BACT for the above Material Handling Operations is given in the BACT Conclusion for $PM_{2.5}$.

(b) <u>Induration Furnace ($PM_{2.5}$)</u>

Particulate matter emissions are primarily due to the attrition of particles (dust) from the iron oxide pellets. This is caused by the abrasion of pellets rubbing against each other and the process equipment as the pellets move through the induration furnace. Particulate matter is emitted from both the waste gas and hood exhaust vents.

The waste gas also contains a small about of condensable particulate matter. The condensable particulates are primarily inorganic compounds like sulfates, acid gases, chlorides, and fluorides which are generated as a byproduct of pellet induration. The waste gas may also contain volatile organic compounds, which are products of incomplete natural gas combustion.

The following new emission units associated with the induration furnaces are subject to $PM_{2.5}$ BACT requirements:

Particulate Matter Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust (WBE)	EU014	SV013B

Existing $PM_{2.5}$ BACT Determinations for Induration Furnaces
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

$PM_{2.5}$ BACT Determinations – Induration Furnace					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 tons/hr pellets)	$PM_{2.5}$: Baghouse, 0.008 gr/dscf, 20.23 lb/hr	NI	BACT-PSD
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 tons/hr pellets)	$PM_{2.5}$: Baghouse, 0.008 gr/dscf, 24.25 lb/hr	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.008 gr/dscf and 54.00 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**Filterable $PM_{2.5}$: Fabric Filter with Leak Detection, 0.008 gr/dscf and 37.00 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 1 (450 tons/hr pellets)	Filterable $PM_{2.5}$: Dry ESP, 0.012 gr/dscf and 21.00 lb/hr (3-hr rolling avg)	99%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 2 (450 tons/hr pellets)	Filterable $PM_{2.5}$: Dry ESP, 0.012 gr/dscf and 14.20 lb/hr (3-hr rolling avg)	95%	BACT-PSD

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces ($PM_{2.5}$)

Historically, baghouses have been deemed technically infeasible in iron induration furnaces due to the temperature limitations of the filter bag material. This is a concern primarily during malfunctions which result in high temperature excursions within the induration furnace. The straight grate induration furnace which Magnetation is proposing has features which can mitigate the effects of high temperature excursions which are not present in the grate/kiln design. The following is a description of those mitigating features that make a baghouse feasible on the Magnetation furnace:

- The traveling grate in a straight-grate furnace is not as susceptible to temperature swings as a grate/kiln. This is because a grate/kiln has one main burner while a traveling grate furnace has many individual gas burners. In Magnetation's case, multiple burners of varying size will be installed. This allows much more flexibility in temperature control within a straight grate furnace.

- A straight-grate furnace has the capability to divert gases from the hood exhaust stream into the firing zone for additional cooling via the tempering air stream to prevent high temperatures from damaging filter bags in waste gas service. The air in this stream is from the outlet of the second cooler and it has a much lower temperature than the firing zone gases. Additional cooling can be provided by drawing in ambient air via the air intake damper on the second cooler duct.

- A baghouse on the waste gas stream would receive exhaust gas after the proposed gas suspension absorber (see the SO_2 BACT determinations for furnace hood exhausts and furnace waste gas exhausts). Lime slurry and water are added in the absorber for SO_2 control. The evaporation of this water is a significant source of cooling, thus significantly reducing the potential for high temperature from reaching the waste gas baghouse.

- A baghouse on the hood exhaust would receive exhaust gas from the drying zone of the furnace where temperatures are low to begin with (<500°F) and the risk of temperature spiking very remote, and the risk of temperature spiking can be mitigated by adding the ability to introduce outside tempering air.

- Filter bags made with fiberglass and PTFE membrane coatings can withstand operating temperatures up to 500°F.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces ($PM_{2.5}$)

The control technologies for material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 30% - 99.9%

(2) Wet scrubbers: 20% - 99.9%

(3) Electrostatic precipitators: 80% - 99.6%

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace ($PM_{2.5}$)

Based on a review of the U.S. EPA RBLC, the primary control used for induration furnaces is dry capture, either using fabric filtration or a dry ESP. Most facilities express emission limitations in terms of grain loading and/or pounds per hour of $PM_{2.5}$. Grain loading is the most effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The grain loadings given in the review range from 0.008 gr/dscf to 0.012 gr/dscf.

BACT Proposal – Induration Furnace ($PM_{2.5}$)

BACT for the $PM_{2.5}$ emissions from the induration furnace has been proposed to be controlled through the use of a baghouse with a maximum outlet concentration of 0.008 gr/dscf and an appropriate pound per hour limitation.

Step 5: Select BACT - Induration Furnace ($PM_{2.5}$)

The proposed BACT for $PM_{2.5}$ meets the most stringent BACT found in the RBLC for induration furnaces. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed $PM_{2.5}$ BACT for the Induration Furnace is given in the BACT Conclusion for $PM_{2.5}$.

(c) <u>Combustion Units ($PM_{2.5}$)</u>

The following emission units associated with combustion processes are subject to $PM_{2.5}$ BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator ($PM_{2.5}$)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators ($PM_{2.5}$)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for natural gas fired generators only used for emergency purposes.

$PM_{2.5}$ BACT Determinations - Emergency Generator					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations - Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	$TPM_{2.5}$: Certified to meet NSPS Subpart JJJJ, proper combustion design, 0.01 lb/MMBtu	NI	BACT-PSD
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	$TPM_{2.5}$: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	Filterable $PM_{2.5}$: Use of pipeline quality natural gas, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator ($PM_{2.5}$)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator ($PM_{2.5}$)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator ($PM_{2.5}$)

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the emergency generator.

The natural gas fired emergency generator (EU017) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of pounds per hour of $PM_{2.5}$. Grams per kilowatt-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

$PM_{2.5}$ BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency generator is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired generators in the same size category.

Step 5: Select BACT - Natural Gas Fired Emergency Generator ($PM_{2.5}$)

A detailed $PM_{2.5}$ BACT for the natural gas fired emergency generator is given in the BACT Conclusion for $PM_{2.5}$.

(2) Natural Gas Fired Fire Pump ($PM_{2.5}$)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps ($PM_{2.5}$)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

$PM_{2.5}$ BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.20 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations – Emergency Generators					
VC Energy LLC (Midland Power Station): Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	$TPM_{2.5}$: Certified to meet NSPS Subpart JJJJ, proper combustion design, 0.01 lb/MMBtu	NI	BACT-PSD
Westlake Vinyls Company LP: Geismar, LA	LA-0256/ PSD-LA-754 (12/6/2011)	Emergency Generator 1,818 hp (1,384 kw)	$TPM_{2.5}$: Use of natural gas, good combustion practices, < 0.01 lb/hr	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	Filterable $PM_{2.5}$: Use of pipeline quality natural gas, 2.66 lb/hr, 0.27 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps ($PM_{2.5}$)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps ($PM_{2.5}$)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

(4) Catalyzed diesel particulate filter (CDPF).

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump ($PM_{2.5}$)

EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE. Therefore, the use of a catalyzed diesel particulate filter is not an economically feasible option for the fire pump.

The natural gas fired fire pump (EU018) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission

limitations in terms of pounds per hour of $PM_{2.5}$. Grams per kilowatt-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 0.20 g/kw-hr and 0.54 g/kw-hr, which correspond to the PM standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Tables 1 and 2) beginning in model year 2007.

$PM_{2.5}$ BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an emission limit, which is 0.20 g/kw-hr for the proposed fire pump. Additionally under 326 IAC 2-7, an emergency fire pump is one that operates less than 500 hours per year. Therefore, an operation limit of 500 hours per year will be included as part of the BACT determination. This is consistent with other recent BACT determinations for emergency natural gas fired fire pumps in the same size category.

Step 5: Select BACT - Natural Gas Fired Fire Pump ($PM_{2.5}$)

A detailed $PM_{2.5}$ BACT for the natural gas fired fire pump is given in the BACT Conclusion for $PM_{2.5}$.

(3) Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC. The search was limited to entries from January 2006 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

$PM_{2.5}$ BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	$PM_{2.5}$: Use of natural gas, good combustion practices, 0.0072 lb/MMBtu	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations - Heaters Firing Natural Gas					
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	$TPM_{2.5}$: Use of pipeline quality natural gas, 0.30 lb/hr	NI	BACT-PSD
City of Victorville: Victorville, CA	CA-1191/ SE 07-02 (3/11/2010)	Auxiliary Heater (40 MMBtu/hr)	$TPM_{2.5}$: 1000 hours/year, 0.20 gr/100 dscf	NI	BACT-PSD

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)

The control technologies for natural gas fired space heaters and air heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)

Based on a review of the RBLC, add-on control devices are generally not used for controlling particulate emissions from natural gas fired space heaters or air heaters. Most facilities express emission limitations in terms of pounds per hour of $PM_{2.5}$. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The only listed emission limit for $PM_{2.5}$ (when converted for comparison) is 0.0075 lb/MMBtu. Based on a review of the RBLC, emission limits for PM (when converted for comparison) varied from 0.0072 lb/MMBtu to 0.0075 lb/MMBtu.

$PM_{2.5}$ BACT for the natural gas fired heaters has been proposed to be the restricted use of only natural gas and the use of good combustion practices along with an emission limit, which is 0.0072 lb/MMBtu for each of the proposed heaters.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters ($PM_{2.5}$)

A detailed $PM_{2.5}$ BACT for natural gas fired heaters is given in the BACT Conclusion for $PM_{2.5}$.

(d) <u>Cooling Towers ($PM_{2.5}$)</u>

Particulate matter emissions are primarily due to the dissipation of heat loads from plant condensate to the atmosphere. Some of the liquid water may be entrained in the air stream and can be carried out of the tower as "drift" droplets. As the droplet evaporates in the atmosphere, any suspended or dissolved water will solidify as particulate matter.

The following new emission units associated with the cooling towers are subject to $PM_{2.5}$ BACT requirements:

Particulate Matter Emission Units Associated with the Cooling Tower		
Emission Unit		Associated Emission Point
Description	Unit No.	
Cooling Tower	EU024	SV022

Existing $PM_{2.5}$ BACT Determinations for Cooling Towers

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for cooling towers at iron ore pelletizing plants. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries), as well as various sources with cooling towers of comparable size, from January 2004 to January 2013.

$PM_{2.5}$ BACT Determinations – Cooling Tower					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Cooling Tower EU024 (4,600 gpm)	Filterable $PM_{2.5}$: Drift eliminator with a maximum drift rate of 0.001% of the circulating water flow rate, use of cooling water with less than 6,009 milligrams per liter TDS concentration, 0.138 lb/hr	NI	BACT-PSD
Existing $PM_{2.5}$ BACT Determinations – Cooling Towers					
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Melt Shop Spray Contact Cooling Tower (198,360 gpm)	$TPM_{2.5}$: 0.04 lb/hr, 0.15 tons/yr	NI	BACT-PSD
			Process Notes: Cooling Tower with 0.005% drift rate and a maximum TDS content of 2,650 mg/L		
Nucor Steel Marion, Inc.: Marion, OH	OH-0341/ P0105283 (12/23/2010)	Rolling Mill Contact Cooling Tower (225,000 gpm)	$TPM_{2.5}$: 0.07 lb/hr, 0.32 tons/yr	NI	BACT-PSD
			Process Notes: Cooling Tower with 0.005% drift rate and a maximum TDS content of 2,650 mg/L		
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Cooling Towers (12) (1,440,000 gpm)	Filterable $PM_{2.5}$: Drift eliminators, 3.42 lb/hr and 14.99 tons/yr (combined)	NI	LAER

These proposed BACT emission limits were based on available RBLC data. IDEM is not aware of any publically available record of compliance testing for $PM_{2.5}$ for condensible particulate testing at the sources listed here.

Step 2: Eliminate Technically Infeasible Options – Cooling Towers ($PM_{2.5}$)

No technologies were eliminated from consideration because of technical infeasibility for cooling towers.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Cooling Towers ($PM_{2.5}$)

The control technologies for cooling towers are ranked as follows:

(1) Drift eliminators.

(2) Minimization of total dissolved solids (TDS).

Step 4: Evaluate the Most Effective Controls and Document the Results – Cooling Tower ($PM_{2.5}$)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for cooling towers at iron ore pelletizing plants is drift eliminators. Most facilities express emission limitations in terms of maximum drift rate and an associated pound per hour limitation. However, all of the cooling towers listed in the RBLC for the pollutant $PM_{2.5}$ are not comparable to the one proposed by Magnetation due to size differences; therefore, a second review of the RBLC was performed for similarly sized cooling towers under the pollutant PM_{10}. The only cooling tower in the range of the proposed cooling tower with a listed drift rate is located at Entergy New Orleans, Inc. (Michoud Electric Plant). The drift rate is 0.001%.

BACT Proposal

BACT has been proposed to be the use of drift eliminators with a maximum drift rate of 0.001%, use of cooling water with less than 6,009 milligrams per liter TDS concentration, and an appropriate pound per hour limitation. The basis for the TDS concentration is documented in the RBLC PM_{10} BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

Step 5: Select BACT – Cooling Tower ($PM_{2.5}$)

The proposed BACT for PM meets the most stringent BACT found in the RBLC for cooling towers of comparable size. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed $PM_{2.5}$ BACT for the cooling tower is given in the BACT Conclusion for $PM_{2.5}$.

(e) <u>Fugitive Dust Emissions ($PM_{2.5}$) from Paved Roads</u>

Fugitive dust emissions will be generated from vehicles traveling over plant roads.

Existing BACT Determinations - Fugitive Dust Emissions ($PM_{2.5}$)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for fugitive dust emissions from paved roads at iron ore pelletizing plants. The table below summarizes these $PM_{2.5}$ BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2005 to January 2013.

$PM_{2.5}$ BACT Determinations: Fugitive Dust Emissions					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fugitive Dust Emissions from Paved Roads	$PM_{2.5}$: Vacuum sweeping and water flushing as necessary, speed reduction plan, in accordance with the rquired fugitive dust control plan	NI	BACT-PSD

$PM_{2.5}$ BACT Determinations: Fugitive Dust Emissions					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Existing $PM_{2.5}$ BACT Determinations: Fugitive Dust Emissions					
Sun Coke Energy, Inc.: Middletown, OH	OH-0332/ P0104768 (2/9/2010)	Roadways and Parking Areas	$PM_{2.5}$: Control measures, 0.05 tons/yr	NI	LAER
			Emission limit from Fugitive PM Pollutant Notes listing		
New Steel International: Haverhill, OH	OH-0315/ 07-00587 (5/6/2008)	Paved Roadways and Parking Areas	Filterable $PM_{2.5}$: Control measures (wet suppressants, watering, speed reduction, and vacuuming/sweeping), 29.90 tons/yr	NI	LAER
Suncoke (Gateway Energy & Coke): Granite City, IL	IL-0109/ 06070020 (3/13/2008)	Roads, Parking Areas, Other Open Areas	Filterable $PM_{2.5}$: Work practices (paving, fugitive dust control program)	NI	LAER

Step 2: Eliminate Technically Infeasible Options - Fugitive Dust Emissions ($PM_{2.5}$)

Fugitive dust emissions will be generated from vehicles traveling over plant roads. Typical particulate control devices such as fabric filtration, mechanical collectors, wet scrubbers, and ESPs are not technically feasible for the control of fugitive dust emissions because, by definition, fugitive emissions cannot be reasonable routed through a single point of exhaust. Therefore, these control devices will not be considered further for fugitive dust emissions.

Since the inclusions of opacity readings as limits were considered under LAER or other case-by-case basis and not as part of a BACT determination, the taking of opacity readings will not be considered further for fugitive dust emissions.

A review of the U.S. EPA RBLC shows that fugitive dust emissions from roads at other iron ore beneficiating plants, steel mills, and steel foundries are controlled through the paving of roads and then through the use of wetting agents or controlling the accumulation of dusty material on the roads. Removal of the accumulation of silt on the roadways can be accomplished by either sweeping or vacuuming the silt from the roads. Fugitive dust control plans are also typically implemented.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Fugitive Dust Emissions ($PM_{2.5}$)

The most effective control for fugitive dust emissions from roadways is paving of the roads and the implementation of a site-specific Fugitive Dust Control Plan.

Step 4: Evaluate the Most Effective Controls and Document the Results - Fugitive Dust Emissions ($PM_{2.5}$)

Based on a review of the RBLC, the most stringent BACT for fugitive dust control of roads is development, implementation and maintenance of a site specific Fugitive Dust Control Plan.

BACT Proposal

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Step 5: Select BACT - Fugitive Dust Emissions ($PM_{2.5}$)

BACT shall be the development, maintenance, and implementation of a site-specific fugitive dust control plan. Since the source is required to meet the most stringent BACT for fugitive emissions from paved roads, no further evaluation of these operations is required and an economic, energy, or environmental impact analysis is not required as part of the BACT evaluation for these operations.

A detailed $PM_{2.5}$ BACT for fugitive dust emissions is given in the BACT Conclusion for $PM_{2.5}$.

BACT Conclusion for $PM_{2.5}$

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for $PM_{2.5}$ emissions shall be as follows:

(a) Material Handling Operations

The material handling operations shall be limited as follows:

(1) $PM_{2.5}$ emissions from the following emission units (EU001a, EU004b, EU005, EU006, EU007, EU008, EU009, EU025b, EU010, EU011, EU012, EU015, EU016, EU019, EU020, EU022, and EU026) shall be controlled by fabric filter dust collectors and shall not exceed the associated emission limits listed in the following table:

Emission Unit		Control	$PM_{2.5}$ Limit (gr/dscf)	$PM_{2.5}$ Limit (lb/hr)
Description	(Unit ID)			
Iron Concentrate Unloading	EU001a	Baghouse CE001	0.002	0.95
Coke Breeze Pneumatic Conveyance & Storage Bin	EU004b	Baghouse CE004	0.002	0.0429
Bentonite Unloading (Truck) & Storage Area	EU005	Bin Vent CE005	0.002	0.0429
Organic Binder Unloading & Storage Area	EU006	Bin Vent CE006	0.002	0.0429
Soda Ash Unloading & Storage Area	EU007	Bin Vent CE007	0.002	0.0429
Bentonite Additive System	EU008	Bin Vent CE008	0.002	0.0429
Coke Breeze Additive System	EU009	Baghouse CE009	0.002	0.09
Limestone and Dolomite Grinding Mill Bin Area	EU025b	Baghouse CE023	0.002	0.22
Ground Limestone and Dolomite Additive System	EU010	Baghouse CE010	0.002	0.32
Mixing Area Material Handling System	EU011	Baghouse CE011	0.002	0.34
Hearth Layer Bin System	EU012	Baghouse CE012	0.002	0.15
Furnace Discharge System	EU015	Baghouse CE017	0.002	0.73
Hearth Layer Separation System	EU016	Baghouse CE017	0.002	0.79

Emission Unit		Control	$PM_{2.5}$ Limit (gr/dscf)	$PM_{2.5}$ Limit (lb/hr)
Description	(Unit ID)			
Oxide Pellet Storage & Unloading System	EU019	Baghouse CE019	0.002	0.63
WBE Lime Storage Area	EU020	Bin Vent CE020	0.002	0.02
WBE Residual Product Loading Area	EU022	Bin Vent CE021	0.002	0.02
Recycled Dust Storage Area	EU026	Baghouse CE024	0.002	0.16

*$PM_{2.5}$ includes both filterable and condensible $PM_{2.5}$.

(2) $PM_{2.5}$ emissions from the following emission units (EU002a, EU003a, and EU004a) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Limestone Unloading (Truck)	EU002a	$PM_{2.5}$*	1.07 E-03	2.20 E-03
Dolomite Unloading (Truck)	EU003a	$PM_{2.5}$*	5.53 E-04	1.22 E-03
Coke Breeze Unloading (Truck)	EU004a	$PM_{2.5}$*	1.02 E-04	4.45 E-04

(3) $PM_{2.5}$ emissions from the following emission units (EU001b, EU002b, and EU003b) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, by enclosures, that the opacity shall not exceed five percent (5%) on a six-minute average, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Unit ID	Emission Limitations		
		Pollutant	Lb/hr	TPY
Iron Concentrate Transfer and Storage Area	EU001b	$PM_{2.5}$*	1.57	6.88
Limestone Conveyor & Enclosed Storage (Pile)	EU002b	$PM_{2.5}$*	0.02	0.04
Dolomite Conveyor & Enclosed Storage (Pile)	EU003b	$PM_{2.5}$*	0.01	0.02

*$PM_{2.5}$ includes both filterable and condensible $PM_{2.5}$.

(4) $PM_{2.5}$ emissions from the following emission unit (EU025a) shall be controlled through the development, maintenance, and implementation of a site-specific fugitive dust control plan, by enclosures, and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Limestone/Dolomite Hopper, Belt Feeder & Grizzly Feeder/Screener	$PM_{2.5}$*	0.33	0.70

*$PM_{2.5}$ includes both filterable and condensible $PM_{2.5}$.

(5) The Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System opacity material shall not exceed five percent (5%) on a six (6) minute average and shall not exceed the emission limits listed in the following table:

Emission Unit Description	Emission Limitations		
	Pollutant	Lb/hr	TPY
Iron Ore Wet Grinding and Filter Cake Production	$PM_{2.5}$*	0.07	0.31
Greenball Production System	$PM_{2.5}$*	0.07	0.31

(b) Induration Furnace

The induration furnace operations shall be limited as follows:

$PM_{2.5}$ emissions from the Furnace Hood Exhaust (EU013) and the Furnace Windbox Exhaust (EU014) shall be controlled by fabric filter dust collectors and shall not exceed the emission limits listed in the following table:

Emission Unit		Control	$PM_{2.5}$ Limit (gr/dscf)	$PM_{2.5}$ Limit (lb/hr)	Opacity (6-min avg)
Description	Unit No.				
Furnace Hood Exhaust	EU013	Baghouse CE013	0.008	20.23*	5%
Furnace Windbox Exhaust	EU014	Baghouse CE016	0.008	24.25*	5%

*The PM2.5 limits include process emissions and combustion emissions.

(c) Combustion Units

The combustion units shall be limited as follows:

(1) $PM_{2.5}$ emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(2) $PM_{2.5}$ emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.20 g/kw-hr.

(3) $PM_{2.5}$ emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 0.0072 lb/MMBtu.

(d) Cooling Tower

The cooling tower emissions shall be controlled through the use of drift eliminators with a maximum drift rate of 0.001%, the use of cooling water with less than 6,009 milligrams per liter TDS concentration, and a 0.138 pound per hour limitation. The basis for the TDS concentration is documented in the RBLC PM_{10} BACT determination table for cooling towers under the entry for Entergy New Orleans, Inc. (Michoud Electric Plant).

(e) Fugitive Dust Emissions from Paved Roads

BACT has been proposed to be the use of a site specific fugitive dust control plan, which shall include vacuum sweeping and water flushing as necessary and the implementation of a speed reduction plan.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (PSD BACT) with regards to $PM_{2.5}$.

Sulfur Dioxide (SO_2) BACT

The SO_2 BACT analysis is divided into two categories: induration furnace and combustion units.

Step 1 of the BACT process is shown below for this SO_2 BACT analysis to describe general sulfur dioxide control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific SO_2 control devices may be discussed in individual BACT analyses. A summary of the SO_2 BACT determinations is provided at the end of this section.

Step 1: Identify Potential Control Technologies (SO_2)

Sulfur dioxide and fluoride emissions are concurrently generated from certain sources at Magnetation. SO_2 is formed when sulfur in raw materials and/or fuels is oxidized by either process conditions or by combustion.

The primary methods of controlling SO_2 emissions are through the use of flue gas desulfurization (FGD) technologies. There are many FGD systems available including wet scrubbing, spray dryer absorption, circulating fluidized bed absorption (also known as a Gas Suspension Absorber), and dry sorbent injection. The FGD systems currently in use to control SO_2 emissions can be classified as either wet or dry systems. In addition, a number of calcium and sodium based SO_2 control reagents may be considered. In most cases, reagent selection will not affect the overall SO_2 control efficiency. This analysis will focus on lime and limestone since they are the most common reagents used in wet scrubbing.

SO_2 emissions from a combustion process are typically controlled through one of the following mechanisms:

(1) Clean fuels.

(2) Good combustion practices.

(3) Usage limitation.

Wet Scrubber

A wet scrubber involves scrubbing the exhaust gas stream with a reagent in slurry form comprised of lime (CaO), limestone ($CaCO_3$), caustic, or soda ash in suspension. The process takes place in a wet scrubbing tower. In some cases, the scrubbing tower is located downstream of a PM control device to reduce the plugging of spray nozzles and other problems caused by the presence of particulates in the scrubber. The SO_2 in the gas stream reacts with the slurry to form calcium sulfite ($CaSO_3$) and calcium sulfate ($CaSO_4$). Wet scrubbing absorption control efficiency is typically in the 90% to 98% range.

In order to meet the SO_2 and particulate levels associated with various requirements two scrubber scenarios are considered. The first is a single high pressure wet scrubber. The advantage of a single high pressure wet scrubber is that it has lower capital cost but the operating

costs are higher. To achieve the level of particulate removal necessary with a single scrubber, a very high pressure drop is required. The high pressure drop requires a larger fan which in turn uses more electricity. The second option is to have a lower pressure wet scrubber for SO_2 removal followed by a wet ESP for particulate removal. The wet scrubber with a wet ESP option has a higher capital cost but lower operating cost.

Other materials could be used for scrubbing. MEA is a sorbent which may be used for CO_2 absorption in GHG capture system. The capture of CO_2 is accomplished by an acid base reaction between CO_2 and MEA. This bond may be broken relatively easily with low pressure steam heat. In CO_2 capture systems for GHG control, an MEA solution circulates through an absorption column to capture the CO_2 in an exhaust gas steam and a regeneration column where the CO_2 is released from the MEA solution using low pressure steam as a heat source. The CO_2 from the regeneration is compressed to a liquid for transport and sequestration. The MEA is continuously circulated between the absorption and regeneration columns, and very little MEA is lost in the process.

MEA also reacts with other acid gas such as H_2S, SO_2, and NO_x. The reaction between MEA and SO_2 and the reaction of MEA with NO_x is irreversible, and the chemical bonds cannot be broken in a regeneration column. In a CO_2 capture systems, MEA reacting with SO_2 and NO_x is consumed and fresh MEA must be added to replace the MEA consumed by SO_2 and NO_x. There are also operating costs for removing the MEA salts from the MEA sorbent solution and disposal of the waste material. SO_2 and NO_x removal by MEA is considered an unwanted collateral reaction within a CO_2 capture system. Therefore, SO_2 and NO_x concentrations in coal-fired boiler applications must be reduced to a minimum in an MEA sorbent based CO_2 capture system to control operating costs.

If an MEA solution would be used to capture the remaining SO_2 and NO_x in the post emission control Hood and Waste Gas exhaust streams, it would result in the consumption of 950 tons per year of MEA assuming all SO_2 and NO_x is captured.

MEA is not considered to be an economically viable option as compared to other reagents for SO_2 control. The current bulk price of MEA is approximately $2,100 per ton. In contrast, hydrated lime costs around $290 per ton, and about the same amount of lime would be used per ton SO_2 controlled as MEA.

Circulating Fluidized Bed (CFB) Dry Scrubber

Circulating fluidized bed (CFB) absorption is a semi-dry system with lime slurry injection. The flue gas enters the reactor through a venturi, which increases the velocity to ensure that solid material can be transported by the flue gas to create a fluidized bed. The slurry and water are injected into the gas stream at the venturi. The lime reacts with the acids in the flue gas and neutralizes them. The SO_2 in the gas stream reacts with the slurry to form calcium sulfite ($CaSO_3$). The fluidized bed allows for a greater surface for the reaction to take place, thus making the process very efficient. The water is injected to cool down the flue gas. The temperature must be as low as possible because decreased temperatures increase the ability of the slurry to absorb the acids. However, if the temperature is too low, the re-circulating material tends to cake more. A cyclone off the top of the reactor captures particles to be recirculated to the reactor. CFB scrubbing (absorption) control efficiency is typically in the 90% to 98% range depending upon inlet concentrations and conditions.

Spray Dryer Absorption (SDA) Dry Scrubber

Spray dryer absorption (SDA) is a dry scrubbing system that sprays a fine mist of slurried lime into an absorption tower where SO_2 is absorbed by the droplets. The absorption of the SO_2 leads to the formation of calcium sulfite (CaSO3●2H2O) within the droplets. The liquid-to-gas ratio is such that the heat from the exhaust gas causes the water to evaporate before the droplets

reach the bottom of the tower. This leads to the formation of a dry powder which is carried out with the gas and collected with a particulate control device. Spray dryer absorption control efficiency is typically in the 70% to 95% range depending upon inlet concentrations and conditions.

Dry Sorbent Injection (DSI) Dry Scrubber

Dry sorbent injection (DSI) involves the injection of a lime or limestone powder into the exhaust gas stream. The process was developed as a lower cost FGD option because the mixing occurs directly in the exhaust gas stream instead of in a separate tower. Sorbent injection control efficiency is typically in the 50% range.

Clean Fuels

The proposed induration furnace is designed to fire only natural gas in its burners. Natural gas does not contain any fuel bound sulfur compounds and therefore is considered to be a clean fuel for SO_2. However, Magnetation is proposing to add coke breeze to the iron ore as it is being processed. The amount of coke breeze will be limited to less than 1.5%. Coke breeze does contain fuel bound sulfur compounds.

It is technically infeasible to burn solid or liquid fuels (e.g., coal and/or fuel oil) in burner systems of a straight grate furnace such as the one designed for the proposed modifications at Magnetation.

Good Design Methods and Operating Practices

Good design includes process and mechanical equipment designs which are either inherently lower polluting or are designed to minimize emissions. Good operating practices include operating methods, procedures, and selection of raw materials to minimize emissions. Since these methods are generally source specific (e.g., good operating practices for SO_2 control), they will be addressed for each process when such measures are available.

(a) <u>Induration Furnace (SO_2)</u>

The majority of sulfur dioxide (SO_2) emissions originate from the sulfur present in the iron concentrate and coke breeze. There is also a small amount of SO_2 emitted from natural gas combustion. The SO_2 emission rate was determined based on a mass balance. The mass balance is based on the sulfur content of the ore concentrate, the concentrate production rate, the sulfur content of the finished iron oxide pellets, and the iron oxide pellet production rate.

The hood exhaust contains a small amount of SO_2 due to leakage between induration furnace zones and the diversion of up to 30% of waste gas for pressure control.

Most of the SO_2 emissions emanate from the windboxes that are routed to the waste gas stack as these are the regions of the induration furnace where sufficient temperature exists to liberate sulfur compounds from the iron oxide pellets.

The following new emission units associated with the induration furnace are subject to SO_2 BACT requirements:

SO_2 Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A

SO_2 Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Windbox Exhaust	EU014	SV013B

Existing SO_2 BACT Determinations for Induration Furnaces

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these SO_2 BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2002 to January 2012.

SO_2 BACT Determinations – Induration Furnace					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 st/hr pellets)	SO_2: No control, 7.1 ppmv wet @ 20% O_2 and 21.68 lb/hr	NI	BACT-PSD
		Note: 0.089 lb SO_2/ton pellets * 450 tons/hr = 40.1 lb/hr SO_2 This meets most stringent BACT.			
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 st/hr pellets)	SO_2: GSA dry scrubber and baghouse, 5.0 ppmv wet @ 15% O_2 and 19.61 lb/hr	NI	BACT-PSD
		Note: 0.048 lb SO_2/ton pellets * 450 tons/hr = 21.6 lb/hr SO_2 This meets most stringent BACT.			
Existing SO_2 BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**SO_2: No control, 6.8 ppmv wet @ 15% O_2 and 55.70 lb/hr (1-hr rolling avg)**	**NI**	**BACT-PSD**
	Note: 55.70 lb/hr ÷ 624 tons/hr = 0.089 lb SO_2/ton pellets				
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**SO_2: GSA dry scrubber, 5 ppmv wet @ 15% O_2 and 29.90 lb/hr (1-hr rolling avg)**	**NI**	**BACT-PSD**
	Note: 29.90 lb/hr ÷ 624 tons/hr = 0.048 lb SO_2/ton pellets				
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Tempered Preheat (450 t/hr pellets)	SO_2: GSA dry scrubber and dry ESP, 5 ppmv wet and 18.40 lb/hr (30-day rolling avg)	95%	BACT-PSD
U.S. Steel Corp - Keetac: Keewatin, MN	MN-0084/ 13700063-004 (12/6/2011)	Grate Kiln – Down Draft Drying Zone 1 (450 t/hr pellets)	SO_2: GSA dry scrubber and dry ESP, 5 ppmv wet (30-day rolling avg), 18.40 lb/hr (3-hr avg)	95%	BACT-PSD
Michigan Iron Nugget LLC: Ishpeming, MI	MI-0392/ 88-10 (12/7/2010)	Rotary Hearth Furnace (75.73 tons/hr nuggets, 663396 tons/yr nuggets)	SO_2: Spray dryer absorption and fabric filter, 1.20 lb/st nugget (24-hr avg), 93.7 lb/hr (1-hr avg)	90%	BACT-PSD
Cleveland – Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace 5 Hood Exhaust (Waste Gas #501, #502, #503) (160 LT/hr pellets)	SO_2: High efficiency wet ESP, 0.130 lb/MMBtu, 0.0720 lb/MMBtu (only natural gas)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (SO_2)

The proposed indurating furnace is designed to operate on natural gas (as an external fuel) and coke breeze (which is added to the raw materials). Therefore, use of natural gas as a clean fuel as well as good design methods and operating practices will be implemented regardless of the SO_2 control system selected.

Induration Furnace Hood Exhaust
Wet scrubbing and spray dryer absorption have been eliminated as control technologies for the Furnace Hood Exhaust (EU013) because the control technologies can feasibly achieve outlet concentrations of 10 and 25 ppmv, respectively. Since the uncontrolled concentration from the hood exhaust is 7.1 ppmv, these technologies will not be able to remove any further SO_2 from the air stream. No other technologies were eliminated from consideration because of technical infeasibility for the induration furnaces with regards to the Furnace Hood Exhaust (EU013).

Induration Furnace Windbox Exhaust
No technologies were eliminated from consideration because of technical infeasibility for the Furnace Windbox Exhaust (EU014).

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (SO_2)

Induration Furnace Hood Exhaust
The control technologies for the induration furnace hood exhaust are ranked as follows:

(1) Gas suspension absorber (GSA): 95%

(2) Dry sorbent injection (DSI) dry scrubber: 40%

Induration Furnace Windbox Exhaust
The control technologies for the induration furnace windbox exhaust are ranked as follows:

(1) Gas suspension absorber (GSA): 95%

(2) High pressure wet scrubber: 80%

(3) Low pressure wet scrubber followed with wet electrostatic precipitator (ESP): 80%

(4) Spray dryer absorption (SDA): 60-70%

(5) Dry sorbent injection (DSI) dry scrubber: 40%

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (SO_2)

Induration Furnace Hood Exhaust
Uncontrolled SO_2 concentrations in the hood exhaust stream are very low; the calculated hood exhaust SO_2 concentration is 7.1 ppmv. Since this concentration is at or near the lowest controlled SO_2 concentration achievable by these control devices (5 ppm), a control cost analysis was performed to determine whether or not add-on SO_2 controls were economically feasible. For the GSA and DSI dry scrubbing options, baghouses are needed to capture the spent sorbent. In GSA applications, a portion of the recovered sorbent is recycled back to the dry scrubber to minimize sorbent use. Therefore, the baghouses are considered as an integral part of the SO_2 control system and are included in the control cost analysis. Control costs for GSA and DSI options were also evaluated without baghouse costs. All of these control costs are provided in Appendix C and are summarized in Appendix C - Table A-1 and in the following table.

Hood Exhaust – SO_2 Controls

Hood Exhaust – SO_2 Controls		
Technology	**SO_2 Control Cost ($/ton)**	**Corresponding Appendix C Cost Tables**
Dry Sorbent Injection (DSI)	$55,943	A-4-2a
Gas Suspension Absorber (GSA)	$82,606	A-3-2a
Dry Sorbent Injection (DSI) with Baghouse	$109,262	A-4-1a
Gas Suspension Absorber (GSA) with Baghouse	$151,663	A-3-1a

From the above table, the implementation of SO_2 controls on the hood exhaust would be economically infeasible whether or not particulate controls are included in the cost analysis.

Based on a review of the U.S. EPA RBLC, the primary control used for furnace hood exhausts at iron ore pelletizing plants is an appropriate pound per hour limitation, based on the process being uncontrolled. Most facilities express emission limitations in terms of exhaust concentration and/or pounds per hour of SO_2. Exhaust concentration is the most effective way of comparing emission limits because it is a relative measure rather than control efficiency limitations which are process-specific measures. The exhaust concentrations given in the review range from 6.8 ppmv wet to 7.8 ppmv wet.

The furnace design at Magnetation differs from the furnace design at Essar. Both furnaces combust natural gas in the windbox to dry pellets then direct residual heat to the hood. This heat recirculation process at the Essar furnace incorporates 26% of the combustion gases in the heated air stream. This can be documented as follows:

> NO_x emissions in the furnace are generated exclusively from the combustion of natural gas. Essar does not utilize coke breeze in its processes. Therefore, the SO_2 emissions at Essar from in the furnace are generated exclusively from the combustion of natural gas.
>
> | | NO_x (tpy) | SO_2 (tpy) |
> |---|---|---|
> | Hood | 197 | 200 |
> | Windbox | 562 | 570 |
> | Ratio of Hood / (Hood + Windbox) | 26% | 26% |
>
> This redirection of oxygen depleted combustion gas to the hood allows Essar to operate the hood at a lower oxygen level than the ambient air oxygen content of twenty percent (20%).

As documented in the furnace calculations for Magnetation, the amount of combustion gas redirected to its hood will be 7.5%. Therefore, Magnetation can not operate its furnace hood at 15% oxygen, and it is designed to operate at ambient air oxygen conentrations of twenty percent (20%).

BACT Proposal – Induration Furnace Hood Exhaust (SO_2)

BACT for the SO_2 emissions from the induration furnace hood exhaust has been proposed to be uncontrolled with a maximum outlet concentration of 7.1 ppmv wet corrected to 20% O_2 and a corresponding 21.68 lb/hr limit.

<u>Induration Furnace Windbox Exhaust</u>

Based on a review of the U.S. EPA RBLC, the primary control used for furnace waste gas/windbox exhausts at iron ore pelletizing plants is a gas suspension absorber (GSA). Most facilities express emission limitations in terms of exhaust concentration and/or pounds per hour of SO_2. Exhaust concentration is the most effective way of comparing emission limits because it is a relative measure rather than control efficiency limitations which are process-specific measures. The exhaust concentrations given in the review range from 3.3 ppmv wet to 5.0 ppmv wet, with most processes being limited at 5.0 ppmv wet, which was determined to be BACT for most furnace waste gas/windbox exhausts.

BACT Proposal – Induration Furnace Windbox Exhaust (SO_2)

BACT for the SO_2 emissions from the induration furnace windbox exhaust has been proposed to be controlled through the use of a GSA dry scrubber combined with a baghouse for sorbent capture and particulate control, in conjunction with a maximum outlet concentration of 5.0 ppmv wet corrected to 15% O_2 and a corresponding 19.61 lb/hr limit.

The proposed BACT for SO_2 meets the most stringent BACT found in the RBLC for induration furnace waste gas exhausts. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

Step 5: Select BACT - Induration Furnace (SO_2)

A detailed SO_2 BACT for the induration furnace is given in the BACT Conclusion for SO_2.

(b) <u>Combustion Units (SO_2)</u>

The following emission units associated with combustion processes are subject to SO_2 BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (SO_2)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (SO_2)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these SO_2 BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for natural gas fired generators only used for emergency purposes.

SO_2 BACT Determinations - Emergency Generator					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	SO_2: Use of natural gas, good combustion practices, 0.0015 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing SO_2 BACT Determinations - Emergency Generators					
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	SO_2: Use of pipeline quality natural gas, 0.03 lb/hr, 0.003 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	SO_2: Use of pipeline quality natural gas, 0.02 lb/hr, 0.002 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	SO_2: 0.002 g/bhp-hr, 200 hours/year	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (SO_2)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (SO_2)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (SO_2)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of pounds per hour of SO_2. Grams per kilowatt-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The converted emission standards given in the review range between 0.0015 g/kw-hr and 0.14 g/kw-hr.

SO_2 BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 0.0015 g/kw-hr for the proposed generator.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (SO_2)

A detailed SO_2 BACT for the natural gas fired emergency generator is given in the BACT Conclusion for SO_2.

(2) Natural Gas Fired Fire Pump (SO_2)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (SO_2)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these PM BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

SO_2 BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	SO_2: Use of natural gas, good combustion practices, 0.0015 g/kw-hr, 500 hours/year	NI	BACT-PSD
Existing SO_2 BACT Determinations – Emergency Generators					
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	SO_2: Use of pipeline quality natural gas, 0.03 lb/hr, 0.003 tons/yr, 200 hours/year	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	SO_2: Use of pipeline quality natural gas, 0.02 lb/hr, 0.002 tons/yr, 200 hours/year	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	SO_2: 0.002 g/bhp-hr, 200 hours/year	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (SO_2)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (SO_2)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (SO_2)

There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of pounds per hour of SO_2. Grams per kilowatt-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The converted emission standards given in the review range between 0.0015 g/kw-hr and 0.14 g/kw-hr.

SO_2 BACT for the natural gas fired fire pump has been determined to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 0.0015 g/kw-hr for the proposed fire pump.

Step 5: Select BACT - Natural Gas Fired Fire Pump (SO_2)

A detailed SO_2 BACT for the natural gas fired fire pump is given in the BACT Conclusion for SO_2.

(3) Natural Gas Fired Space Heaters and Air Heaters (SO_2)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (SO_2)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these SO_2 BACT determinations as provided by the RBLC. The search was limited to entries from January 2006 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

SO_2 BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	SO_2: Use of natural gas, good combustion practices, 0.00048 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	SO_2: Use of natural gas, good combustion practices, 0.00048 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	SO_2: Use of natural gas, good combustion practices, 0.00048 lb/MMBtu	NI	BACT-PSD
Existing SO_2 BACT Determinations - Heaters Firing Natural Gas					
Lake Charles Cogeneration, LLC: Sulphur, LA	LA-0231/ PSD-LA-742 (6/22/2009)	Shift Reactor Startup Heater (34.20 MMBtu/hr)	SO_2: Use of natural gas, 0.02 lb/hr	NI	BACT-PSD
Lake Charles Cogeneration, LLC: Sulphur, LA	LA-0231/ PSD-LA-742 (6/22/2009)	Gasifier Startup Preheater Burners (5) (35 MMBtu/hr)	SO_2: Use of natural gas, 0.02 lb/hr	NI	BACT-PSD
Pryor Plant Chemical : Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	SO_2: Use of natural gas, 0.03 lb/hr	NI	BACT-PSD

SO_2 BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	SO_2: 0.01 lb/hr, 0.05 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	SO_2: 0.01 lb/hr, 0.05 tons/yr	NI	BACT-PSD
Florida Power & Light: Loxahatchee, FL	FL-0303/ 0990646-002-AC (PSD-FL-396) (7/30/2008)	Natural Gas Fired Process Heaters (2) (10 MMBtu/hr)	SO_2: 2 gr/100 scf	NI	BACT-PSD
Florida Power & Light: Loxahatchee, FL	FL-0286/ 0990646-001-AC (PSD-FL-354) (1/10/2007)	Natural Gas Fired Process Heaters (2) (10 MMBtu/hr)	SO_2: 2 gr/100 scf	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (SO_2)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (SO_2)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (SO_2)

Based on a review of the RBLC, add-on control devices are generally not used for controlling particulate emissions from natural gas fired space heaters or air heaters. Most facilities express emission limitations in terms of pounds per hour of SO_2. Pounds per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. Emission limits for SO_2 (when converted for comparison) varied from 0.00048 lb/MMBtu to 0.0015 lb/MMBtu.

SO_2 BACT for the natural gas fired heaters has been proposed to be the restricted use of only natural gas and the use of good combustion practices along with an emission limit, which is 0.00048 lb/MMBtu for each of the proposed heaters.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (SO_2)

A detailed SO_2 BACT for natural gas fired heaters is given in the BACT Conclusion for SO_2.

BACT Conclusion for SO_2

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for SO_2 emissions shall be as follows:

(a) Induration Furnace

The induration furnace operations shall be limited as follows:

(1) SO_2 emissions from the induration furnace hood exhaust be uncontrolled with a maximum outlet concentration of 7.1 ppmv wet corrected to 20% O_2 and a corresponding 21.68 lb/hr limit.

(2) SO_2 emissions from the induration furnace windbox exhaust be controlled through the use of a GSA dry scrubber combined with a baghouse for sorbent capture and particulate control as well as a maximum outlet concentration of 5.0 ppmv wet corrected to 15% O_2 and a corresponding 19.61 lb/hr limit.

(b) Combustion Units

The combustion units shall be limited as follows:

(1) SO_2 emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.0015 g/kw-hr.

(2) SO_2 emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.0015 g/kw-hr.

(3) SO_2 emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 0.00048 lb/MMBtu.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (BACT) with regards to SO_2.

Nitrogen Oxide (NO_x) BACT

The NO_x BACT analysis is divided into three categories: induration furnace hood exhausts, induration furnace waste gas exhausts, and combustion units.

Step 1 of the BACT process is shown below for this NO_x BACT analysis to describe general particulate control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific NO_x control devices may be discussed in individual BACT analyses. A summary of the NO_x BACT determinations is provided at the end of this section.

Step 1: Identify Potential Control Technologies (NO_x)

There are three mechanisms by which NO_x production occurs. They are thermal, fuel, and prompt NO_x formation.

In the case of natural gas combustion, the primary mechanism of NO_x production is through thermal NO_x formation. This mechanism arises from the thermal dissociation of nitrogen and oxygen molecules in combustion air to nitric oxide (NO). The thermal oxidation reaction is as follows:

$N_2 + O_2 \rightarrow 2NO$ (1)

Downstream of the flame, significant amounts of NO_2 can be formed when NO is mixed with air. The reaction is as follows:

$2NO + O_2 \rightarrow 2NO_2$ (2)

Thermal oxidation is a function of the residence time, free oxygen, and peak reaction temperature.

Prompt NO_x is a form of thermal NO_x which is generated at the flame boundary. It is the result of reactions between nitrogen and hydrocarbon radicals generated during combustion. Only minor amounts of NO_x are emitted as prompt NO_x.

Fuel bound NO_x is primarily a concern with solid and liquid fuel combustion sources; it is formed as nitrogen compounds in the fuel are oxidized in the combustion process. Natural gas has minimal fuel bound nitrogen which eliminates fuel bound NO_x as a major concern.

Various combustion controls exist for NO_x reduction from combustion units. These technologies are summarized below.

New Natural Gas Combustion Chamber Design with Low Emission (LE) Burners

Magnetation is proposing to build the new induration furnace with a new natural gas combustion chamber design. The new design has inherently lower NO_x emissions than standard straight grate furnace designs.

Controlling NO_x emissions in induration furnaces is due, in part, to the way the furnace's recuperative heat recovery system works. To minimize energy use, induration furnaces are designed with recuperative heat recovery systems to use heat recovered from pellet cooling to preheat and fire the green pellets. Magnetation's induration furnace is being designed to maximize energy efficiency by recovering as much heat via recuperative heat recovery systems as is practicable. Preheated air from the first pellet cooling zone is routed to the pellet firing zones so that the hottest air from the pellet coolers is routed to the hottest part of the furnace.

Traditionally, firing zone burners were designed to fire directly into the preheated air stream from the pellet cooler. This conserved energy by reducing the energy needed to heat the firing zone air up to the proper temperature, and use of preheated air for combustion air improved the thermal efficiency of the burner. Unfortunately, this arrangement also produces high NO_x emissions because:

- The preheated air increases burner flame temperatures. Higher flame temperatures increase NO_x emissions. Preheated combustion air in an induration furnace is approximately 2,000 °F. Preheated combustion air in a gas fired package boiler would range from 400 °F to 600 °F.

- Oxygen levels in the combustion zone cannot be controlled when a direct fired burner is used. To effectively control NO_x emissions, O_2 levels need to be in the 2% to 3% range. When O_2 levels are higher (>3%), more nitrogen is oxidized to form NO_x in the combustion zone. Oxygen levels in the firing zone of an induration furnace are typically 15% to 20% O_2.

Magnetation is proposing a new natural gas combustion chamber and burner design which generates substantially less NO_x than the standard design. The new design does this in the following ways:

- The gas combustion chamber design includes a separate chamber for natural gas combustion where conditions are favorable to low NO_x combustion techniques. Hot gases from the combustion chamber then mix with hot air from the pellet cooler in the air duct so that the air stream flowing into the pellet firing zone is at the proper temperature. The air stream flowing into the pellet firing zone is at temperatures where NO_x formation is minimal.

- The new combustion chamber design facilitates the use of pre-mix ultra low NO_x burners and allows control of oxygen levels in the 2% to 3% O_2 range in the combustion zone to optimize performance of the ultra low NO_x burners.

- The Fives Low Emissions (LE) burner is designed to pre-mix the air and fuel prior to combustion. This produces the optimal air-fuel mixture for minimal NO_x formation.

- The combustion chamber is designed in a manner which allows use of combustion air which is at a lower temperature than combustion air supplied directly from the pellet cooler. This further reduces flame temperatures and lowers NO_x emissions. However, this also reduces the thermal efficiency of the burner. Consequently, the final natural gas burner design must strike a balance between energy use and NO_x control.

The premix ultra low NO_x burners used in the new combustion chamber design are Fives North America Low Emissions (LE) lean-premix burners. These burners use a fuel staged, partial premix combustion system. Prior to the primary combustion zone of this burner, fuel and air are intimately mixed in a series of elements internal to the burner body. These mixing elements are integrated into the stabilizer design resulting in a highly uniform, lean burning flame front.

Since the primary zone operates fuel lean, a burner centerline secondary fuel injector supplies fuel to the secondary combustion stage, bringing the overall fuel/air ratio close to stoichiometric conditions. The secondary fuel is injected at high velocity into the Products of Combustion (POC) in the primary combustion zone via a centerline fuel injector. Since the lean premix POC are lower in oxygen than the air in the furnace downcomer, the tendency to form NO_x is reduced. The high velocity injection also provides rapid mixing, a compact secondary fuel flame envelope, and reduced in-flame residence time before combustion is complete. Injecting the secondary fuel at the centerline of the burner prevents interferences from the downcomer air. The reduced residence time also reduces the potential for NO_x emissions because the NO_x reaction does not have time to proceed farther toward equilibrium.

In summary, the new natural gas combustion chamber design is comprised of two parts:

(1) A combustion chamber specifically designed to provide the proper combustion conditions for LE ultra low NO_x burners. The combustion chamber allows the combustion to take place at low oxygen levels and reduced combustion air temperatures.

(2) LE ultra low NO_x burners pre-mix air and fuel to achieve optimal air-fuel mixtures prior to combustion. Pre-mix burners have lower NO_x emission rates than staged burners that inject air and fuel in the combustion zone of the burner. The LE ultra low NO_x burners could not achieve the proposed level of NO_x control if installed directly in the induration furnace or in the recoup air duct feeding the furnace because the oxygen concentrations and combustion air temperature at these locations cannot be controlled at the levels needed for ultra low NO_x burners to effectively minimize NO_x emissions.

Low NO_x Burners (LNB) and Ultra Low NO_x Burners (ULNB)

LNB technology utilizes advanced burner design to reduce NO_x formation through the restriction of oxygen, flame temperature, and/or residence time. LNB technology is a staged combustion process that is designed to split fuel combustion into two zones. In the primary zone, NO_x formation is limited by either one of two conditions; rich or lean fuel. Under a rich (high fuel) condition, oxygen levels and flame temperatures are low resulting in less NO_x formation. The primary zone is then followed by a secondary zone in which the incomplete combustion products formed in the primary zone act as reducing agents.

LNB technology reduces the formation of NO_x during fuel combustion, rather than remove it after formation as do other control devices. LNB are more reliable than other control devices because there are no added pieces of equipment to operate, maintain, or malfunction. LNB do not use additional electricity nor do they generate any wastewater or solid waste streams. They do have the disadvantage that they are not as thermally efficient as standard burners when considering only the thermal requirements and not considering the overall energy (thermal and electrical) as compared to a standard burner technology and the electricity used by a control device and the treatment of wastewater and solid waste disposal.

Second generation low NO_x burners are called Ultra Low NO_x Burners (ULNB). These burners achieve further NO_x reductions by the following techniques:

- Recirculating firebox flue gas within the burner to accomplish the same effect as external flue gas recirculation. Recirculation can be convectively induced or mechanically induced via fuel pressure.

- Tertiary fuel staging to improve upon staged combustion techniques used in standard low NO_x burners

Low Temperature Oxidation (LoTOx)

BOC Gases' LoTOx is a low temperature oxidation NO_x control system. LoTOx technology is an add-on NO_x control system, which uses ozone to oxidize NO to NO_2 and NO_2 to N_2O_5 prior to removal in a wet scrubber (absorber). The N_2O_5 is converted to HNO_3 in the scrubber and may be treated with lime or caustic. The same scrubber may also be used for particulate and/or SO_2 removal. Ozone for LoTOx is generated onsite with an electrically powered ozone generator. The ozone generation rate is controlled to match the amount needed for NO_x control. Ozone is generated from pure oxygen. In order for LoTOx to be economically feasible, a source of low cost oxygen must be available from a pipeline or onsite generation.

The LoTOx chemical reactions are as follows:

$NO + O_3 \rightarrow NO_2 + O_2$ (1)

$NO_2 + O_3 \rightarrow NO_3 + O_2$ (2)

$NO_3 + NO_2 \rightarrow N_2O_5$ (3)

$N_2O_5 + H_2O \rightarrow 2HNO_3$ (4)

$HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$ (5)

The normal NO_x control efficiency range for LoTOx is 80 to 95 percent with outlet NO_x concentrations limited to no lower than 15 ppm to 25 ppm range due to chemical reaction constraints. When LoTOx is in use, scrubber water blowdown contains high levels of nitrates which typically require treatment before the water can be reused or discharged.

Selective Catalytic Reduction (SCR)

SCR is a post combustion NO_x control technology in which ammonia (NH_3) is injected into the flue gas stream in the presence of a catalyst. SCR control efficiency is typically 70 to 90 percent. NO_x is removed through the following chemical reaction:

$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$ (1)

$2NO_2 + 4NH_3 + O_2 \rightarrow 3N_2 + 6H_2O$ (2)

The catalyst bed lowers the activation energy required for NO_x decomposition. The SCR catalyst typically contains vanadium pentoxide as the catalytic agent. However, other metallic compounds may be used in special circumstances. These materials are used for their ability to lower the activation energy required for NO_x decomposition reaction. SCR requires an optimum temperature range of 570°F to 850°F.

Regenerative Selective Catalytic Reduction (RSCR)

RSCR is an energy efficient control technology that uses a catalytic reduction process similar to SCR to remove NO_x from the flue gas. RSCR has a NO_x control efficiency of approximately 75 percent. The goal of the RSCR system is to combine the heat recovery, temperature control, and catalyst elements of the SCR process into a single unit so that SCR technology can be used in low temperature applications. Similar to the SCR technology, RSCR uses a reagent and catalyst to reduce NO_x to N_2 and H_2O through the following chemical reaction:

$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$ (1)

$2NO_2 + 4NH_3 + O_2 \rightarrow 3N_2 + 6H_2O$ (2)

RSCR is a “tail end” SCR that is located after the particulate control device, where temperatures are between 100°F and 200°F. Because this temperature is below the required temperature for SCR catalyst operation, the flue gas temperature must be re-heated to reach catalyst operating temperatures. Tail end SCR systems typically employ special SCR catalysts which operate at temperatures between 400°F and 540°F (Johnson Matthey Catalysts, April 2, 2011 McIlvaine webinar presentation). The Babcock Power RSCR system is designed to operate at 465°F. Temperature elevation takes place in the RSCR, where a regenerative heater (RH) is used. The RH uses beds of ceramic media to achieve thermal efficiencies of >95 percent. Because the ceramic heat recovery beds are critical to RSCR operation, high efficiency particulate controls must be used upstream of the RSCR system. Otherwise, PM in the off-gas could foul or plug up the ceramic heat recovery bed or poison the RSCR catalyst.

Due to the nature of the regenerative heat recovery system, a fraction of the uncontrolled NO_x bypasses the catalyst when the RSCR system switches beds as part of the regenerative heat recovery process. The preheat bed on the inlet side of the RSCR cools off as cold gas passes through it. Once the preheat bed temperatures are reduced below temperatures needed for effective NO_x control; the preheat bed must be switched to a position where it can be reheated. When the RSCR system switches this bed from gas preheat to heat recovery, gas flow in the bed is reversed and NO_x in the bed which has not reached the SCR catalyst is flushed out of the bed as uncontrolled NO_x emissions. This effectively creates a bypass of the catalyst which would not occur in a standard SCR system under normal operating conditions.

Catalyst temperatures in an RSCR will vary as the bed temperatures cycle with the regenerative heat recovery process. Some of the catalyst particles in the bed may be outside of optimal catalyst operating temperature range at the beginning and end of the regenerative heat recovery cycles, diminishing effectiveness.

RSCR is supplementally heated to maintain operating temperatures by a direct fired gas burner. NO_x emissions from the gas burner add to the total NO_x which must be controlled within the RSCR system to meet the overall NO_x control efficiency of the RSCR controls. In other words, the RSCR catalyst must control more NO_x than a standard SCR reactor system to achieve the same control efficiency. These emissions would not be present in a standard SCR reactor system because no direct fired burners are used in a standard SCR system.

Selective Non-Catalytic Reduction (SNCR)

In the SNCR process, urea or ammonia-based chemicals are injected into the flue gas stream to convert NO to molecular nitrogen (N_2) and water. SNCR control efficiency is typically 25 to 50 percent. Without the participation of a catalyst, the reaction requires a high temperature range to obtain activation energy. The relevant reactions are as follows:

$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$ (1)

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ (2)

At temperature ranges of 1,470°F to 1,830°F, reaction (1) dominates, and NO_x emissions are controlled. At temperatures above 2,000°F, reaction (2) will dominate, and the ammonia will decompose and increase NO_x emissions. Therefore, it is critical to inject the ammonia or urea reagent into a furnace or boiler in the 1,470°F to 1,830°F temperature range to ensure that NO_x emissions will be controlled.

Non-Selective Catalytic Reduction (NSCR)

NSCR system is a post combustion add-on exhaust gas treatment system. NSCR catalyst is very sensitive to poisoning by sulfur compounds. NSCR is usually applied primarily in natural gas combustion applications. NSCR is often referred to as “three-way conversion” catalyst because it simultaneously reduces NO_x, unburned hydrocarbons, and CO. Typically, NSCR can achieve NO_x emission reductions of 90 percent. In order to operate properly, the combustion process must be near stoichiometric conditions. Under this condition and in the presence of a catalyst, NO_x is reduced by CO, resulting in N_2 and CO_2. The most important reactions for NO_x removal are:

$2CO + 2NO \rightarrow 2CO_2 + N_2$ (1)

$[UBH] + NO \rightarrow N_2 + CO_2 + H_2O$ (2)

Induced Flue Gas Recirculation (IFGR)

Induced flue gas recirculation burners are low NO_x burners which are designed to draw flue gas into the burner to dilute the fuel. This further reduces flame temperature and NO_x formation over levels that can be achieved in a standard low NO_x burner.

External Flue Gas Recirculation (EFGR)

EFGR uses flue gas as an inert material to reduce flame temperatures. In an EFGR system, flue gas is collected from the heater or stack and returned to the burner via a duct and blower. The flue gas is mixed with the combustion air, and this mixture is introduced into the burner. The addition of flue gas reduces the oxygen content of the “combustion air” (air + flue gas) in the burner. The lower oxygen level in the combustion zone reduces flame temperatures, which in turn reduces NO_x emissions.

Low Excess Air (LEA)

LEA is a good combustion practice (GCP) for minimizing NO_x emissions. LEA is implemented by limiting the amount of air used in fuel combustion and by preventing air leaks into the furnace/boiler combustion zone. LEA reduces NO_x emissions by limiting the amount of oxygen in the combustion zone which can react with nitrogen to form NO_x.

Oxyfuel Combustion

Oxyfuel combustion is the use of pure oxygen instead of air for combustion. Using pure oxygen for combustion eliminates the presence of atmospheric nitrogen from the combustion process. Atmospheric nitrogen is the primary source of nitrogen for thermal NO_x formation. Use of pure oxygen in the combustion process leads to very high combustion temperatures, so oxyfuel combustion is limited to very high temperature applications like electric arc furnaces.

Combustion Design Controls

NO_X emissions are caused by oxidation of nitrogen gas in the combustion air during fuel combustion. This occurs due to high combustion temperatures and insufficiently mixed air and fuel in the cylinder where pockets of excess oxygen occur. These effects can be minimized through air-to-fuel ratio control, ignition timing reduction, and exhaust gas recirculation.

(a) <u>Induration Furnace (NO_x)</u>

Nitrogen oxides (NO_x) are formed by both the thermal oxidation of nitrogen in the combustion air and the reduction and subsequent oxidation of fuel bound nitrogen. Since the indurating furnace will be fired with natural gas, NO_x emissions due to fuel-bound nitrogen are negligible. Thermal oxidation is a function of the residence time, free oxygen, and peak temperature. The majority of NO_x emissions from a pellet plant are from thermal NO_x formation.

The majority of combustion zone gases, including NO_x, are emitted through the waste gas stack. The hood exhaust contains up to thirty percent of the NO_x due to leakage between induration furnace zones and the diversion of waste gas for temperature control.

The following new emission units associated with the induration furnace are subject to NO_x BACT requirements:

NO_x Emission Units Associated with the Induration Furnace		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust	EU014	SV013B

Existing NO_x BACT Determinations for Induration Furnaces
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these NO_x BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2002 to January 2012.

NO_x BACT Determinations – Induration Furnace					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 and Furnace Windbox Exhaust EU014 (combined)	NO_x: Low NO_x LE natural gas burners, 0.25 lb NO_x/MMBtu and 109 lb/hr	NI	BACT-PSD
		Note: 0.249 lb NO_x/MMBtu * 436 MMBtu/hr = 109 lb/hr NO_x This meets the most stringent BACT.			
Existing NO_x BACT Determinations – Induration Furnaces					

NO_x BACT Determinations – Induration Furnace					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Essar Steel Minnesota LLC: Nashwauk, MN	**Permit # 06100067-004 (5/10/2012)**	**Indurating Furnace - Hood and Waste Gas (combined) (624 st/hr pellets)**	**NO_x: Low NO_x burners, 0.25 lb/MMBtu, 135 lb/hr (3-hr rolling avg)**	**NI**	**BACT-PSD**
	Note: 135 lb/hr ÷ 542 MMBtu/hr = 0.249 lb NO_x/MMBtu				
U.S. Steel Corp - Keetac: Keewatin, MN	Permit # 13700063-004 (12/6/2011)	Grate Kiln – Indurator Waste Gas (450 t/hr pellets)	NO_x: High-efficiency wet scrubbers, 1975 lb/hr (1-hr avg), 1726 tons (180-day rolling sum)	NI	BACT-PSD
Cleveland - Cliffs, Inc. (Northshore Mining Co.): Silver Bay, MN	MN-0064/ 07500003-003 (3/22/2006)	Furnace 5 Hood Exhaust (Waste Gas #501, #502, #503) (160 LT/hr pellets)	NO_x: High-efficiency wet ESP, 0.13 lb/MMBtu, 0.072 lb/MMBtu (natural gas only)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (NO_x)

Low and Ultra Low NO_x Burners

In order for low and ultra low NO_x burners to function properly, the oxygen content in the combustion zone must be limited to 2% to 3% oxygen. In straight grate induration furnaces, burners are typically mounted in the duct work which transfers preheated air from the pellet cooler to the pellet firing zone of the furnace. Under these conditions, the oxygen concentrations at the burner are at 15% to 20% oxygen. This is far too high for a low NO_x burner to operate properly. In addition, the combustion air is very hot (1,500°F to 1,600°F). This further degrades low and ultra low NO_x burner performance. For all practical purposes, low and ultra low NO_x burners are infeasible in this application unless the gas combustion system is completely re-designed. The issues that make low NO_x burners infeasible in standard installation have been addressed in the proposed burner design, which is why they are considered to be feasible as part of the "New Natural Gas Combustion Chamber Design", as discussed in Step 4 of this BACT determination.

Low Temperature Oxidation (LoTOx)

LoTOx is considered to be a technically feasible control option if the concentration in the stream to be treated is greater than 15 – 25 ppm which is the lowest concentration that LoTOx can reach. The NO_x concentration at the hood exhaust is 18 ppm, which is near the bottom of the range for the minimum achievable outlet concentration for LoTOx. For this reason, LoTOx is considered technically infeasible at the hood exhaust.

Selective Catalytic Reduction (SCR)

In evaluating the technical feasibility of SCR, two potential locations were evaluated in the pelletizing furnace where SCR could potentially be installed to control NO_x emissions in the waste gas stream:

(1) In the recuperative heat recovery system duct between the pellet firing zone and drying/preheating zones, and

(2) Downstream of particulate emission controls.

<u>SCR Installation In Heat Recovery System Duct</u>

Waste gases exiting the bottom of the grate in the combustion zone of the induration furnace are below the temperatures needed to operate an SCR reactor. The normal SCR operating temperature window is 600ºF – 800ºF and the minimum temperature that the newer low

temperature catalysts can operate at is 400ºF – 600ºF. The operating temperature of SCR is 1,500ºF – 2,000ºF. Therefore, the gas would need to be re-heated before SCR would work. In addition only a portion of the waste gas exhaust could be treated, thus reducing the overall effectiveness. Reheating the exhaust would require additional natural gas combustion that would generate additional NO_x and GHG emissions.

During previous permitting exercises, one pelletizing furnace vendor developed a conceptual design for application of SCR downstream of the combustion zone. The conceptual design balances treatment of NO_x emissions with the additional amount of fuel required. This is accomplished by applying SCR to only portions of the waste gas exhaust from windboxes that are at higher temperatures. In addition, the flows from the firing and post-firing windbox sections of the pelletizer would be rearranged in a manner that would recover part of this energy and thereby minimizes the amount of additional fuel that would be needed by recovering part of this energy. However, a duct burner would still be required to bring the waste gas temperature up to SCR operating conditions. The NO_x generated by the duct burner would also have to be treated by the SCR unit. The waste gas exhaust from the cooler windboxes, which would normally be routed with the waste gas exhaust, would not be treated for NO_x. This reduces the overall efficiency of SCR compared to other technologies that are able to treat the entire waste gas exhaust stream.

Regardless of whether the temperature requirements for SCR can be met, there are additional technical unknowns associated with its application to an iron oxide pellet plant indurating furnace. SCR requires the use of a catalyst. There is the potential for catalyst deactivation by catalyst poisons in the iron oxide pellet dust and corrosion/plugging problems in the pellet drying and preheat zones of the furnace caused by ammonium sulfate salts. Ammonia slip (un-reacted ammonia) would react with sulfur dioxide to form ammonium sulfate salts. These compounds are gummy and corrosive. If present in sufficient quantities, sulfur oxides and excess ammonia from the SCR system may react to form enough ammonium sulfate compounds to have an adverse effect on the pellet drying and preheat sections of the indurating furnace. Therefore, use of SCR in the recuperative heat recovery system duct between the pellet firing zone and the pellet drying/ preheating zone is not technically feasible.

<u>SCR Installation Downstream of Other Air Pollution Control Equipment</u>

The second potential alternative for application of SCR is to install it downstream of the other pollution control equipment for the pellet plant. To do this, the waste gas stream would require re-heating the gas to SCR catalyst operating temperatures. Re-heating the waste gas pollution control exhaust for SCR would require an excessive amount of energy. Use of a regenerative SCR system is discussed as an energy efficient option to SCR with re-heat in the following section.

A potential source of energy for re-heating the exhaust gases would be to recover the heat from a hot waste gas stream elsewhere in the plant. The DRI reformer heater exhaust already includes a heat recovery system and is not available for this service. The EAF exhaust is too dust laden before the baghouse system and too cold after the baghouse. The tunnel furnace exhaust is hot enough, but will be located about 2,200 feet from the pellet plant; this is too far from the pellet plant to feasibly run a large diameter refractory lined duct. In addition, the tunnel furnace and the EAFs have cyclic operating patterns, so it would not be feasible to provide the steady flow of heat needed to operate an SCR system. Due to the infeasibility of the above options for re-heating the exhaust streams, installation of SCR downstream of the other air pollution control devices would require a standalone re-heat system located at the SCR.

For purposes of this BACT report, a SCR system that includes a stand-alone reheat system will be considered technically feasible for the hood exhaust. However, there are drawbacks to installation of this type of reheat system. Due to the re-heating requirement, natural gas must be supplied to the system. As with any combustion source, there will be some collateral air

emissions (NO_x and GHG) that occur due to natural gas combustion. Additionally, this type of system significantly increases the control cost.

Selective Non-Catalytic Reduction (SNCR)

SNCR is not a feasible option for the pellet plant as there is no location in the flue gas circuit where the temperatures are suitable for the installation of reagent injection nozzles. SNCR injection points must be at 1,600ºF - 2,000ºF to achieve NO_x control. The combustion zone temperature of the indurating furnace is 2,400ºF. Gases leaving the pellet firing zone grates are only 258ºF - 320ºF, well below the SNCR temperature window. In addition, ammonia slip would react with sulfur dioxide to form ammonium sulfate salts. These compounds are gummy and corrosive. If present, they would have an adverse effect on the pellet drying and preheat sections of the indurating furnace.

A potential alternative for application of SNCR is to install it downstream of the other pollution control equipment for the pellet plant. To do this, the waste gas stream would require re-heating up to SNCR catalyst operating temperatures. Reheating the waste gas for SNCR would require an inordinate amount of energy.

Non Selective Catalytic Reduction (NSCR)

NSCR is not feasible in this application due to the concentrations of sulfur dioxide in the hood exhaust. EMx™ is an NSCR catalytic NO_x control system used in industrial applications such as natural gas fired combustion turbines. The EMx™ NSCR catalyst is coated with potassium carbonate. NO_x is captured on the catalyst when the NO_x reacts with the potassium carbonate to form potassium nitrites. When the catalyst is regenerated, the NO_x captured in the potassium nitrates and nitrites is converted to N_2, and the potassium nitrates and nitrites are converted back to potassium carbonate. If SO_2 is present in the gas stream, it reacts with the potassium carbonate to form potassium sulfate. Potassium sulfate cannot be removed from the catalyst during catalyst regeneration, and catalyst activity is reduced over time.

Although the GSA SO_2 control system is expected to reduce SO_2 concentration to 5 ppm or less, this amount of SO_2 is still too high to be considered for successful application of NSCR. NSCR was rejected as technically infeasible for several projects with similar levels of SO_2:

(1) NSPS Subpart Ja limits the SO_2 concentration in new gas fired heaters and boilers at petroleum refineries to 8 ppm on an annual basis. Even at this level of SO_2 control, NSCR was determined to be technically infeasible for NO_x control in February 2009 for the Conoco Phillips refinery in Ponca City, Oklahoma; in March 2009 for the Hyperion Refinery in Union County, South Dakota; and in March 2009 for the Los Angeles Tesoro refinery.

(2) NSCR was determined to be technically infeasible for the Grays Harbor Energy LLC Statsop Combustion Turbine Project in August 2005 because of the high levels of sulfur in the natural gas available to the facility in Elma, Washington.

(3) In June 2008, NSCR was determine to be technically infeasible for the Medicine Bow Fuel and Power coal gasification and liquefaction plant because NSCR has not been demonstrated to be successful at combustion turbines firing treated syngas.

Induced and External Flue Gas Recirculation (FGR)

In the induration process, it would be unacceptable to reroute the flue gas to the combustion zone since this would lower the optimal temperature range needed for pellet induration. Pellets must be held at an optimum temperature (2400°F - 2450°F), in the presence of excess oxygen, for a sufficient time to allow oxidation to reach the pellet center and allow realignment of the iron oxide

molecules in the microstructure of the pellet to form a strong pellet that meets product specifications.

Another factor affecting the feasibility of FGR is the high levels of oxygen in the pelletizer furnace. Normally flue gas is inert and has low levels of oxygen (2% - 3%). At these levels, flue gas injected into the combustion zone of a burner effectively dilutes the combustion reactants (fuel and air) so the flame temperature can be lowered for NO_x control. Pelletizer flue gas has approximately 12% - 15% oxygen. At these levels, injection of flue gas into the burner combustion zone would be more like adding combustion air into the flame instead of an inert gas. Therefore, flame temperatures cannot be effectively controlled using pelletizer flue gas in FGR.

Low Excess Air (LEA)

Low excess air operation is not feasible in the indurating furnace because the pelletizer must be operated with high oxygen levels in order to achieve complete pellet oxidation. These oxygen levels are much higher than LEA controls would permit.

Oxyfuel Combustion

Oxyfuel combustion is not feasible in this application due to the high temperatures associated with oxyfuel combustion. Oxyfuel combustion produces flame temperatures which are similar to temperatures in oxy-acetylene torches (~6000°F) used for cutting metal. These temperatures would exceed the maximum allowable temperatures of the steel and refractory materials normally used to construct induration furnaces.

Clean Fuels

NO_x is the only pollutant that would potentially benefit from the combustion of solid fuel in the indurating furnace. Solid fuels have resulted in lower NO_x emission in existing iron ore furnaces. However, NO_x emissions from the Magnetation furnace with the new natural gas combustion chamber and LE burners is expected to result in lower emissions than has been achieved in existing iron ore furnaces using solid fuel burner designs. Solid fuels have been determined to be technically infeasible for burner fuel for the proposed Magnetation straight-grate furnace; in order to accommodate solid fuels as burner fuel in the indurating furnace, a complete redesign of the furnace would be required.

Good Design Methods and Operating Practices

It is feasible to design, operate, and maintain the induration furnace in a manner which minimizes waste gas bypasses to the hood exhaust within product quality and production constraints. The proposed induration furnace for Magnetation includes a newly designed natural gas combustion chamber equipped with premix ultra-low NO_x burners (LE burners). The new combustion chamber and low NO_x LE burners are estimated to emit 90% less NO_x than the current direct fired burner systems used in straight grate furnaces. Standard burners typically emit NO_x at a rate of 4 lb NO_x/MMBtu. The LE burners are expected to emit NO_x at a rate of 0.25 lb NO_x/MMBtu. The new design includes a separation combustion chamber for the burner which facilitates controlled combustion conditions, premix ultra-low NO_x burners, and a system for controlling combustion air temperatures.

Additionally, the design of the induration furnace include a number of heat recovery aspects. Pellet drying and preheating are accomplished using waste heat from other sections of the induration furnace. Air and induration furnace flue gas flows through the furnace have been designed to recover as much heat as possible via recuperative heat exchange. Using heat recovery techniques allows the facility to minimize fuel usage, and because NO_x emissions are directly related to fuel combustion, improvements in heat recovery design can also reduce the generation of NO_x emissions.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (NO_x)

The proposed indurating furnace is designed to operate on natural gas as an external fuel and coke breeze, which is added to the raw materials. Therefore, use of natural gas as a clean fuel as well as good design methods and operating practices will be implemented regardless of the NO_x control system selected.

Induration Furnace Hood Exhaust
The control technologies for the induration furnace hood exhaust are ranked as follows:

(1) Selective Catalytic Reduction (SCR) with Reheat: 2-3 ppm

(2) Regenerative Selective Catalytic Reduction (RSCR): 2-3 ppm

Although RSCR is being considered as technically feasible for the hood exhaust, there are a number of concerns associated with this control option. Installation of RSCR would require pilot testing at the Magnetation facility. This technology has not been installed at this type of facility. Installation of this technology would be a first time occurrence and therefore would be considered a technology transfer.

The control effectiveness for RSCR listed above represents the expected control efficiency based on incorporation of the new natural gas combustion chamber design with LE burners in the induration furnace at an emission rate of 0.25 lb NO_x/MMBtu. It was assumed that an RSCR could achieve an outlet concentration of 2-3 ppm NO_x on the hood exhaust; actual outlet concentrations may be higher.

Induration Furnace Windbox Exhaust
The control technologies for the induration furnace windbox exhaust are ranked as follows:

(1) Selective Catalytic Reduction (SCR) with Reheat: 4 ppm

(2) Regenerative Selective Catalytic Reduction (RSCR): 6 ppm (75% control efficiency)

(3) LoTOx: 15 – 25 ppm

Although LoTOx and RSCR are being considered as technically feasible for the windbox exhaust, there are a number of concerns associated with each of these control options. Installation of LoTOx and/or RSCR would require pilot testing at the Magnetation facility. Neither of these technologies have been installed at this type of facility. Installation of these technologies would be a first time occurrence and therefore would be considered technology transfers.

The control effectiveness for LoTOx and RSCR listed above represents the expected control efficiency based on incorporation of the new natural gas combustion chamber design with LE burners in the induration furnace at an emission rate of 0.25 lb NO_x/MMBtu. For example, LoTOx has an estimated minimum achievable outlet concentration of 15 ppm – 25 ppm, so when the uncontrolled NO_x emission rate gets close to that level, the control effectiveness is reduced. It was assumed that an RSCR could achieve an outlet concentration of 6 ppm NO_x, a 75% control efficiency was utilized for the control cost calculations. Actual outlet concentrations may be higher.

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (NO_x)

The emissions control effectiveness of the NO_x control technologies were evaluated for consideration as BACT. The control cost analyses for the control options are summarized in Appendix C of this TSD. Note that control costs represented are calculated assuming an inherent

0.25 lb NO_x/MMBtu control due to the design of the natural gas combustion chamber and low NO_x LE natural gas burners for the proposed furnace.

Hood Exhaust – NOx Controls		
Technology	**NO_x Control Cost ($/ton)**	**Corresponding Appendix C Cost Tables**
Regenerative Selective Catalytic Reduction (RSCR)	$298,097	A-5a
Selective Catalytic Reduction (SCR) with Reheat	$327,123	A-6a
Windbox Exhaust – NO_x Controls		
Technology	**NO_x Control Cost ($/ton)**	**Corresponding Appendix C Cost Tables**
Regenerative Selective Catalytic Reduction (RSCR)	$18,088	A-9a
Selective Catalytic Reduction (SCR) with Reheat	$24,299	A-10a
LoTOx	$28,257	A-8a

LoTOx, SCR plus reheat and RSCR are considered to be economically infeasible for NO_x control from the windbox exhaust. In addition to the high control cost of SCR plus reheat, there are collateral NO_x and GHG emissions from the natural gas combustion that is required to re-heat the exhaust streams. The required natural gas usage for re-heating the windbox stream is 34.44 million cubic feet of natural gas per year. This additional natural gas combustion results in an additional 1.62 tpy of NO_x and 2,055 tpy of GHG from the windbox exhaust. Although the regenerative heat recovery system in RSCR is a relatively efficient way to employ SCR NO_x controls, it still requires additional natural gas to operate. The estimated annual natural gas consumption rate for the waste gas stream is 78.15 million cubic feet of natural gas per year. This additional gas combustion will also lead to additional GHG emissions.

The only remaining technically feasible NO_x control technology is good design methods and operating practices including the new natural gas combustion chamber design with LE burners. Because this control option is inherent to the proposed process, there are no adverse operational impacts associated with implementation of this control option. There may be a slight energy penalty associated with use of the low LE NO_x burner system. The LE burners do not use 100% preheated combustion air. This is done to minimize flame temperatures for NO_x control.

BACT Proposal – Induration Furnace Hood Exhaust and Windbox Exhaust (NO_x)

BACT for the NO_x emissions from the induration furnace hood exhaust and windbox exhaust has been proposed to be as follows:

(1) The proposed BACT NO_x emission control system is good design methods and operating practices including the new natural gas combustor design with LE burners for NO_x emitted from the hood exhaust stream. The induration furnace design will include use of low NO_x natural gas combustors (i.e., LE burners).

(2) The proposed NO_x BACT limits for the induration furnace are 0.25 lb NO_x/MMBtu and 109 lb/hr for the combined NO_x emissions from the hood exhaust and windbox exhaust. The BACT performance standard of 0.25 lb NO_x/MMBtu is the expected level of performance achievable based on BACT reports from other similar induration furnaces. NO_x BACT limits for the combined emissions from the hood exhaust and windbox exhaust streams are proposed because all NO_x emissions are from natural gas combustion in the firing section of induration furnace.

Step 5: Select BACT - Induration Furnace (NO_x)

A detailed NO_x BACT for the induration furnace is given in the BACT Conclusion for NO_x.

(b) Combustion Units (NO_x)

The following emission units associated with combustion processes are subject to NO_x BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (NO_x)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (NO_x)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these NO_x BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for natural gas fired generators only used for emergency purposes.

NO_x BACT Determinations - Emergency Generator					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	NO_x: Use of natural gas, good combustion practices, 0.50 g/hp-hr, 500 hours/year	NI	BACT-PSD
Existing NO_x BACT Determinations - Emergency Generators					
VC Energy LLC (Midland Power Station).: Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	NO_x: Certified to meet NSPS Subpart JJJJ, 0.50 g/hp-hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (722 hp)	NO_x: SCR/oxidation catalyst system, 0.21 g/hp-hr, 50 hours/yr	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	NO_x: Use of pipeline quality natural gas, 9.2 g/kw-hr, 200 hours/yr	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	NO_x: Use of pipeline quality natural gas, 6.4 g/kw-hr, 200 hours/yr	NI	BACT-PSD

NO_x BACT Determinations - Emergency Generator					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
Consumers Energy (White Pigeon): White Pigeon, MI	MI-0390/ 137-08 (11/24/2008)	Emergency Generator 1,383 kw (1,818 hp)	NO_x: 0.50 g/bhp-hr	NI	BACT-PSD
Gulf Crossing Pipeline: Sterlington, LA	LA-0232/ PSD-LA-729 (6/24/2008)	Emergency Backup Generator 637 kw (838 hp)	NO_x: Use of natural gas, good combustion practices, 4.80 lb/hr, 1.20 tons/yr	NI	BACT-PSD
Dominion Point Cove: Lusby, MD	MD-0036/ CPCN 9055 (3/10/2006)	Emergency Generator 637 kw (838 hp)	NO_x: Use of natural gas, good combustion practices, 2.00 g/bhp-hr, 200 hours/year	NI	BACT-PSD
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	NO_x: Three way catalyst, 2.13 g/bhp-hr, 200 hours/year	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (NO_x)

Selective Catalytic Reduction (SCR) process involves the mixing of anhydrous or aqueous ammonia vapor with flue gas and passing the mixture through a catalytic reactor to reduce NO_X to water and N_2. Under optimal conditions, SCR has a removal efficiency up to 90% when used on steady state processes. The efficiency of removal will be reduced for processes that are not stable or require frequent changes in the mode of operation. The most important factor affecting SCR efficiency is temperature. SCR can operate in a flue gas window ranging from 480°F to 800°F, although the optimum temperature range depends on the type of catalyst and the flue gas composition. In this particular service, the minimum target temperature is approximately 750°F. Temperatures below the optimum decrease catalyst activity and allow NH_3 to slip through; above the optimum range, ammonia will oxidize to form additional NO_x. SCR efficiency is also largely dependent on the stoichiometric molar ratio of NH_3:NO_x; variation of the ideal 1:1 ratio to 0.5:1 ratio can reduce the removal efficiency to 50%. Unreacted reagent may form ammonium sulfates which may plug or corrode downstream equipment. Particulate-laden streams may blind the catalyst and may necessitate the application of a sootblower. Therefore, while catalyst reduction control systems are technically feasible (see RBLC ID# CA-1192 and CA-1132), they are not optimally technically feasible as shown by the majority of the RBLC determinations above and can be eliminated as part of this review.

With selective non-catalytic reduction (SNCR), NO_x is selectively removed by the injection of ammonia or urea into the flue gas at an appropriate temperature window of 1600°F to 2100°F and without employing a catalyst. Similar to SCR without a catalyst bed, the injected chemicals selectively reduce the NO_x to molecular nitrogen and water. This approach avoids the problem related to catalyst fouling, but the temperature window and reagent mixing residence time is critical for conducting the necessary chemical reaction. At the proper temperature, urea decomposes to produce ammonia which is responsible for NO_x reduction. At a higher temperature, the rate of a competing reaction for the direct oxidation of ammonia that actually forms NO_x becomes significant. At a lower temperature, the rates of NO_x reduction reactions become too slow resulting in urea slip (i.e. emissions of unreacted urea). Optimal implementation of SNCR requires the employment of an injection system that can accomplish thorough reagent/gas mixing within the temperature window while accommodating spatial and production rate temperature variability in the gas stream. The attainment of maximum NO_x control performance therefore requires that the source exhibit a favorable opportunity for the application of this technology relative to the location of the reaction temperature range.

Also, U.S. EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (NO_x)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Combustion design controls

(2) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (NO_x)

The natural gas fired emergency generator (EU017) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour, grams per horsepower-hour, and/or pounds per hour of NO_x. Grams per power-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 6.4 g/kw-hr and 9.2 g/kw-hr, which correspond to the NO_x standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Table 1) beginning in model year 2007. The emission standards given in the review also listed 0.50 g/hp-hr, which correspond to the NO_x standards for compression ignition engines in 40 CFR 60, Subpart JJJJ.

NO_x BACT for the natural gas fired emergency generator has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 0.50 g/hp-hr for the proposed generator. This is consistent with other recent BACT determinations for emergency natural gas fired generators in the same size category.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (NO_x)

A detailed NO_x BACT for the natural gas fired emergency generator is given in the BACT Conclusion for NO_x.

(2) Natural Gas Fired Fire Pump (NO_x)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (NO_x)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these NO_x BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps that are only natural gas fired. There are no current listings in the RBLC for natural gas fired fire pumps; therefore, a second review of the RBLC was performed for similar natural gas fired internal combustion engines, primarily natural gas fired emergency generators.

NO_x BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	NO_x: Use of natural gas, good combustion practices, 0.50 g/hp-hr, 500 hours/year	NI	BACT-PSD
Existing NO_x BACT Determinations – Emergency Generators					
VC Energy LLC (Midland Power Station).: Midland, MI	MI-0401/ 24-11B (12/21/2011)	Emergency Generator 1,200 kw (1,576 hp)	NO_x: Certified to meet NSPS Subpart JJJJ, 0.50 g/hp-hr	NI	BACT-PSD
Avenal Power Center: Kettleman City, CA	CA-1192/ SJ 08-01 (6/21/2011)	Emergency IC Engine 550 kw (722 hp)	NO_x: SCR/oxidation catalyst system, 0.21 g/hp-hr, 50 hours/yr	NI	BACT-PSD
Allegheny Ludlum Corp.: Brackenridge, PA	PA-0274/ 0059-I008 (2/16/2010)	Emerg. Generator #1 2,250 kw (3,015 hp)	NO_x: Use of pipeline quality natural gas, 9.2 g/kw-hr, 200 hours/yr	NI	BACT-PSD
		Emerg. Generator #2 1,000 kw (1,340 hp)	NO_x: Use of pipeline quality natural gas, 6.4 g/kw-hr, 200 hours/yr	NI	BACT-PSD
		There is no documented basis to include the annual operational limit as part of the BACT. The 200 hr/yr limit is only to limit the PTE of the unit.			
Consumers Energy (White Pigeon): White Pigeon, MI	MI-0390/ 137-08 (11/24/2008)	Emergency Generator 1,383 kw (1,818 hp)	NO_x: 0.50 g/bhp-hr	NI	BACT-PSD
Gulf Crossing Pipeline: Sterlington, LA	LA-0232/ PSD-LA-729 (6/24/2008)	Emergency Backup Generator 637 kw (838 hp)	NO_x: Use of natural gas, good combustion practices, 4.80 lb/hr, 1.20 tons/yr	NI	BACT-PSD
Dominion Point Cove: Lusby, MD	MD-0036/ CPCN 9055 (3/10/2006)	Emergency Generator 637 kw (838 hp)	NO_x: Use of natural gas, good combustion practices, 2.00 g/bhp-hr, 200 hours/year	NI	BACT-PSD
City of Sacramento PW: Sacramento, CA	CA-1132/ 17661 (5/3/2004)	ICE: Emergency, Spark Ignition 310 bhp (236 kw)	NO_x: Three way catalyst, 2.13 g/bhp-hr, 200 hours/year	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (NO_x)

Selective Catalytic Reduction (SCR) process involves the mixing of anhydrous or aqueous ammonia vapor with flue gas and passing the mixture through a catalytic reactor to reduce NO_X to water and N_2. Under optimal conditions, SCR has a removal efficiency up to 90% when used on steady state processes. The efficiency of removal will be reduced for processes that are not stable or require frequent changes in the mode of operation. The most important factor affecting SCR efficiency is temperature. SCR can operate in a flue gas window ranging from 480°F to 800°F, although the optimum temperature range depends on the type of catalyst and the flue gas composition. In this particular service, the minimum target temperature is approximately 750°F. Temperatures below the optimum decrease catalyst activity and allow NH_3 to slip through; above the optimum range, ammonia will oxidize to form additional NO_x. SCR efficiency is also largely dependent on the stoichiometric molar ratio of NH_3:NO_x; variation of the ideal 1:1 ratio to 0.5:1 ratio can reduce the removal efficiency to 50%. Unreacted reagent may form ammonium sulfates which may plug or corrode downstream equipment. Particulate-laden streams may blind the catalyst and may necessitate the application of a sootblower. Therefore, while catalyst reduction control systems are technically feasible (see RBLC ID# CA-1192 and CA-1132), they are not optimally technically feasible as shown by the majority of the RBLC determinations above and can be eliminated as part of this review.

With selective non-catalytic reduction (SNCR), NO_x is selectively removed by the injection of ammonia or urea into the flue gas at an appropriate temperature window of 1600°F to 2100°F and without employing a catalyst. Similar to SCR without a catalyst bed, the injected chemicals selectively reduce the NO_x to molecular nitrogen and water. This approach avoids the problem related to catalyst fouling, but the temperature window and reagent mixing residence time is critical for conducting the necessary chemical reaction. At the proper temperature, urea decomposes to produce ammonia which is responsible for NO_x reduction. At a higher temperature, the rate of a competing reaction for the direct oxidation of ammonia that actually forms NO_x becomes significant. At a lower temperature, the rates of NO_x reduction reactions become too slow resulting in urea slip (i.e. emissions of unreacted urea). Optimal implementation of SNCR requires the employment of an injection system that can accomplish thorough reagent/gas mixing within the temperature window while accommodating spatial and production rate temperature variability in the gas stream. The attainment of maximum NO_x control performance therefore requires that the source exhibit a favorable opportunity for the application of this technology relative to the location of the reaction temperature range.

Also, U.S. EPA determined in the development of NSPS JJJJ that add-on controls are economically infeasible for emergency ICE.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (NO_x)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Combustion design controls

(2) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (NO_x)

The natural gas fired fire pump (EU018) will be subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. There are no current listings in the RBLC for natural gas fired fire pumps. Based on a review of the U.S. EPA RBLC and other Indiana permits for similar internal combustion engines, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. Most facilities express exhaust emission limitations in terms of grams per kilowatt-hour, grams per horsepower-hour, and/or pounds per hour of NO_x. Grams per power-hour is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The emission standards given in the review range between 6.4 g/kw-hr and 9.2 g/kw-hr, which correspond to the NO_x standards for compression ignition engines with a maximum engine power of greater than 560 kw (735 hp) in 40 CFR 89.112 (Table 1) beginning in model year 2007. The emission standards given in the review also listed 0.50 g/hp-hr, which correspond to the NO_x standards for compression ignition engines in 40 CFR 60, Subpart JJJJ.

NO_x BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 0.50 g/hp-hr for the proposed fire pump.

Step 5: Select BACT - Natural Gas Fired Fire Pump (NO_x)

A detailed NO_x BACT for the natural gas fired fire pump is given in the BACT Conclusion for NO_x.

(3) Natural Gas Fired Space Heaters and Air Heaters (NO_x)

The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (NO_x)

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these NO_x BACT determinations as provided by the RBLC. The search was limited to entries from January 2007 to January 2013 for space heaters, air heaters, and process heaters with a heat input capacity less than 50 MMBtu/hr that combust only natural gas.

NO_x BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	NO_x: Low-NO_x burners, good combustion practices, 0.05 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	NO_x: Low-NO_x burners, good combustion practices, 0.012 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	NO_x: Low-NO_x burners, good combustion practices, 0.05 lb/MMBtu	NI	BACT-PSD
Existing NO_x BACT Determinations - Heaters Firing Natural Gas					
Black Hills Power: Cheyenne, WY	WY-0070/ CT-12636 (8/28/2012)	Inlet Air Heater (EP06) (16.10 MMBtu/hr)	NO_x: Ultra low-NO_x burners, 4380 hours/yr, 0.012 lb/MMBtu and 0.20 lb/hr (3-hr avg), 0.40 tons/yr	NI	BACT-PSD
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	NO_x: 9.00 ppmvd @ 3% O_2 (3-hr avg)	NI	BACT-PSD
City of Victorville: Victorville, CA	CA-1191/ SE 07-02 (3/11/2010)	Auxiliary Heater (40 MMBtu/hr)	NO_x: 9.00 ppmvd @ 3% O_2 (3-hr avg)	NI	BACT-PSD
Lake Charles Cogeneration, LLC: Sulphur, LA	LA-0231/ PSD-LA-742 (6/22/2009)	Shift Reactor Startup Heater (34.20 MMBtu/hr)	NO_x: Good design and proper operation, 3.35 lb/hr	NI	BACT-PSD
Lake Charles Cogeneration, LLC: Sulphur, LA	LA-0231/ PSD-LA-742 (6/22/2009)	Gasifier Startup Preheater Burners (5) (35 MMBtu/hr)	NO_x: Good design and proper operation, 3.85 lb/hr	NI	BACT-PSD
Medicine Bow Fuel & Power: Medicine Bow, WY	WY-0066/ CT-5873 (3/4/2009)	Gasification Preheater 1 (21 MMBtu/hr)	NO_x: Low-NO_x burners, 500 hours/yr, 0.05 lb/MMBtu, 1.00 lb/hr, 0.30 tons/yr	NI	BACT-PSD
Pryor Plant Chemical: Oklahoma City, OK	OK-0135/ 2008-100-C PSD (2/23/2009)	Nitric Acid Preheaters #1, #3, and #4 (20 MMBtu/hr)	NO_x: Low-NO_x burners, good combustion practices, 0.98 lb/hr (168-hr rolling cumulative)	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P-2008.0066 (2/10/2009)	ASU Regen Heater (0.1 MMBtu/hr)	NO_x: Good combustion practices	NI	BACT-PSD
Southeast Idaho Energy, LLC: American Falls, ID	ID-0017/ P-2008.0066 (2/10/2009)	Gasifier Heaters (2) (25 MMBtu/hr)	NO_x: Good combustion practices	NI	BACT-PSD

NO_x BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
GP Clarendon LP: Manning, SC	SC-0115/ 0680-0046-CB (2/10/2009)	Natural Gas Space Heaters - 14 Units (ID 17) (20.89 MMBtu/hr)	NO_x: 1.99 lb/hr, 8.71 tons/yr	NI	BACT-PSD
GP Allendale LP: Fairfax, SC	SC-0114/ 0160-0020-CB (11/25/2008)	Natural Gas Space Heaters - 14 Units (ID 18) (20.89 MMBtu/hr)	NO_x: 1.99 lb/hr, 8.71 tons/yr	NI	BACT-PSD
Consumers Energy: White Pigeon, MI	MI-0390/ 137-08 (11/24/2008)	Heater (3 MMBtu/hr)	NO_x: Low-NO_x burners, 0.025 lb/MMBtu	NI	BACT-PSD
Competitive Power Ventures: St. Charles, MD	MD-0040/ CPCN Case No. 9129 (11/12/2008)	Heater (1.7 MMBtu/hr)	NO_x: 0.10 lb/MMBtu	NI	BACT-PSD
Florida Power & Light: Loxahatchee, FL	FL-0303/ 0990646-002-AC (PSD-FL-396) (7/30/2008)	Natural Gas Fired Process Heaters (2) (10 MMBtu/hr)	NO_x: Good combustion practices, 0.095 lb/MMBtu	NI	BACT-PSD
Louisiana-Pacific Corporation: Sagola, MI	MI-0387/ 41-03F (1/31/2008)	Natural Gas Thermal Oil Heater (24 MMBtu/hr)	NO_x: Good combustion practices, 2.83 lb/hr	NI	BACT-PSD
Basin Electric Power Cooperative: Gillette, WY	WY-0064/ CT-4631 (10/15/2007)	Inlet Gas Heater (8.36 MMBtu/hr)	NO_x: Good combustion practices, 2000 hours/yr, 0.10 lb/MMBtu, 0.80 lb/hr, 1.00 tons/yr	NI	BACT-PSD
Celite: Vandenberg Village, CA	CA-1146/ ATC 12105A (6/11/2007)	Heater – Other Process (35 MMBtu/hr)	NO_x: 20.0 ppmvd @ 3% O_2 (6-min avg)	NI	BACT-PSD
Florida Power & Light: Loxahatchee, FL	FL-0286/ 0990646-001-AC (PSD-FL-354) (1/10/2007)	Natural Gas Fired Process Heaters (2) (10 MMBtu/hr)	NO_x: 0.095 lb/MMBtu	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (NO_x)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (NO_x)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Low NO_x burners

(2) Clean fuels

(3) Good combustion practices

(4) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (NO_x)

Based on a review of the RBLC, the primary control used for controlling NO_x emissions from natural gas fired space heaters or air heaters is low NO_x burners. Most facilities express emission limitations in terms of pounds per MMBtu and/or pounds per hour of NO_x. Pounds per

MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. Emission limits for PM (when converted for comparison) varied from 0.012 lb/MMBtu to 0.11 lb/MMBtu.

NO_x BACT for the space heaters and coke breeze additive system air heater (EU009) has been proposed to be the use of low NO_x burners along with the restricted use of only natural gas, the use of good combustion practices, and an emission limit of 0.05 lb/MMBtu for each of the proposed heaters.

NO_x BACT for the ground limestone/dolomite additive system air heater (EU010) has been proposed to be the use of low NO_x burners along with the restricted use of only natural gas, the use of good combustion practices, and an emission limit of 0.012 lb/MMBtu.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (NO_x*)*

A detailed NO_x BACT for natural gas fired heaters is given in the BACT Conclusion for NO_x.

BACT Conclusion for NO_x

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for NO_x emissions shall be as follows:

(a) Induration Furnace

The induration furnace operations shall be limited as follows:

(1) The NO_x emission control system is good design methods and operating practices including the new natural gas combustor design with LE burners for NO_x emitted from the hood exhaust and windbox exhaust streams. The induration furnace design will include use of low NO_x natural gas combustors (i.e., LE burners).

(2) The NO_x BACT limits for the induration furnace are 0.25 lb NO_x/MMBtu and 109 lb/hr for the combined NO_x emissions from the hood exhaust and windbox exhaust.

(b) Combustion Units

The combustion units shall be limited as follows:

(1) NO_x emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.50 g/hp-hr.

(2) NO_x emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 0.50 g/hp-hr.

(3) NO_x emissions from the space heaters (EU021 and coke breeze additive system air heater (EU009) shall each be controlled with the use of low NO_x burners along with the restricted use of only natural gas, the use of good combustion practices, and an emission limit of 0.05 lb/MMBtu.

(4) NO_x emissions from the ground limestone/dolomite additive system air heater (EU010) shall be controlled with the use of low NO_x burners along with the restricted use of only natural gas, the use of good combustion practices, and an emission limit of 0.012 lb/MMBtu.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (BACT) with regards to NO_x.

Fluoride (F) BACT

The fluoride BACT analysis is divided into two categories: material handling and induration furnaces.

Step 1 of the BACT process is shown below for this fluorides BACT analysis to describe general fluoride control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific fluoride control devices may be discussed in individual BACT analyses. A summary of the fluoride BACT determinations is provided at the end of this section.

Step 1a: Identify Potential Control Technologies (Particulate Fluorides)

Fluoride emissions will be controlled with particulate matter emission controls on sources where fluorides are emitted as dust. Fluoride salts are present in trace quantities in iron concentrate. These salts are emitted as particulate matter along with ore dust during ore processing such as conveying. These salts can be controlled with the same piece of pollution control equipment as the particulate (PM) emissions.

Emissions of particulate matter (PM) are generally controlled with add-on control equipment designed to capture the emissions prior to the time they are exhausted to the atmosphere. In cases where the material being emitted is organic, particulate matter may be controlled through a combustion process. Generally, PM emissions are controlled through one of the following mechanisms:

(1) Mechanical collectors (such as cyclones or multiclones);

(2) Wet scrubbers;

(3) Electrostatic precipitators (ESP); or

(4) Fabric filter dust collectors (baghouses).

The choice of which technology is most appropriate for a specific application depends upon several factors, including particle size to be collected, particle loading, stack gas flow rate, stack gas physical characteristics (e.g., temperature, moisture content, presence of reactive materials), and desired collection efficiency. These control mechanisms are discussed further below:

Mechanical Collectors (such as Cyclones or Multiclones)

Mechanical collectors use the inertia of the particles for collection. The particulate-laden gas stream enters the control device and is forced to move in a cyclonic manner, which causes the particles to move toward the outside of the vortex. Most of the large-diameter particles enter a hopper below the cyclonic tubes while the gas stream turns and exits the device.

Cyclones are typically used to remove relatively large particles from gas streams. Conventional single cyclones are estimated to control PM at 70-90%, PM_{10} at 30-90% and $PM_{2.5}$ at 0-40%. High efficiency single cyclones are designed to achieve higher control of smaller particles and multiclones may also achieve higher control of smaller particles. Collection efficiency generally increases with particle size and/or density, inlet duct velocity, cyclone body length, number of gas revolutions in the cyclone, ratio of cyclone body diameter to gas exit diameter, dust loading, and smoothness of the cyclone inner wall. Cyclone efficiency will decrease with increases in gas viscosity, body diameter, gas exit diameter, gas inlet duct area, and gas density.

Cyclones are often used for recovery and recycling of material or as precleaners for more expensive final control devices such as fabric filters or electrostatic precipitators. Cyclones are used for applications such as after spray drying operations in the food and chemical industries; after crushing/grinding/calcining operations in the mineral and chemical industries to collect salable or useful material; for first stage control of PM from sinter plants, roasters, kilns, and furnaces in the metallurgical industries; for catalyst recycling in the fluid-cracking process; and for precleaning fossil-fuel and wood-waste fired industrial and commercial fuel combustion units.

The typical gas flow rates for a single cyclone are 1,060 to 25,400 scfm. Flows that are higher use multiple cyclones in parallel. Inlet gas temperatures are only limited by the material of construction of the cyclone. Cyclones perform more efficiently with higher pollutant loadings, with loadings typically ranging from 1.0 to 100 gr/scf). Cyclones are unable to handle sticky or tacky materials.

Wet Scrubbers

A wet scrubber is an air pollution control device that removes PM from waste gas streams primarily through the impaction, diffusion, interception and/or absorption of the pollutant onto droplets of liquid. The liquid containing the pollutant is then collected for disposal. There are numerous types of wet scrubbers that remove PM, including venturi, impingement and sieve plate, spray towers, mechanically aided, condensation growth, packed beds, ejector, mobile bed, caternary grid, froth tower, oriented fiber pad, and wetted mist eliminators. Collection efficiencies for wet scrubbers vary with the particle size distribution of the waste gas stream. In general, collection efficiency decreases as the PM size decreases. Collection efficiencies also vary with scrubber type. Collection efficiencies range from greater than 99% for venturi scrubbers to 40-60% (or lower) for simple spray towers. Wet scrubbers are smaller and more compact than baghouses or ESPs. They have lower capital costs and comparable operation and maintenance (O&M) costs. Wet scrubbers are particularly useful in the removal of PM with the following characteristics:

(1) Sticky and/or hygroscopic materials (materials that readily absorb water);

(2) Combustible, corrosive and explosive materials;

(3) Particles which are difficult to remove in their dry form;

(4) PM in the presence of soluble gases; and

(5) PM in waste gas streams with high moisture content.

Some applications of wet scrubbers include the following:

- Condensation scrubbers: for controlling fine PM-containing waste-gas streams.

- Fiber-bed scrubbers (wetted-fiber scrubbers or mist eliminators): for controlling aerosol emissions from chemical, plastics, asphalt, sulfuric acid, and surface coating industries; for controlling lubricant mist emission from rotating machinery and storage tanks; and for eliminating visible plume downstream of other control devices.

- Impingement-plate/tray-tower scrubbers: for the food and agriculture industry and at gray and iron foundries. These types of scrubbers may be used to control other pollutants such as SO_2, VOC, and HAPs in other settings.

- Mechanically-aided scrubbers: for food processing paper, pharmaceuticals, chemicals, plastics, tobacco, fiberglass, ceramics, and fertilizer. Processes controlled include dryers, cookers, crushing and grinding operations, spraying, ventilation, and material handling.

- Orifice scrubbers: for food processing and packaging; pharmaceutical processing and packaging; manufacture of chemicals, rubber and plastics, ceramics, and fertilizer. Processes controlled include dryers, cookers, crushing and grinding operations, spraying, ventilation, and material handling.

- Packed-bed/packed-tower wet scrubbers: for the chemical, aluminum, coke and ferroalloy, food and agriculture, and chromium electroplating industries.

- Spray-chamber/spray-tower wet scrubbers: often used as part of a flue gas desulfurization systems, where they are used to control emissions from coal and oil combustion from electric utilities and industrial sources.

- Venturi scrubbers: for controlling PM emissions from utility, industrial, commercial, and institutional boilers fired with coal, oil, wood, and liquid waste; for sources in the chemical, mineral products, wood, pulp and paper, rock products, and asphalt manufacturing industries; for lead, aluminum, iron and steel, and gray iron production industries; for municipal solid waste incinerators. They are typically used where it is necessary to obtain high collection efficiencies for fine PM.

The primary disadvantage of wet scrubbers is that increased collection efficiency comes at the cost of increased pressure drop across the control system. Another disadvantage is that they are limited to lower waste gas flow rates and temperatures than ESPs or baghouses. Current wet scrubber designs accommodate air flow rates over 100,000 actual cubic feet per minute and temperatures of up to 750°F. Another disadvantage is that they generate waste in the form of a sludge which requires treatment and/or disposal. Lastly, downstream corrosion or plume visibility problems can result unless the added moisture is removed from the gas stream.

Electrostatic Precipitators

An electrostatic precipitator (ESP) is a particle control device that uses electrical forces to move the particles out of the flowing gas stream and onto collector plates. The particles are given an electrical charge by forcing them to pass through a corona, a region in which gaseous ions flow. The electrical field that forces the charged particles to the walls comes from electrodes maintained at high voltage in the center of the flow lane.

Once the particles are collected on the plates, they must be removed from the plates without re-entraining them into the gas stream. This is usually accomplished by knocking them loose from the plates, allowing the collected layer of particles to slide down into a hopper from which they are evacuated. Some precipitators remove the particles by intermittent or continuous washing with water.

Dry-type ESPs are primarily used in the electric utility industry and may also be used by the textile industry, pulp and paper facilities, the metallurgical industry, cement and mineral industry, sulfuric acid manufacturing plants, as well as for coke ovens and hazardous waste incinerators. Dust characteristics are a limiting factor for dry-type ESPs. Sticky, moist, high resistivity, flammable, or explosive dusts and particles are not well-suited for dry-type ESPs. Wet ESPs are used in situations for which dry ESPs are not suited, such as when the material to be collected is wet, sticky, flammable, explosive, or has a high resistivity. Wet ESPs are commonly used by the textile industry, pulp and paper facilities, the metallurgical industry, and sulfuric acid manufacturing plants. The limiting factor for wet ESPs is temperature; typically wet ESPs cannot handle operating temperatures exceeding 170 °F.

ESP control efficiencies are very high and can range from 95% to 99.9% due to the strong electrical forces applied to small particles and can handle high temperatures (dry ESPs), pressures, and gas flow rates. The composition of the particulate matter is very important

because it influences the conductivity within the dust layers on the collection plate. Wet ESPs are effective at collecting sticky particles and mist, help to cool and condition gas streams, and may provide for control of other aerosolized pollutants in the gas stream. ESPs in general are not suited for use in processes which are highly variable because they are very sensitive to fluctuations in gas stream conditions (flow rates, temperatures, particulate and gas composition, and particulate loadings). They have high capital costs and require large installation space. Dry ESPs are not recommended for removing sticky or moist particles. Wet ESPs can have potential problems with corrosion and they generate a wastewater slurry that must be handled.

Fabric Filtration

A fabric filter unit consists of one or more isolated compartments containing rows of fabric bags in the form of round, flat, or shaped tubes, or pleated cartridges. Particle laden gas passes up (usually) along the surface of the bags then radially through the fabric. Particles are retained on the upstream face of the bags, and the cleaned gas stream is vented to the atmosphere. The filter is operated cyclically, alternating between relatively long periods of filtering and short periods of cleaning. During cleaning, dust that has accumulated on the bags is removed from the fabric surface and deposited in a hopper for subsequent disposal.

Fabric filters collect particles with sizes ranging from submicron to several hundred microns in diameter at efficiencies generally in excess of 99 or 99.9%. The layer of dust, or dust cake, collected on the fabric is primarily responsible for such high efficiency. The cake is a barrier with tortuous pores that trap particles as they travel through the cake. Gas temperatures up to about 500°F, with surges to about 550°F, can be accommodated routinely in some configurations. Most of the energy used to operate the system appears as pressure drop across the bags and associated hardware and ducting. Typical values of system pressure drop range from about 5 to 20 inches of water.

Fabric filters are used where high efficiency particle collection is required and can be used in most any process where dust is generated and can be collected and ducted to a central location. Limitations are imposed by gas characteristics (temperature and corrosivity) and particle characteristics (primarily stickiness) that affect the fabric or its operation and that cannot be economically accommodated. Important process variables include particle characteristics, gas characteristics, and fabric properties. The most important design parameter is the air- or gas-to-cloth ratio (the amount of gas in ft^3/min that penetrates one ft^2 of fabric) and the usual operating parameter of interest is pressure drop across the filter system. The major operating feature of fabric filters that distinguishes them from other gas filters is the ability to renew the filtering surface periodically by cleaning. Common furnace filters, high efficiency particulate air (HEPA) filters, high efficiency air filters (HEAFs), and automotive induction air filters are examples of filters that must be discarded after a significant layer of dust accumulates on the surface. These filters are typically made of matted fibers, mounted in supporting frames, and used where dust concentrations are relatively low. Fabric filters are usually made of woven or (more commonly) needle-punched felts sewn to the desired shape, mounted in a plenum with special hardware, and used across a wide range of dust concentrations.

Fabric filters provide high collection efficiency for both coarse and fine particles and are relatively insensitive to fluctuations in gas stream conditions. Operation is simple and fabric filters are useful for collecting particles with resistivities either too low or too high for collection with ESPs. Fabric filters have relatively high maintenance requirements, such as periodic bag replacement, and have limited application for high temperatures and corrosive or moist exhaust.

Step 1b: Identify Potential Control Technologies (Gaseous Fluorides)

Fluoride emissions are also emitted in a gaseous state from iron ore at induration temperatures. These gases can be controlled with the same piece of pollution control equipment as the sulfur dioxide (SO_2) emissions.

The primary methods of controlling SO_2 and fluoride emissions are through the use of flue gas desulfurization (FGD) technologies. There are many FGD systems available including wet scrubbing, spray dryer absorption, circulating fluidized bed absorption (also known as a gas suspension absorber), and dry sorbent injection. The FGD systems currently in use to control SO_2 emissions can be classified as either wet or dry systems. In addition, a number of calcium and sodium based SO_2 control reagents may be considered. In most cases, reagent selection will not affect the overall SO_2 control efficiency. This analysis will focus on lime and limestone since they are the most common reagents used in wet scrubbing.

Wet Scrubber

A wet scrubber involves scrubbing the exhaust gas stream with a reagent in slurry form comprised of lime (CaO), limestone ($CaCO_3$), caustic, or soda ash in suspension. The process takes place in a wet scrubbing tower. In some cases, the scrubbing tower is located downstream of a PM control device to reduce the plugging of spray nozzles and other problems caused by the presence of particulates in the scrubber. The SO_2 in the gas stream reacts with the slurry to form calcium sulfite ($CaSO_3$) and calcium sulfate ($CaSO_4$). Wet scrubbing absorption control efficiency is typically in the 90% to 98% range.

In order to meet the SO_2 and particulate levels associated with various requirements two scrubber scenarios are considered. The first is a single high pressure wet scrubber. The advantage of a single high pressure wet scrubber is that it has lower capital cost but the operating costs are higher. To achieve the level of particulate removal necessary with a single scrubber, a very high pressure drop is required. The high pressure drop requires a larger fan which in turn uses more electricity. The second option is to have a lower pressure wet scrubber for SO_2 removal followed by a wet ESP for particulate removal. The wet scrubber with a wet ESP option has a higher capital cost but lower operating cost.

Other materials could be used for scrubbing. MEA is a sorbent which may be used for CO_2 absorption in GHG capture system. The capture of CO_2 is accomplished by an acid base reaction between CO_2 and MEA. This bond may be broken relatively easily with low pressure steam heat. In CO_2 capture systems for GHG control, an MEA solution circulates through an absorption column to capture the CO_2 in an exhaust gas steam and a regeneration column where the CO_2 is released from the MEA solution using low pressure steam as a heat source. The CO_2 from the regeneration is compressed to a liquid for transport and sequestration. The MEA is continuously circulated between the absorption and regeneration columns, and very little MEA is lost in the process.

MEA also reacts with other acid gas such as H_2S, SO_2, and NO_x. The reaction between MEA and SO_2 and the reaction of MEA with NO_x is irreversible, and the chemical bonds cannot be broken in a regeneration column. In a CO_2 capture systems, MEA reacting with SO_2 and NO_x is consumed and fresh MEA must be added to replace the MEA consumed by SO_2 and NO_x. There are also operating costs for removing the MEA salts from the MEA sorbent solution and disposal of the waste material. SO_2 and NO_x removal by MEA is considered an unwanted collateral reaction within a CO_2 capture system. Therefore, SO_2 and NO_x concentrations in coal-fired boiler applications must be reduced to a minimum in an MEA sorbent based CO_2 capture system to control operating costs.

If an MEA solution would be used to capture the remaining SO_2 and NO_x in the post emission control Hood and Waste Gas exhaust streams, it would result in the consumption of 950 tons per year of MEA assuming all SO_2 and NO_x is captured.

MEA is not considered to be an economically viable option as compared to other reagents for SO_2 and NO_x control. The current bulk price of MEA is approximately $2,100 per ton. In

contrast, hydrated lime costs around $290 per ton, and about the same amount of lime would be used per ton SO_2 controlled as MEA.

Circulating Fluidized Bed (CFB) Dry Scrubber

Circulating fluidized bed (CFB) absorption is a semi-dry system with lime slurry injection. The flue gas enters the reactor through a venturi, which increases the velocity to ensure that solid material can be transported by the flue gas to create a fluidized bed. The slurry and water are injected into the gas stream at the venturi. The lime reacts with the acids in the flue gas and neutralizes them. The SO_2 in the gas stream reacts with the slurry to form calcium sulfite ($CaSO_3$). The fluidized bed allows for a greater surface for the reaction to take place, thus making the process very efficient. The water is injected to cool down the flue gas. The temperature must be as low as possible because decreased temperatures increase the ability of the slurry to absorb the acids. However, if the temperature is too low, the re-circulating material tends to cake more. A cyclone off the top of the reactor captures particles to be recirculated to the reactor. CFB scrubbing (absorption) control efficiency is typically in the 90% to 98% range depending upon inlet concentrations and conditions.

Spray Dryer Absorption (SDA) Dry Scrubber

Spray dryer absorption (SDA) is a dry scrubbing system that sprays a fine mist of slurried lime into an absorption tower where SO_2 is absorbed by the droplets. The absorption of the SO_2 leads to the formation of calcium sulfite (CaSO3●2H2O) within the droplets. The liquid-to-gas ratio is such that the heat from the exhaust gas causes the water to evaporate before the droplets reach the bottom of the tower. This leads to the formation of a dry powder which is carried out with the gas and collected with a particulate control device. Spray dryer absorption control efficiency is typically in the 70% to 95% range depending upon inlet concentrations and conditions.

Dry Sorbent Injection (DSI) Dry Scrubber

Dry sorbent injection (DSI) involves the injection of a lime or limestone powder into the exhaust gas stream. The process was developed as a lower cost FGD option because the mixing occurs directly in the exhaust gas stream instead of in a separate tower. Sorbent injection control efficiency is typically in the 50% range.

Clean Fuels

The proposed induration furnace is designed to fire only natural gas in its burners. Natural gas does not contain any fuel bound sulfur compounds and therefore is considered to be a clean fuel for SO_2. However, Magnetation is proposing to add coke breeze to the iron ore as it is being processed. The amount of coke breeze will be limited to less than 1.5%. Coke breeze does contain fuel bound sulfur compounds.

It is technically infeasible to burn solid or liquid fuels (e.g., coal and/or fuel oil) in burner systems of a straight grate furnace such as the one designed for the proposed modifications at Magnetation.

Good Design Methods and Operating Practices

Good design includes process and mechanical equipment designs which are either inherently lower polluting or are designed to minimize emissions. Good operating practices include operating methods, procedures, and selection of raw materials to minimize emissions. Since these methods are generally source specific (e.g., good operating practices for SO_2 control), they will be addressed for each process when such measures are available.

(a) Material Handling Operations (Fluorides)

The emissions from the material handling operations are in the form of particulate matter (PM, PM_{10}, and $PM_{2.5}$). Particulate matter emissions are primarily due to the attrition of particles (dust) from the feedstocks, iron oxide pellets, and by-products. This is caused by the abrasion of materials rubbing against each other and the process equipment as they move through the process.

Fluoride emissions will be controlled with particulate matter emission controls on sources where fluorides are emitted as dust. Fluoride salts are present in trace quantities in iron concentrate. These salts are emitted as particulate matter along with ore dust during ore processing such as conveying. These salts can be controlled with the same piece of pollution control equipment as the particulate (PM) emissions.

The following new emission units associated with material handling operations are subject to fluoride BACT requirements:

Fluoride Emission Units Associated with Material Handling Operations	
Emission Unit	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
Recycled Dust Storage Area	EU026
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

Existing Fluoride BACT Determinations for Material Handling Operations
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for material handling operations at iron ore pelletizing plants. The table below summarizes these fluoride BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

Fluorides BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Material Handling Operations: EU001a, EU011, EU012, EU015, EU016, EU019, EU026	F: Baghouse, concentration limits, lb/hr limitations	NI	BACT-PSD
Proposed BACT for Magnetation		Material Handling Operations (Insignificant Activities): Iron Ore Wet Grinding and Filter Cake Production, Greenball Production System	F: concentration limit, 5% opacity (6-min avg)	NI	BACT-PSD
Existing Fluorides BACT Determinations - Material Handling Operations					
Essar Steel Minnesota LLC: Nashwauk, MN	MN-0085/ 06100067-004 (5/10/2012)	Oxide Pellet Stockpile Conveyor Gallery	F: 50 mg/kg (3-hr avg) of oxide pellets handled	NI	BACT-PSD

Fluorides BACT - Material Handling Operations					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
		Hearth Layer Bin	F: 50 mg/kg and 0.0001 lb/hr (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Hearth Layer Feed	F: 50 mg/kg (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Pellet Discharge	F: 50 mg/kg and 0.0002 lb/hr (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Pellet Screening and Handling	F: 50 mg/kg and 0.0001 lb/hr (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Pellet Screenings to Regrind Conveyors	F: 50 mg/kg (3-hr avg) of oxide pellets handled	NI	BACT-PSD
		Primary Grinding Mill Line 3	F: 1.00 mg/kg (3-hr avg) of crude ore handled	NI	BACT-PSD
		Grizzly Transfer Tower	F: 1.00 mg/kg (3-hr avg) of crude ore handled	NI	BACT-PSD
		Non-magnetic Cobber Rejects Transfer Tower	F: 1.00 mg/kg (3-hr avg) of crude ore handled	NI	BACT-PSD
		Secondary Screening Crusher/Cobber Line 1	F: 1.00 mg/kg (3-hr avg) of crude ore handled	NI	BACT-PSD
		While the RBLC doesn't list a baghouse as control for fluorides, a baghouse is required for this process for the control of PM, PM_{10} (filterable), $PM_{2.5}$ (filterable), and lead.			
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Ore Crushing and Handling	F: Baghouse, 1.00 mg/kg (12-month rolling avg) of crude ore handled	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Oxide Pellet Handling	F: Wet Scrubber, 50 mg/kg (12-month rolling avg) of oxide pellets handled	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Silos	F: Baghouse, 50 mg/kg (12-month rolling avg) of DRI pellets handled	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	DRI Pellet Handling	F: Wet Scrubber, 50 mg/kg (12-month rolling avg) of DRI pellets handled	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Material Handling Operations (Fluorides)

The air streams associated with dry material handling operations are characterized by air streams at or near ambient temperature and moisture content. Such streams would not be expected to contain materials that would be considered to be acidic or corrosive. As such, none of the listed particulate matter control devices were eliminated from consideration because of technical infeasibility.

The air streams associated with wet material handling operations are characterized by air streams at elevated moisture content. Such streams would be expected to clog and minimize the

control efficiency of dry collection systems. As such, fabric filters and cyclones were eliminated from consideration because of technical infeasibility.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Material Handling Operations (Fluorides)

For the following types of material handling operations, all fluoride emissions are emitted as a percentage of the particulate emissions. Therefore, the control effectiveness of the control technologies for fluorides should be comparable to the control effectiveness of the control technologies for PM.

The control technologies for dry material handling operations are ranked as follows:

(1) Fabric filter dust collectors: 99% - 99.9%+

(2) Electrostatic precipitators: 95% - 99.9%+

(3) Wet scrubbers: 70% - 90%

(4) Cyclones: 70% - 90%

(5) Wet suppression: 50% - 90%

The control technologies for wet material handling operations are ranked as follows:

(1) Electrostatic precipitators: 95% - 99.9%+

(2) Wet scrubbers: 70% - 90%

(3) Wet suppression: 50% - 90%

Step 4: Evaluate the Most Effective Controls and Document the Results - Material Handling Operations (Fluorides)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for dry material handling operations at iron ore pelletizing plants is fabric filtration. A few operations are controlled by wet scrubbers or wet suppression. Most facilities express emission limitations in terms of the fluoride concentration of the processed materials and/or pounds per hour fluorides. Fluoride concentration is a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures. The fluoride concentrations given in the review range from 1.0 mg/kg to 50.0 mg/kg, which was determined to be BACT for many types of material handling operations.

Based on a review of the U.S. EPA RBLC and other Indiana permits, there is no primary control used for wet material handling operations (Iron Ore Wet Grinding and Filter Cake Production and Greenball Production) at iron ore pelletizing plants. In researching taconite ore processing (AP-42, Chapter 11.23.3), it specifically states that “because the ore remains wet, PM emissions are insignificant for the rest of the process until the dry stage of induration”. Additionally, these processes are generating less than ten tons per year each, and any type of control device for wet material (such as an electrostatic precipitator or wet scrubber) would be economically infeasible.

BACT Proposal

(a) Material Handling Group 1 Emission Units:

Group 1 Emission Units	
Description	Unit No.
Iron Concentrate Unloading	EU001a
Mixing Area Material Handling System	EU011
Hearth Layer Bin System	EU012
Furnace Discharge System	EU015
Hearth Layer Separation System	EU016
Oxide Pellet Storage & Unloading System	EU019
Recycled Dust Storage Area	EU026

BACT shall be the use of baghouses with an appropriate fluoride concentration and pound per hour limitation.

(b) Material Handling Group 2 Emission Units:

Group 2 Emission Units	
Description	Unit No.
Iron Ore Wet Grinding and Filter Cake Production	IA
Greenball Production System	IA

BACT shall be an appropriate fluoride concentration and that the opacity material shall not exceed five percent (5%) on a six (6) minute average.

Step 5: Select BACT - Material Handling Operations (Fluorides)

The proposed BACT for fluorides meets the most stringent BACT found in the RBLC for material handling operations. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

A detailed fluoride BACT for the above Material Handling Operations is given in the BACT Conclusion for fluorides.

(b) <u>Induration Furnaces (Fluorides)</u>

The majority of fluoride emissions originate from the fluoride salts present in the iron oxide concentrate. These fluorides are released in gaseous form as a result of the high operating temperature of the induration furnace. Most of the fluoride emissions emanate from the waste gas stack, which vents the regions of the induration furnace where sufficient temperature exist to liberate fluoride compounds from the iron ore concentrate. The hood exhaust contains a small amount of fluoride due to leakage between induration furnace compartments and the diversion of a small amount of waste gas for temperature control.

There is also a small amount of fluoride emission from natural gas combustion.

The following new emission units associated with the induration furnace are subject to fluorides BACT requirements:

Fluorides Emission Units Associated with Induration Furnaces		
Emission Unit		Associated Emission Point
Description	Unit No.	
Furnace Hood Exhaust	EU013	SV013A
Furnace Windbox Exhaust	EU014	SV013B

Existing Fluorides BACT Determinations for Induration Furnaces

The U.S. EPA RBLC was reviewed to identify control requirements and limitations for induration furnaces at iron ore pelletizing plants. The table below summarizes these fluoride BACT determinations as provided by the RBLC, as well as other IDEM permits. The search was limited to sources with SIC Codes of 1011 (iron ore beneficiating plants), 3312 (iron and steel mills), and 3325 (steel foundries) from January 2003 to January 2013.

Fluorides BACT Determinations – Induration Furnace					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Furnace Hood Exhaust EU013 (450 st/hr pellets)	F: No Control, 2.1 ppmv wet @ 20% O_2 and 1.98 lb/hr	NI	BACT-PSD
		Note: 0.00705 lb F/ton pellets * 450 tons/hr = 3.2 lb/hr F This meets most stringent BACT.			
Proposed BACT for Magnetation		Furnace Windbox Exhaust EU014 (450 st/hr pellets)	F: GSA Dry Scrubber, 11.4 ppmv wet @ 15% O_2 and 12.34 lb/hr	NI	BACT-PSD
		Note: 0.03205 lb F/ton pellets * 450 tons/hr = 14.4 lb/hr F This meets most stringent BACT.			
Existing Fluorides BACT Determinations – Induration Furnaces					
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Hood Exhaust (624 st/hr pellets)**	**F: No control, 1.8 ppmv wet @ 15% O_2 and 4.40 lb/hr (3-hr avg)**	**NI**	**BACT-PSD**
	Note: 4.40 lb/hr ÷ 624 tons/hr = 0.00705 lb F/ton pellets				
Essar Steel Minnesota LLC: Nashwauk, MN	**MN-0085/ 06100067-004 (5/10/2012)**	**Furnace Waste Gas (624 st/hr pellets)**	**F: GSA dry scrubber, 11.5 ppmv wet @ 15% O_2 and 20.0 lb/hr (3-hr avg)**	**NI**	**BACT-PSD**
	Note: 20.0 lb/hr ÷ 624 tons/hr = 0.03205 lb F/ton pellets				
United States Steel Corp.: Parkville, MN	MN-0077/ 13700005-005 (12/22/2008)	Agglomerator Line 3	F: Wet scrubber (for PM), 1.04 lb/hr (3-hr avg)	NI	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Indurating Furnace - Hood Exhaust (624 st/hr pellets)	F: Wet scrubber, 0.13 lb/hr of greenballs handled	93%	BACT-PSD
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Indurating Furnace - Waste Gas (624 st/hr pellets)	F: Wet scrubber, 0.25 lb/hr of greenballs handled	95%	BACT-PSD

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (Fluorides)

The proposed indurating furnace is designed to operate on natural gas (as an external fuel) and coke breeze (which is added to the raw materials). Therefore, use of natural gas as a clean fuel

as well as good design methods and operating practices will be implemented regardless of the fluorides control system selected.

Induration Furnace Hood Exhaust
Wet scrubbing and spray dryer absorption have been eliminated as control technologies for the Furnace Hood Exhaust (EU013) because the control technologies can feasibly achieve outlet concentrations of 10 and 25 ppmv, respectively. Since the uncontrolled concentration from the hood exhaust is 7.1 ppmv, these technologies will not be able to remove any further SO_2 from the air stream. No other technologies were eliminated from consideration because of technical infeasibility for the induration furnaces with regards to the Furnace Hood Exhaust (EU013).

Induration Furnace Windbox Exhaust
No technologies were eliminated from consideration because of technical infeasibility for the Furnace Windbox Exhaust (EU014).

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (Fluorides)

SO_2 control efficiencies have been used as a general indicator of the emission control effectiveness on fluoride compounds in the exhaust streams. Fluorides are present only in trace quantities in the iron oxide and are released as acid gases due to the temperatures of the indurating process. Since SO_2 gases are acidic, SO_2 control efficiencies are a good indicator of control effectiveness for fluoride emissions because fluorides are also acidic. Due to the inherent low concentrations of fluorides, fluoride control efficiency may vary from the overall SO_2 control efficiency.

Induration Furnace Hood Exhaust
The control technologies for the induration furnace hood exhaust are ranked as follows:

(1) Gas suspension absorber (GSA): 95%

(2) Dry sorbent injection (DSI) dry scrubber: 40%

Induration Furnace Windbox Exhaust
The control technologies for the induration furnace windbox exhaust are ranked as follows:

(1) Gas suspension absorber (GSA): 95%

(2) High pressure wet scrubber: 80%

(3) Low pressure wet scrubber followed with wet electrostatic precipitator (ESP): 80%

(4) Spray dryer absorption (SDA): 60-70%

(5) Dry sorbent injection (DSI) dry scrubber: 40%

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (Fluorides)

Since SO_2 gases are acidic, SO_2 control efficiencies are a good indicator of control effectiveness for fluoride emissions because fluorides are also acidic.

Induration Furnace Hood Exhaust
Uncontrolled SO_2 concentrations in the hood exhaust stream are very low; the calculated hood exhaust SO_2 concentration is 7.1 ppmv. Since this concentration is at or near the lowest controlled SO_2 concentration achievable by these control devices (5 ppm), a control cost analysis was performed to determine whether or not add-on SO_2 controls were economically feasible. For

the GSA and DSI dry scrubbing options, baghouses are needed to capture the spent sorbent. In GSA applications, a portion of the recovered sorbent is recycled back to the dry scrubber to minimize sorbent use. Therefore, the baghouses are considered as an integral part of the SO_2 control system and are included in the control cost analysis. Control costs for GSA and DSI options were also evaluated without baghouse costs. All of these control costs are provided in Appendix C and are summarized in Appendix C - Table A-1 and in the following table.

Hood Exhaust – SO_2 Controls		
Technology	**SO_2 Control Cost ($/ton)**	**Corresponding Appendix C Cost Tables**
Dry Sorbent Injection (DSI)	$55,943	A-4-2a
Gas Suspension Absorber (GSA)	$82,606	A-3-2a
Dry Sorbent Injection (DSI) with Baghouse	$109,262	A-4-1a
Gas Suspension Absorber (GSA) with Baghouse	$151,663	A-3-1a

From the above table, the implementation of SO_2 controls on the hood exhaust would be economically infeasible whether or not particulate controls are included in the cost analysis. Due to the inherent low concentrations of fluorides, costs for fluoride control is significantly greater than the above listed costs.

Based on a review of the U.S. EPA RBLC, the primary control used for furnace hood exhausts at iron ore pelletizing plants is an appropriate pound per hour limitation, based on the process being uncontrolled. Most facilities express emission limitations in terms of exhaust concentration and/or pounds per hour of fluorides. Exhaust concentration is the most effective way of comparing emission limits because it is a relative measure rather than control efficiency limitations which are process-specific measures. The exhaust concentration given in the review is 1.8 ppmv wet.

The furnace design at Magnetation differs from the furnace design at Essar. Both furnaces combust natural gas in the windbox to dry pellets then direct residual heat to the hood. This heat recirculation process at the Essar furnace incorporates 26% of the combustion gases in the heated air stream. This can be documented as follows:

> NO_x emissions in the furnace are generated exclusively from the combustion of natural gas. Essar does not utilize coke breeze in its processes. Therefore, the SO_2 emissions at Essar from in the furnace are generated exclusively from the combustion of natural gas.
>
> | | NO_x (tpy) | SO_2 (tpy) |
> |---|---|---|
> | Hood | 197 | 200 |
> | Windbox | 562 | 570 |
> | Ratio of Hood / (Hood + Windbox) | 26% | 26% |
>
> This redirection of oxygen depleted combustion gas to the hood allows Essar to operate the hood at a lower oxygen level than the ambient air oxygen content of twenty percent (20%).

As documented in the furnace calculations for Magnetation, the amount of combustion gas redirected to its hood will be 7.5%. Therefore, Magnetation can not operate its furnace hood at 15% oxygen, and it is designed to operate at ambient air oxygen conentrations of twenty percent (20%).

BACT Proposal – Induration Furnace Hood Exhaust (Fluorides)

BACT for the fluorides emissions from the induration furnace hood exhaust has been proposed to be uncontrolled with a maximum outlet concentration of 2.1 ppmv wet corrected to 20% O_2 and a corresponding 1.98 lb/hr limit.

Induration Furnace Windbox Exhaust
Based on a review of the U.S. EPA RBLC, the primary control used for furnace waste gas/windbox exhausts at iron ore pelletizing plants is a gas suspension absorber (GSA). Most facilities express emission limitations in terms of exhaust concentration and/or pounds per hour of fluorides. Exhaust concentration is the most effective way of comparing emission limits because it is a relative measure rather than control efficiency limitations which are process-specific measures. The exhaust concentration given in the review is 11.5 ppmv wet.

BACT Proposal – Induration Furnace Windbox Exhaust (Fluorides)

BACT for the fluorides emissions from the induration furnace windbox exhaust has been proposed to be controlled through the use of a GSA dry scrubber combined with a baghouse for sorbent capture and particulate control and a maximum outlet concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit.

The proposed BACT for fluorides meets the most stringent BACT found in the RBLC for induration furnace waste gas exhausts. Therefore, no further evaluation of these operations is required, and an economic, energy, or environmental impact analysis is not required as part the BACT evaluation for these operations.

Step 5: Select BACT - Induration Furnace (Fluorides)

A detailed fluorides BACT for the induration furnace is given in the BACT Conclusion for fluorides.

(c) Combustion Units (Fluorides)

The following emission units associated with combustion processes are subject to NO_x BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (Fluorides)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (Fluorides)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. There are no current listings in the RBLC for fluorides for natural gas fired emergency generators or other comparable combustion units.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (Fluorides)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (Fluorides)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (Fluorides)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. The only facility expresses its exhaust emission limitation in terms of pounds per hour of fluorides. Pound per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures.

Magnetation did not propose a fluorides BACT for the natural gas fired emergency generator. IDEM has determined that BACT shall be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 6.95×10^{-6} lb/MMBtu for the proposed generator. This is equivalent to the total of the emission factors for the fluoride containing pollutants (benzo(b)fluoranthene, fluoranthene, and fluorene) in the natural gas as listed in AP-42, Table 3.2-2 for 4-stroke lean-burn reciprocating engines.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (Fluorides)

A detailed fluorides BACT for the natural gas fired emergency generator is given in the BACT Conclusion for fluorides.

(2) Natural Gas Fired Fire Pump (Fluorides)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (Fluorides)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. There are no current listings in the RBLC for fluorides for natural gas fired fire pumps or other comparable combustion units.

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (Fluorides)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (Fluorides)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (Fluorides)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired fire pumps is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. The only facility expresses its exhaust emission limitation in terms of pounds per hour of fluorides. Pound per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures.

Fluorides BACT for the natural gas fired fire pump has been proposed to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 6.95 x 10^{-6} lb/MMBtu for the proposed fire pump. This is equivalent to the total of the emission factors for the fluoride containing pollutants (benzo(b)fluoranthene, fluoranthene, and fluorene) in the natural gas as listed in AP-42, Table 3.2-2 for 4-stroke lean-burn reciprocating engines.

Step 5: Select BACT - Natural Gas Fired Fire Pump (Fluorides)

A detailed fluorides BACT for the natural gas fired fire pump is given in the BACT Conclusion for fluorides.

(3) Natural Gas Fired Space Heaters and Air Heaters (Fluorides)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these fluorides BACT determinations as provided by the RBLC. Since there are so few entries in the RBLC for total fluorides, the search was only limited to natural gas fired combustion sources, excluding boilers.

NO_x BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	F: Use of natural gas, good combustion practices, 9.40E-06 lb/MMBtu	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	F: Use of natural gas, good combustion practices, 9.40E-06 lb/MMBtu	NI	BACT-PSD

NO_x BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	F: Use of natural gas, good combustion practices, 9.40E-06 lb/MMBtu	NI	BACT-PSD
Existing NO_x BACT Determinations - Heaters Firing Natural Gas					
Minnesota Steel Industries: Nashwauk, MN	MN-0070/ 06100067-001 (9/7/2007)	Process Heaters (606 MMBtu/hr)	F: 0.0004 lb/hr (3-hr avg)	NI	BACT-PSD
		Compliance is demonstrated through a limit on fluorides in the raw material (oxide pellets) of 1.0 mg/kg.			

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired heaters is the restricted use of only natural gas, the use of good combustion practices, and a limited hours of operation. The only facility expresses its exhaust emission limitation in terms of pounds per hour of fluorides. Pound per MMBtu limitations are a more effective way of comparing emission limits because it is a relative measure rather than pounds per hour limitations which are process-specific measures.

The RBLC listing for the process heaters at Minnesota Steel were not considered as part of this BACT determination because the limit is based on the fluoride concentration of the raw material being heated and not on the combustion of the natural gas itself.

Magnetation did not propose a fluorides BACT for the natural gas fired fire pump. IDEM has determined that BACT shall be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 9.40 x 10^{-6} lb/MMBtu for the proposed heaters. This is equivalent to the total of the emission factors for the fluoride containing pollutants (benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthene, and fluorene) in the natural gas as listed in AP-42, Table 1.4-3 for general natural gas combustion.

Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (Fluorides)

A detailed fluorides BACT for natural gas fired heaters is given in the BACT Conclusion for fluorides.

BACT Conclusion for Fluorides

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for fluorides emissions shall be as follows:

(a) Material Handling Operations

The material handling operations shall be limited as follows:

Fluorides emissions from the following emission units (EU001a, EU011, EU012, EU015, EU016, and EU019) shall be controlled by fabric filter dust collectors and shall not exceed the emission limits listed in the following table:

Emission Unit		Control	Fluoride Concentration of Oxide Pellets Handled (mg/kg)	Fluoride Concentration of Oxide Pellets Handled (lb/hr)
Description	Unit No.			
Iron Concentrate Unloading	EU001a	Baghouse CE001	50.0	4.73×10^{-5}
Mixing Area Material Handling System	EU011	Baghouse CE011	50.0	1.71×10^{-5}
Hearth Layer Bin System	EU012	Baghouse CE012	50.0	7.55×10^{-6}
Furnace Discharge System	EU015	Baghouse CE017	50.0	3.65×10^{-5}
Hearth Layer Separation System	EU016	Baghouse CE018	50.0	3.94×10^{-5}
Oxide Pellet Storage & Unloading System	EU019	Baghouse CE019	50.0	3.15×10^{-5}
Recycled Dust Storage Area	EU026	Baghouse CE024	50.0	7.88×10^{-6}

Fluorides emissions from the Iron Ore Wet Grinding and Filter Cake Production and the Greenball Production System shall be controlled by using process material with a maximum fluoride concentration of 50.0 mg/kg and that the opacity material shall not exceed five percent (5%) on a six (6) minute average.

(b) Induration Furnace

The induration furnace operations shall be limited as follows:

(1) Fluorides emissions from the induration furnace hood exhaust be uncontrolled with a maximum outlet concentration of 2.1 ppmv wet corrected to 20% O_2 and a corresponding 1.98 lb/hr limit.

(2) Fluorides emissions from the induration furnace windbox exhaust be controlled through the use of a GSA dry scrubber combined with a baghouse for sorbent capture and particulate control as well as a maximum outlet concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit.

(c) Combustion Processes

The combustion processes shall be limited as follows:

(1) Fluorides emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 6.95 x 10^{-6} lb/MMBtu.

(2) Fluorides emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 6.95 x 10^{-6} lb/MMBtu.

(3) Fluorides emissions from the space heaters (EU021), ground limestone/dolomite additive system air heater (EU010), and coke breeze additive system air heater (EU009) shall each be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 9.40 x 10^{-6} lb/MMBtu.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (PSD BACT) with regards to fluorides.

Greenhouse Gases (GHG) BACT

The GHG BACT analysis is divided into two categories: induration furnaces and combustion units.

Step 1 of the BACT process is shown below for this GHG BACT analysis to describe general GHG control devices. Each of the categories of processes undergoing BACT is then described further with the remainder of the BACT process steps. Additional or more specific GHG control devices may be discussed in individual BACT analyses. A summary of the GHG BACT determinations is provided at the end of this section.

Step 1: Identify Potential Control Technologies (GHG)

The list of potential control technologies considered for the GHG BACT analysis, and detailed descriptions of each control technology are included in this section. The emission control technologies evaluated include add-on controls, evaluation of fuel alternatives, and inherently lower pollution from process equipment where applicable. The majority of GHGs that will be emitted from the Magnetation project are due to combustion activities; CO_2 is a product of combustion. A smaller amount of GHG emissions will occur as a result of physical or chemical processes at the facility. The CO_2 from both of these generation mechanisms is in a gaseous phase in the exhaust streams at the Magnetation facility. The majority of the add-on CO_2 control technologies involve the absorption of the CO_2 gas into a solution. If simply left in the solution, the CO_2 would disassociate and would be emitted back into the atmosphere because CO_2 is a gas at ambient temperatures and pressures. In addition, vast quantities of the absorbing solution would be required, and these would require proper disposal. Therefore, these technologies also involve the removal of the CO_2 gas from the absorbing solution, forming a concentrated CO_2 gas stream. In order for the CO_2 to be permanently removed from the atmosphere, this gas stream must be compressed using high pressure until the CO_2 gas forms a liquid. The pressure must be maintained, or the CO_2 will convert back to a gas. In order to keep the CO_2 in liquid form for essentially eternity, it must be stored in a manner where the pressure can be maintained. One method being evaluated for this by DOE and others is to pump the CO_2 into underground geological units. There are some developing technologies that remove the CO_2 from the exhaust stream through a mineralization reaction where a solid such as calcium carbonate is formed but these are in the early stages of development. These are discussed in more detail later in this section.

Based on the physical characteristic of CO_2, a successful control technology that accomplishes the goal of permanently removing CO_2 from the atmosphere must include:

- a technology for removing it from the exhaust stream, also referred to as a carbon capture technology,
- a viable place for permanent storage of the CO_2 given the physical form that it is in after removal (i.e., gas, liquid, or solid), this is typically referred to as carbon sequestration, and
- a feasible means of transporting the quantities of material generated to the storage location (i.e. pressurized gas pipeline).

Having a feasible carbon capture technology that is based on removing CO_2 in the gaseous form but no viable storage will not accomplish the goal of removing CO_2 from the atmosphere because it would have nowhere to go but back into the atmosphere.

The remainder of this section discusses identified control technologies in the following categories:

- Carbon capture technologies (gas based or mineralization based).
- Geological formation types that can be used for carbon sequestration.
- Pressurized CO_2 transportation options.
- Fuel alternatives.
- Energy efficiency measures.

Carbon Capture

There are currently two general classes of CO_2 capture technologies, those that remove CO_2 as a gas and those that involve a chemical reaction to form a mineral. As discussed above, technologies that remove CO_2 in a gaseous form also require a permanent storage location in order to accomplish the goal of removing the CO_2 from the atmosphere.

Before CO_2 can be sequestered, it must be captured as a relatively concentrated gas in order to minimize the pressure necessary to liquefy it for transportation and to minimize the storage volume. The CO_2 that is coming off of the indurating furnace as a component of the flue gas is usually at relatively low concentrations and low pressure. For comparison, coal-fired power plants have CO_2 concentrations in the 10 to 15 percent range, while the estimated CO_2 concentration from an indurating furnace is 2 to 3 percent. In order for CO_2 to be successfully transported for sequestration, the recovered gas stream must be concentrated to 90 percent or greater CO_2[1] and must also be compressed to 100 atm or greater[2]. For this reason, gas based carbon capture systems must produce a concentrated and pressurized stream of CO_2 in order to be effective. Post-combustion, pre-combustion, and oxy-fuel combustion are three technologies currently being developed that create a way to capture CO_2 gas from the flue gas. Also discussed in this section are a couple of developing mineralization processes that were identified.

[1] U.S. Climate Change Technology Program, "Capturing and Sequestering Carbon Dioxide" http://www.climatetechnology.gov/stratplan/final/CCTP-StratPlan-Ch06-Sept2006.pdf, September 2006.
[2] Herzog, Howard, Meldon, Jerry, Hatton, Alan, "Advanced Post-Combustion CO_2 Capture", http://web.mit.edu/mitei/docs/reports/herzog-meldon-hatton.pdf, April, 2009.

Post-Combustion CO_2 Capture

Post-combustion CO_2 capture involves separating the CO_2 from the flue gas after combustion so that it can be transported and/or stored in one of the ways discussed above instead of emitted to the air. Currently, commercial post-combustion CO_2 capture plants have only used chemical absorption processes with ammonia (NH_3) and mono-ethanolamine (MEA)-based solvents.[3]

Amine-based sorbents undergo a reversible chemical reaction with CO_2. The amine solvent is injected in an absorber column at low temperatures where the amine comes into contact with the flue gas. At low temperatures, CO_2 physically dissolves in water and then reacts with the amine in an exothermic process. The CO_2 rich amine sorbent is sent to a stripper column for CO_2 recovery. Prior to entering the stripper, 'CO_2-rich' solution is preheated in a heat exchanger using waste heat from a hot stream of 'CO_2-lean' regenerated solvent. The heat added to the CO_2-rich solution breaks the CO_2-amine bond releasing the CO_2 as the amine solution flows through the stripper. CO_2 gas and water vapor are released from top of the stripper. The concentrated CO_2 stream is first condensed to remove the water and is then compressed to be prepared for transportation and/or sequestration. The regenerated amine is recirculated back to the absorber and the process starts over.

Note that when the flue gas enters the absorber column, any SO_3, SO_2, and NO_2 present in the stream will also react irreversibly with amines. Therefore, concentrations of SO_3, SO_2, and NO_2 must be ideally removed to less than 10 ppm to prevent excessive amine consumption. This is beyond the current demonstrated capability of most flue gas desulfurization (FGD) and de-NO_x emission control systems. Given the current state of FGD and de-NOx emission control technologies, CO_2 capture technologies that use amine sorbents will require significant quantities of amine solution.

[3] Herzog, Howard, Meldon, Jerry, Hatton, Alan, "Advanced Post-Combustion CO_2 Capture", http://web.mit.edu/mitei/docs/reports/herzog-meldon-hatton.pdf, April, 2009.

Oxyfuel Combustion with CO_2 Capture

Oxyfuel combustion uses a high purity oxygen (O_2) stream for combustion instead of air. Use of pure oxygen for combustion minimizes nitrogen from the combustion process. Since air contains 79 percent nitrogen and 21 percent oxygen this also significantly reduces the volume of the exhaust stream. Therefore, minimal nitrogen is available for NO_x formation or to dilute the combustion products. Oxyfuel combustion results in an exhaust stream of almost pure CO_2 and water vapor. The water vapor can easily be removed by condensation, and CO_2 recovery and compression costs are reduced because of the lower flow rates associated with nitrogen free combustion.

For existing facilities, a portion of the CO_2 can be recycled in the combustion unit so that the flow rate and thermodynamic properties of the oxyfuel flue gas are similar to air-based combustion. This allows oxyfuel combustion to be installed without significant modifications to the boiler.

The O_2 for oxyfuel combustion is produced by separating the oxygen from the air. The most common way to do this is to use cryogenic separation which requires a very large (3 GJ/tonne CO_2) amount of energy.

Gasification and Pre-Combustion CO_2 Capture

Pre-combustion CO_2 capture refers to the capture of CO_2 prior to combustion to produce hydrogen. Hydrogen combustion does not produce CO_2 emissions. The capture process typically consists of three steps. First, a hydrocarbon fuel (i.e., methane or gasified coal) is converted into hydrogen and carbon monoxide (CO) to form a synthetic gas or syngas. Second, the CO is used to generate additional H_2 by reacting CO and H_2O catalytically to form H_2 and CO_2. Lastly, the CO_2 is separated from the hydrogen. The hydrogen is then used for clean

combustion, and the concentrated CO_2 is ready for compression and then transportation and/or storage. Note that this process requires a hydrocarbon fuel source; if coal or biomass is to be used as a fuel source, the solid fuel must first go through the gasification process. Gasification converts a carbonaceous material (i.e., coal or biomass) into carbon monoxide and hydrogen. The raw carbonaceous material is reacted at high temperatures with a controlled amount of oxygen and/or steam. This gas moisture that is created from this process is syngas. The syngas can then be used as described above.

Because CO_2 is present at much higher concentrations in syngas than in post-combustion flue gas, CO_2 capture should be less expensive for pre-combustion capture than for post-combustion capture. Currently, there are few gasification plants in full-scale operation, and capital costs are higher than for conventional pulverized coal plants. Of the gasification plants currently in operation, there are no units that are currently generating additional H_2 by reacting CO and H_2O and then separating and capturing the concentrated CO_2 stream for sequestration.

Use of this technology will increase energy use and water use over direct fuel combustion. Energy is released in the pre-combustion of fuel to generate carbon monoxide and hydrogen. Not all of the energy released in this process can be recovered through waste heat recovery systems such as heat exchangers. The generation of hydrogen from the water gas shift reaction to convert CO to H_2 and CO_2 consumes energy because this is an endothermic reaction. Lastly, additional energy will be needed to separate hydrogen from the exhaust gas stream containing CO, CO_2, water, and residual fuel which was not oxidized in the pre-combustion process.

CO_2 Mineralization

Carbon dioxide mineralization is the process of reacting CO_2 to form a solid by-product, such as silicate or carbonate minerals. The solid by-product is considered stable and could be stored for very long periods of time.[4] In the case of carbonates (such as sodium bicarbonate), the product can be sold for beneficial use. This process is very kinetically slow (>24 hours to reach 50% capture[5]) and therefore in order to make this a relevant control option for captured carbon, heat, energy and or pressure must be supplied to speed up the reaction. There are, however, commercial processes that are under development. Two examples that are discussed in more detail below are alkalinity driven processes that produce carbonate minerals and an electrochemical process that produces sodium bicarbonate. The alkalinity driven process uses an aqueous precipitation process to produce carbonates from CO_2. This technology requires an aqueous source of calcium and magnesium cations and a source of alkalinity to precipitate calcium and magnesium carbonates from reaction with carbon dioxide.[6] The process produces carbonate minerals and salt water. An add-on electrochemical process can use the salt water to produce the alkalinity needed for the precipitation process, and also produces hydrochloric acid as a byproduct.[7]

The second process under development uses an electrochemical cell to produce carbonates from CO_2.[8] Carbon dioxide is combined with salt water and produces sodium bicarbonate, which may be precipitated out in solid form.[9] This process also produces electrolytic-grade hydrogen and electrolytic-grade chlorine along with saleable bicarbonate as well as a way to recover the electricity required for the process.[10]

[4] BiofuelsWatch.com, "Carbon Sequestration Technology", January 4, 2010.
[5] NETL, "CO_2 Mineral Sequestration Studies in U.S.", 2001.
[6] Calera, "Notes on Sustainability and Potential Market", 2010.
[7] Ibid.
[8] Angelo, David, Skyonic, "SkyMine Commercialization Update", Webinar Presentation, September 9, 2010.
[9] Layton, Julia, "Can baking soda save the environment?", March 12, 2008, HowStuffWorks.com http://science.howstuffworks.com/environmental/green-science/baking-soda-save-environment.htm, November 29, 2010.
[10] Angelo, David, Skyonic, "SkyMine Commercialization Update", Webinar Presentation, September 9, 2010.

Carbon Transportation and Sequestration

Carbon sequestration involves taking CO_2 that has been captured from the flue gas, compressing, and then transporting the pressurized CO_2 to a suitable site for pressurized

injection and storage. The CO_2 is stored deep underground in geological formations in such a way that the CO_2 will be permanently stored.

The majority of geologic formations considered for CO_2 storage are deep saline formations or depleted oil and gas reservoirs. These formations consist of multiple underground layers of porous rock that are underneath a layer or multiple layers of non-porous rock. The sequestration process starts with drilling a well down into the porous rock and then injected pressurized CO_2 into the porous rock. Under high pressure, the injected CO_2 turns to liquid and can move through a formation as a fluid, the liquid CO_2 tends to flow upward until it encounters the non-porous rock, which traps the CO_2 to prevent further upward migration.[11]

Coal seams are another formation considered a viable option for geologic storage. When CO_2 is injected into the coal seam formation, it is adsorbed onto the coal surfaces, and methane gas is released and produced in adjacent wells.[12]

[11] NETL, Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/core_rd/storage.html.
[12] NETL, Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/core_rd/storage.html.

Deep Saline Aquifers

Deep saline aquifers are layers of porous rock that are saturated with brine. CO_2 can be injected into these formations and stored beneath a layer of nonporous rock.

Saline aquifers are very widespread in many parts of the world and therefore represent an enormous potential for CO_2 storage. The EPA classifies any aquifers with greater than 10,000 mg/l salinity unfit as sources of drinking water.[13] Aquifers such as these serve as a resource for CO_2 storage. CO_2 will eventually dissolve into solution and react to form solid carbonates in the reservoir. These carbonates can increase the permanence of the CO_2 storage, but they may also block the injection well.

Additionally, little is known about saline formations. Research is just beginning on how CO_2 injection into a saline aquifer might affect the environment over a longer period of time. There is some uncertainty around the suitability of saline formations for CO_2 storage.

One potential risk from carbon injection into a saline aquifer is the consequence of unintended leakage of CO_2 from the storage formation into overlying aquifers. If these other aquifers are sources of drinking water, there is a possibility that the CO_2 will affect water quality characteristics, possibly posing a threat to water resources.[14]

[13] Van Essendelft, Dirk J, Fitzgerald, Taron, M, Abdel-Hafez A., Sakti, A., Achimugu, O., Faoro, I., "CO_2 Sequestration through Deep Saline Injection and Photosynthetic Biological Fixation: System Design for Two Plausible CO_2 Sequestartion Strategies", http://www.ems.psu.edu/~elsworth/courses/egee580/Sequestration_final_report.pdf.
[14] Carbon Capture Journal, "Potential Impact of GCS to Underground Sources of Drinking Water", http://www.carboncapturejournal.com/displaynews.php?NewsID=513, February 12, 2010.

Oil and Gas Reserves

Both active and depleted oil and gas reserves are potential formations for underground storage of CO_2. As discussed above, these formations consist of layers of porous rock with a layer of nonporous rock above. Oil and gas reserves have held crude oil and natural gas for centuries; the same geologic characteristics that trap the oil and gas are the characteristics that make these reservoirs good locations for CO_2 sequestration.

When CO_2 is injected into an active mature oil reserve, it has the potential to produce additional oil. This process is referred to as enhanced oil recovery (EOR). EOR begins with the injection of CO_2 into an oil reserve. The injected CO_2 dissolves in the oil, which increases the volume and decreases the viscosity of the liquid; this improves the mobility of the remaining oil and extends

the production life of the oil reserve. CO_2 injection can result in recovery of an additional 10 to 15 percent of the oil.[15]

[15] NETL, Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/core_rd/storage.html.

Un-mineable Coal Seams

Coal seams that are too deep or too thin to be mined economically are considered to be un-mineable. CO_2 can be injected into these un-mineable coal seams to potentially increase coal bed methane recovery, referred to as enhanced coal bed methane (ECBM) recovery. ECBM recovery can be achieved by sweeping the coal bed with CO_2. All coal types have a variable amount of methane absorbed onto pore surfaces.[16] So, depending on the type of coal, a variable amount of methane is released, at the same time providing a storage location for CO_2.

A potential problem with sequestering of CO_2 into un-mineable coal seams and ECBM recovery is coal swelling. When coal adsorbs CO_2, it increases or 'swells' in volume. The swelling can cause a significant decrease in permeability, which in turn restricts the flow of CO_2 into the formation and also may prevent the recovery of coal bed methane. Angled drilling techniques and fracturing are being researched as possibilities reducing the effects of coal swelling.

[16] NETL, Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/core_rd/storage.html.

Fuels

This fuels analysis is based on pollutant emissions directly associated with the combustion of the fuel. Emissions from a specific fuel may be related to the inherent properties of the fuel (e.g., sulfur content) or by the nature of the combustion process and is assessed on the uncontrolled CO_2 pollutant emission factors for each fuel.

Historically EPA policy has held that a facility need not consider emission control options which would fundamentally "re-define" the proposed project. For example, a coal-fired power plant would not need to consider installation of a natural gas-fired turbine as BACT for emissions control as an alternative to the proposed coal-fired plant. However, recent court decisions have held that clean fuels must be considered in a BACT review. So, for example, natural gas must be considered as an alternative fuel for a coal-fired boiler application (a turbine option is still excluded).

Magnetation is proposing the use of a straight-grate furnace designed to burn natural gas and to utilize coke breeze. No provisions for the combustion of solid fuels have been made in the design of the furnace burner system. Magnetation is proposing to add coke breeze to the iron ore as it is being processed. The coke breeze provides heat input from the conversion of carbon to carbon dioxide in an endothermic reaction and improve the energy balance for the process. Natural gas has the lowest GHG emissions of the fuels when the biogenic nature of biomass is not considered. The straight-grate furnace is not technically feasible of burning biomass, and no provisions in the project for the use of biomass have been included in the definition of the project.

Energy Efficiency

Energy efficiency focuses on reducing the amount of energy/fuel used in the process. Reducing energy is considered a key solution to reducing GHG emissions. Energy efficiency will be strongly influenced by ore type, pellet type, maintenance practices, process control, and pellet throughput. Combined heat and power alternatives will not be addressed as an energy efficiency measure in this report. There are no boilers currently included in the proposed project and therefore, these alternatives are considered to be out of scope for this GHG BACT evaluation.

Recuperative Heat Recovery

The recuperative heat recovery system proposed for the Magnetation furnace utilizes hot air from the pellet cooler to dry and preheat the pellets. A portion of the cooling air is also used as

combustion air to minimize fuel use. Because the combustion air is hot, less fuel is necessary to heat the combustion air.

Minimization of Heat Loss (Insulation)

Insulation can be used as a way to reduce heat loss from the process and the indurating furnace. Heat naturally transfers from a warmer to cooler area. Therefore, the heat generated during combustion has a natural tendency to transfer away from the furnace. Insulation is a means of minimizing the heat transfer.

Good Design Practices / Good Operating Practices
Good design includes process and mechanical equipment designs which are either inherently lower polluting or are designed to minimize emissions. Good operating practices include operating methods, procedures, and selection of raw materials (i.e., additives and control reagents) to minimize emissions.

Lower Emitting Processes
In addition to add-on controls and energy efficiency measures, an evaluation of process changes to lower GHG emissions is also considered part of a BACT determination. Most of the process-related GHG emissions from the iron oxide process are the result of the inherent nature of the raw materials and their carbon content.

Step 2: Eliminate Technically Infeasible Options – Induration Furnaces (GHG)

Carbon Capture
Carbon capture is proven on a limited scale in some operations including enhanced oil recovery (EOR) and food-grade applications. Research is currently being completed on pilot or demonstration scales for a number of larger-scale power generation applications. However, sequestration is an integral part of any GHG control technology option. Therefore the feasibility of gas-based carbon capture technology is limited by the feasibility and availability of carbon transport capabilities and sequestration sites.

Post-Combustion CO_2 Capture

To date, there are a number of projects that are using or planning on using post combustion capture technology for capture of CO_2 from a flue gas stream. Below are a few examples of existing facilities or planned demonstration projects.

- *First Energy*
  The Berger Powerplant Project in Shadyside, OH finished a 1 MW pilot project using Powerspan's EC02 post combustion CO_2 capture technology. The inlet CO_2 concentration was approximately 11-12%, and 20 tons of CO_2 were captured (and released) per day. An outside evaluation by Worley Parsons indicated that the technology would be effective on 200MW or greater coal plants. The vendor indicated that this technology would be effective for use in an iron ore plant application.[17] However, no transportation or sequestration solution was identified.

  [17] Powerspan, "Powerspan Carbon Capture Technology", March, 2011.

- *Northeast Energy Associates*
  The Northeast Energy facility in Bellingham, MA captures 320 tons per day of CO_2 from a gas turbine using the Fluor Daniel ecoamine process.[18] The captured CO_2 is used onsite for food grade applications. CO_2 concentrations from the turbine treated by the process are similar to those seen in indurating furnace discharges (3.5% CO_2 and 13-14% O_2). Although the concentration of CO_2 and O_2 are similar, no information could be obtained

regarding the size of the turbine or the flowrate of this application. Given that it is a food grade application, it was assumed to be a small grade system.

[18] Reddy, Satosh, et al., "Fluor's Ecoamine FG Plus Technology", Second National Conference on Carbon Sequestration, DOE/NETL, May, 2003.

- *Carbon Dioxide Technology*
  The Lubbock, TX project captures CO_2 from a gas boiler for EOR use in nearby oil and gas production using the Dow MEA process.[19] Attempts to contact Dow were unsuccessful, but Cansolv was contacted to discuss potential application of their amine process to an iron ore project. They indicated that while technically feasible to capture CO_2, they declined on providing additional information because they thought it would be too expensive and not a very good fit with their process.[20]

[19] Chapel, Dan, Mariz, Carl, "Recovery of CO_2 from Flue Gases: Commercial Trends", Canadian Society of Chemical Engineers Annual Meeting, October, 1999.
[20] Personal communication, Devon Shaw, CanSolv, March 1, 2011.

- *American Electric Power*
  The Mountaineer project is currently using post combustion CO_2 capture technology during "Phase 1" of the testing of the facility, capturing and sequestering 0.1 million tons per year of CO_2. However, the commercial scale demonstration of post combustion CO_2 capture ("Phase 2") will not begin until 2015.[21]

[21] Massachusetts Institute of Technology (MIT), "Carbon Capture and Sequestration Technologies", September, 7, 2010.

- *NRG Energy*
  NRG Energy in Thomson, Texas intends to capture 0.5 million tons per year of CO_2 from a power plant using post combustion capture techniques starting in 2015.[22]

[22] U.S. DOE, "DOE/NETL Advanced Carbon Dioxide Capture R&D Program: Technology Update", http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/CO2%20Capture%20Tech%20Update%20Final.pdf, September, 2010.

- *Basin Electric*
  The Antelope Valley Station project will use post combustion CO_2 capture techniques. The project will capture 1 million tons per year of CO_2 starting in 2014.[23]

[23] U.S. DOE, "DOE/NETL Advanced Carbon Dioxide Capture R&D Program: Technology Update", http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/CO2%20Capture%20Tech%20Update%20Final.pdf, September, 2010.

As shown in the above project descriptions, post combustion carbon capture cannot yet be considered as a commercially available technology.

Additionally, post combustion carbon capture requires a large amount of energy for operation. The energy demand can be attributed to the following:

- Extraction of steam from the electric generating turbine to the stripper reboiler. The steam provides energy to break the chemical bonds between the CO_2 and the amine and provides heat required to raise the temperature of the amine to the operating temperature of the stripper.

- Electricity is required to run the CO_2 compressors. The CO_2 stream must be compressed to 100 psi or greater for transportation and/or storage.

- Electricity is required to drive the blowers to push the flue gas through the absorber/stripper system.[24]

[24] Herzog, Howard, Meldon, Jerry, Hatton, Alan, "Advanced Post-Combustion CO_2 Capture", April, 2009.

Because of the large energy demand, a key goal of the research around post combustion capture of CO_2 is reducing the energy requirements. For these reasons, post combustion CO_2 capture is not considered economically feasible or commercially available at this time.

Oxyfuel Combustion with CO_2 Capture

Oxyfuel combustion is not a technically feasible control option due to the design of the induration furnace. The recuperative heat recovery system uses air to cool pellets, and energy captured by the air in the pellet cooling process is used in the preheat section of the furnace. Therefore, it is not possible to eliminate air from the process without changing the design of the furnace.

Additionally, oxyfuel combustion is not considered commercially available for this type of application. Per the U.S. Department of Energy, there is only one full-scale demonstration project planned to test the effectiveness of oxyfuel combustion. The project, FutureGen 2.0, will capture, compress, and transport CO_2. FutureGen 2.0 in Meredosia, Illinois intends to start an oxyfuel combustion process will CO_2 capture in 2015. The project will collect 1 million tons per year of CO_2.

Gasification and Pre-Combustion CO_2 Capture

There are gasification plants in operation. However, the process of generating additional H_2 by reacting CO and H_2O and then separating and capturing the concentrated CO_2 stream for sequestration is still in development. In order for the gasification process to be implemented for the Magnetation project, significant re-design of the induration furnace would be required, which would re-define the project. The furnace is currently not designed to burn hydrogen. Therefore, this technology is not considered to be technically feasible control option for the Magnetation project.

Additionally, pre-combustion CO_2 capture is not yet considered commercially available for this type of application. The following is a list of facilities that have planned demonstration projects that will capture, compress, and transport CO_2 using a gasification process.

- *Summit Texas Clean Energy*
  Summit Texas Clean Energy is an integrated gasification combined cycle power plant in Odessa, Texas. The facility will collect 3 million tons per year of CO_2 starting in 2014.

- *Southern Company*
  Southern Company is an existing integrated gasification combined cycle power plant in Kemper County, Mississippi. The facility will collect 2 million tons per year of CO_2 starting in 2016.

- *Hydrogen Energy California*
  Hydrogen Energy California is an existing integrated gasification combined cycle power plant in Kern County, California. The facility will collect 2 million tons per year of CO_2 starting in 2016.

<u>CO_2 Mineralization</u>
There are several demonstration plants either underway or planned for these mineralization technologies, two alkalinity based and one electrochemical based.

- *Moss Landing, California (alkalinity driven technology)*
  An alkalinity driven CO_2 mineralization demonstration plant in Moss Landing, California is capable of capturing 30,000 metric tons per year of CO_2 from a natural gas-fired power plant by producing magnesium and calcium carbonates. The size of this plant is significantly less than the size needed for Magnetation.

- *Latrobe Valley in Victoria, Australia (alkalinity driven technology)*
  A commercial-scale demonstration of an alkalinity driven CO_2 mineralization technology is planned in the Latrobe Valley in Victoria, Australia. This project was scheduled to break ground on a smaller demonstration phase in 2010, but is expected to expand its capabilities to capture 300,000 metric tons per year of CO_2 from a coal-fired power plant.[25] The timeframe for the full capacity demonstration is not yet determined.

  [25] Calera, "Notes on Sustainability and Potential Market", 2010.

- *San Antonio, Texas (electrochemical driven technology)*
  This demonstration project, which is receiving funding from the U.S. Department of Energy, will capture 75,000 metric tons per year of CO_2 from a cement manufacturing plant in San Antonio, Texas.[26] The demonstration project is currently in the detailed engineering and construction phase.

  [26] Angelo, David, Skyonic, "SkyMine Commercialization Update", Webinar Presentation, September 9, 2010.

Since none of these facilities have yet to be completed, these technologies are not considered to be commercially available and therefore technically infeasible.

<u>Carbon Transportation and Sequestration</u>
Carbon sequestration is considered to be a potentially technically feasible control option at the time of this report. Currently, research is being completed on several pilot scale tests within the Illinois Basin to determine the long-term effectiveness of sequestration and identify reservoir uncertainties of the storage capability of the target formations. Therefore, carbon sequestration is not considered to be fully commercially available technology at the time of this report.

The feasibility of each of the CO_2 sequestration techniques are discussed below. Carbon sequestration strategies have been researched and investigated in the Illinois Basin for nearly a decade. At this time, most of the pilot projects are in Phase II, where injection of the CO_2 into the target formation is performed.

While pipeline technology exists, there are significant logistical hurdles that make CO_2 transportation economically infeasible given that the nearest possible storage facilities are 20 to 100 miles away. The nearest CO_2 pipeline is in Mississippi (Dooley et al, 2009). Successful receipt of permitting, right-of-way, and other environmental considerations necessary to establish a pipeline to reach sequestration sites is not guaranteed. The cost to the proposer to establish this pipeline would preclude consideration for the Magnetation project.

Deep Saline Aquifers

There is a suitable deep saline aquifer that underlies most of the state of Indiana, the Mt. Simon Sandstone Aquifer. Reservoirs in the Mt. Simon formation are located between 3,000 and 4,000 feet below the surface. Typically the Indiana Geological Survey considers any formation depth shallower than 2,500 feet below ground surface (bgs) to be a potential risk to overlying aquifers. Already several pilot projects are underway that utilize the Mt. Simon Sandstone Aquifer for carbon sequestration. The location of the Magnetation facility is in relatively close proximity (approximately 100 miles or less) to the regions of the Mt. Simon Sandstone Aquifer that would potentially provide an adequate volume of storage (Indiana CCS, 2008).

There are uncertain risks associated with carbon sequestration into a saline aquifer. One major risk is the possibility of unintended leakage of CO_2 from the storage formation into overlying aquifers. If the aquifers are source of drinking water, there is a possibility that the CO_2 will affect water quality characteristics, possibly posing a threat to water resources (Carbon Capture Journal, 2010). The EPA has published federal requirements under the Safe Drinking Water Act (SDWA) for underground injection of CO_2. Additional risks that are still being researched include: release of CO_2 from the storage location, injection pressure increase or seismic events, geochemical reactions, and displacement of brine or other fluids (NETL, 2012). All of these risks are still under evaluation for the pilot projects listed below and continued evaluation will be necessary for definitive data that the risks of sequestration into saline aquifers are minimal.

Therefore, carbon sequestration into a saline aquifer is not considered technically feasible at this time.

To date, there are several demonstration projects planned to research the possibility of injected CO_2 into a saline aquifer. Many of the projects that are currently underway in the United States are government supported by the Department of Energy (DOE) (Herzog, 2010).[27] Additionally, according to the Indiana Clean Air Task Force, saline aquifers represent the largest potential for carbon sequestration within the state, equating to a potental for 38 billion tons of storage capacity (Thompson, 2008).

[27] Herzog, Howard, "Carbon Dioxide Capture and Storage: A Status Report", McIlvane Company Hot Topic Hour, August 26, 2012.

- *Midwest Geological Sequestration Consortium - Illinois Basin Decatur Project*
  In Decatur, Illinois, a pilot project is underway at the Archer Daniels Midland (ADM) ethanol plant. The ADM demonstration project is for the capture and sequestration of 1 million tons per year of CO_2 in 2011. The CO_2 will be injected into the Mt. Simon Sandstone Aquifer, which is located approximately 1 mile from the plant (NETL, 2010). Currently, the project is in the validation phase. Because this is a full scale pilo test, no results have been reported for this project yet.

- *Midwest Regional Carbon Sequestration Partnership - East Bend Kentucky Project*
  For the validation phase of this project, the Midwest Regional Carbon Sequestration Partnership conducted a geologic field demonstration in the Cincinnati Arch province at Duke Energy's East Bend Generating Station in Rabbit Hash, Kentucky; the project entailed injecting approximately 1,000 tons of CO_2. The injection was into a deep saline reservoir in the area, which included targets in the Mt. Simon Sandstone Aquifer. As is the case in all deep saline injection tests, these reservoirs were located well below drinking water supplies, which are about 100 feet deep in this part of the Cincinnati Arch province. The project team took core samples and conducted reservoir tests in the well. information from these tests were used to assess the nature and strength of the underground rock and determine the maximum acceptable pressure for injection.

As shown above, carbon sequestration is not considered commercially available at the time of this report. This technology is still undergoing research studies, and there is still work being completed to better understand the risks of sequestration of CO_2 into saline aquifers. For these reasons, carbon sequestration into a saline aquifer is not considered technically feasible for the Magnetation project.

Oil and Gas Reserves

Carbon sequestration into an oil and/or gas reserve is considered technically feasible at this time. The Magnetation facility is located near a mature gas field (Trenton Field) that might be appropriate for sequestration. However, pipeline access for transportation of CO_2 to this field for sequestration is not economically feasible as the western border of the field is approximately 50

miles from the site. the cost to develop a pipeline of this length would be $50-75 million with an annual operating cost of approximately $1 million. The capital cost of completing the pipeline would add 30% to the capital cost of the project, and the added operating cost would add 17% to the annual cost of the proposed project.

The closest oil field has been identified in the county immediately northwest of White County. The Gifford Field is located in east central Jasper County; however, the material produced from this field is a very heavy crude which significantly reduces the porosity of the formation and makes the field an unlikely candidate for carbon sequestration. The Gifford Field is also located at a depth shallower than 2,000 feet bgs, which conflicts with the Indiana Geological Survey's preferred depth for carbon sequestration (Indiana Geological Survey PDMS, 2012). To the east of White County is a mature gas field, the Royal Center Field (located in northwestern Cass County and southwestern Fulton County). The Royal Center Field is underlain by the Mt. Simon Sandstone Aquifer and, because of the Kankakee Arch structural feature, the field would be a potential candidate for carbon sequestration (Medina and Rupp, 2012); however, the field is currently in use as a gas storage formation for natural gas and therefore does not have the capacity to be used for carbon sequestration. Larger oil/gas fields are located approximately 100 miles from the site to the southwest and have been idnetified as highly viable storage sites for carbon sequestration; however, the use of these fields for carbon sequestration would require the development of a CO_2 pipeline at a cost significantly greater than that discussed above. The cost to construct a pipeline 100 miles long would be up to $150 million with an annual operating and maintenance cost of up to $1.25 million.

Currently there are a number of demonstration projects underway in the United States that are examining sequestration into oil and/or gas reserves. Most of the projects are for enhanced oil recovery (EOR). Below are a few examples.

- *Midwest Geological Sequestration Consortium - Loudon Field Illinois Project*
  This project involves the injection of CO2 into a mature oil field (Loudon Field) in Fayette County, Illinois (NETL, 2010). Like many other pilot carbon sequestration projects, the Loudon Field is located in the Illinois Basin. This EOR test was a small scale test with approximately 43 tons of CO_2 injected into the Mississippian Weiler Sandstone at a depth of approximately 1,550 feet below ground surface (bgs). Results of the test indicated that the 43 tons were injected over a five-day period, which resulted in increased oil production for the subsequent two months. The test did not indicate any leakage of the CO_2 into the surrounding or overlying strata.

- *Midwest Geological Sequestration Consortium - Mumford Hills Field Kentucky Project*
  This EOR project involves the pattern flood injection of CO_2 into a mature oil field at a depth of approximately 1,900 feet bgs (NETL, 2010). The project plan is to sequester approximately 30 tons of CO_2 per day for a period of six to eight months followed by a period of water injection for three to five months. As of January 2010, approximately 3,100 tons had been injected at a rate of between 25 and 30 tons per day. The results of this project will be used to estimate CO_2 injectivity, validate Phase I storage estimates, and identify barriers or risks for commercial CO_2 sequestration.

- *Midwest Geological Sequestration Consortium - Sugar Creek Field*
  This project involves a well conversion EOR test at the Sugar Creek oil field in Hopkins County, Kentucky (NETL, 2010). For a period of six to eight months, up to 8,000 tons of CO_2 will be injected into an existing brine-water injection well at depths of approximately 1,900 feet bgs in a mature oil field. To monitor the fate of the CO_2, a monitoring program has been implemented at the site with technical support from the Kentucky Geological Survey. The program consists of tracking the rate and volume of injected CO_2 and the pressures and temperatures within the well. These measurements provide an indication of how efficiently the CO_2 displaces oil within the reservoir and how efficiently the servoir

stores the CO_2. Results indicate that the CO_2 injection is displacing the oil and, despite one breakthrough at a monitoring well, no other leakages have been detected.

- *Midwest Regional Carbon Sequestration Partnership - East Bend Kentucky Project*
  The test site is located on a state-owned, military land management area in Otsego County, Michigan. The primary carbon dioxide storage formation is the St. Peter Sandstone at a depth of approximately 7,500 feet bgs, below natural gas and oil producing zones. A secondary storage formation is the Bass Island Dolomite at a depth of approximately 3,500 feet bgs. Two rounds of injection were conducted at the site. This portion of the Michigan Basin is in an area of active EOR projects and natural gas processing plants. The research team was able to test innovative monitoring methods including repeated cross-well seismic tests. A total of 60,000 tons of CO2 was injected into saline formations (known as the Bass Islands Dolomite) in an EOR field operated by Core Energy in the vicinity of a DTE natural gas processing plant.

These results should be reviewed prior to determining whether oilfield sequestration is technically feasible for the Magnetation project.

Un-mineable Coal Seams

Although carbon sequestration into an un-mineable coal seam may be technically feasible soon, less research and investigation of carbon sequestration impacts on un-mineable coal seams are being performed compared to the other sequestration methods. Additionally, there is not access to a pipeline for transportation of CO_2 to a coal seam for sequestration. The closest un-mineable coal seam is in southwest Indiana approximately 100 miles away.

A potential problem with sequestering of CO_2 into un-mineable coal seams and ECBM recovery is coal swelling. When coal adsorbs CO_2, it increases or 'swells' in volume. The swelling can cause a significant decrease in permeability, which in turn restricts the flow of CO_2 into the formation and also may prevent the recovery of coal bed methane. Angled drilling techniques and fracturing are being researched as possibilities reducing the effects of coal swelling.

- *Midwest Geological Sequestration Consortium - Tanquary Field Illinois Project*
  The purpose of the Tanquary Field project is to determine the CO2 injection and capacity and the enhanced coal-bed methane recovery potential for Illinois Basin coal seams (NETL, 2010). This particular field is located in Wabash County, Illinois. The target formation was the Pennsylvanian Carbondale formation at a depth of 900 feet in a 7-foot thick Springfield Coal. To provide reference data for the project, the pre- and post-CO_2 injection coal permeability was estimated using a water pressure transient test. Additionally, swelling and permeability reduction was evaluated by means of three monitoring wells located around the injector well. Approximately 100 tons of CO_2 was injected during the project. Results of the test did not indicate any leakage of the CO_2 into the surrounding groundwater sources.

As shown above, carbon sequestration is no considered to be a fully commercially available technology at the time of this report. This technology is still undergoing research studies, and there is still work being completed to better understand the risks of sequestration of CO_2 into saline aquifers, oil fields, and un-mineable coal seams. for these reasons, carbon sequestration is not yet considered to be a technically feasible control option for the Magnetation project.

<u>Energy Efficiency</u>
Magnetation is taking measures to minimize greenhouse gas emissions by both ensuring high levels of energy and production efficiency for the proposed project. The leading technology in the iron oxide pellet industry is being employed as part of the project. Heat recovery will be utilized in the indurating process in order to minimize fuel usage and separate recuperative heat recovery loops are planned which will maximize heat recovery. Minimizing fuel use miimized GHG

emissions. The Magnetation furnace will have up and down draft drying zones which use recuperative heat from the second pellet cooler for pellet drying. Recuperative heat is also used to preheat pellets in the down draft drying, preheat windbox, and firing sections of the furnace using heat recovered from the first pellet cooler. A portion of the hot air coming off the first pellet cooler will be used as combustion air int he firing section of the furnace. Because the combustion air is hot, less fuel is necessary to heat the combustion air and more of the fuel energy can be directed into the production process. As noted in the NO_x control analysis, the amount of preheated combustion air is limited in order to control NO_x emissions in the low NO_x LE burners. through these energy efficiency measures, the Magnetation project is expected to achieve thermal consumption levels consistent with a modern, well-designed, energy efficient straight grate furnace.

The Energy Star information on the iron and steel production industrial sector does not include benchmark information on iron oxide pellet productin processes. It is difficult to make direct comparisons of energy use between iron ore facilities because there are a number of site-specific factors which affect energy use. These factors include the type of iron-bearing materials (magnetite, hematite, and siderites) in the ore, the amount of fluxing agents added, and the type of fuel used in the furnace; plants of idnetical design could operate at the low end of the energy use range at one location and at the high end of the range at another location based on differences in these factors.

Another indicator of energy efficiency is the amount of waste heat recovered within the process relative to the total amount of waste heat energy that is feasible to recover. The proposed Magnetation straight grate is designed to recover as much heat as practicable (approximately 65-66%). The temperatures of the hood and windbox exhaust streams are so low that very little recoverable energy is left to be recovered, and there are significant technical hurdles to achieve additional energy recovery. The new straight grate is designed to recover waste heat from two pellet coolers. The exahust from the first cooler is routed through the furnace pellet preheat and firing zones and then through the downdraft drying zone; air from the first pellet cooler is also used to provide preheated combustion air to the firing zone. The exhuast from the second pellet cooler is used for pellet drying in the updraft pellet drying section.

The straight grate induration furnace proposed by Magnetation was designed as an energy efficient furnace to help minimize GHG emissions associated with fuel combustion. Additionally, Magnetation intends to use good operating methods and procedures to reduce GHG emissions.

Magnetation is proposing to process primarily hematite concentrate. Unlike the processing of magnetite material, which is an exothermic reaction, the processing of hematite ore is an endothermic reaction. Magnetation is proposing to add coke breeze to the hematite concentrate during processing in order to replace the energy that is supplied by magnetite in the exothermic reaction. the addition of coke breeze results in a more uniform heat profile, as opposed to adding heat to the outside of the material being processed from the natural gas burners, resulting in a reduction in overall heat input of up to 30%.

Recuperative Heat Recovery

The proposed Magnetation induration furnace process involves pellet pre-heating, drying, hardening, oxidation, and cooling. Each of these steps is accomplished in different sections of the induration furnace as the grate system moves pellets through the furnace.

Minimization of Heat Loss (Insulation)

Insulation will be used as a way to reduce heat loss from the process and the induration furnace. the effectiveness of insulation depends on a number of different factors. Some of these factors include local climate, quality of insulation, and thermal resistance of the insulation. Magnetation

will use good engineering and design practices to determine the correct placement and design features that will minimize the heat loss from the furnace.

Good Design Practices / Good Operating Practices
Good design includes process and mechanical equipment designs which are either inherently lower polluting or are designed to minimize emissions.

Magnetation intends to use good operating practices and procedures to reduce GHG emissions from fuel combustion in the furnace.

Lower Emitting Processes

GHG Emissions Associated with SO_2 Control Reagents

There are a number of different sorbents that can be used in flue gas desulfurization (FGD) units. Some of these sorbents are limestone, lime, sodium bicarbonate, and sodium hydroxide. These sorbents produce CO_2 when reacted with SO_2 during the FG process. These reactions indicate that the use of limestone and sodium bicarbonate both produce one molecule of direct CO_2 emissions per SO_2 molecule reacted. Neither lime nor sodium hydroxide produce any direct CO_2 emissions and can be considered the best choice for SO_2 sorbents when considering direct GHG emissions from FGD.

GHG Emissions from Iron Oxide Pellet Additives

The addition of limestone and other additives is necessary to produce pellets of the quality required by the customers. Because of these quality requirements on the part of the customer, the above additives are required components of the pellet-making process in the amounts that are proposed to be used in the new indruation furnace for the proposed Magnetation project. There are no technically and economically feasible alternatives that would produce fewer GHG emissions.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness – Induration Furnaces (GHG)

The control technologies for the induration furnace are ranked as follows:

(1) Energy efficiency measures

(2) Clean fuels

(3) Lower emitting processes - SO_2 removal reagent

As part of the proposed project, Magnetation has considered and is taking measures to reduce the greenhouse gas footprint of the facility and decrease the carbon intensity of production by improving both energy and production efficiency. The project will incorporate the leading technology in the iron ore industry to take advantage of energy and fuel saving opportunities at the furnace, in process flow, and for new grinding capacity. Given current technology, energy efficiency measures are the best method for reducing greenhouse gas emissions. Use of lime as a reagent in the proposed SO_2 control technology eliminates GHG from this source.

Step 4: Evaluate the Most Effective Controls and Document the Results - Induration Furnace (GHG)

Energy Efficiency Measures
There are no adverse energy, environmental, or economic impacts associated with the implementation of the energy efficiency measures proposed for the Magnetation project. Due to reduced fuel rate requirements associated with the energy efficiency measures, all criteria

pollutant emissions will be reduced. Magnetation is proposing to use coke breeze in the combustion process to reduce the overall energy consumption of the induration furnace.

Clean Fuels

There are a few adverse energy, environmental, or economic impacts associated with fuel selection proposed for the Magnetation project. Magnetation intends to use a combination of natural gas and coke breeze for combustion in the induration furnace. As fuel, natural gas will result in the lowest GHG emissions of the possible fuel options for the induration furnace. However, due to the endothermic nature of the proposed pellet production process, the use of only natural gas will result in an increased energy demand of up to 30%

Fuel Cost Comparison			
Parameter	**Natural Gas Only**	**Natural Gas + Coke Breeze**	**Comments/ Assumptions**
Gross Heat Input (MMBtu/yr)	3,900,000	3,000,000	For NG+CB, net heat input = 1 MMBtu/ton. CB heat transfer is 10-30% more efficient than NG. NG only gross heat input = 1.3*Net.
Combustion GHG (tons/yr)	228,000	287,000	
NG Transportation GHG (tons/yr)	2,800	1,300	Based on 2006 IPCC Guidelines for National GHG Inventories, Volume 2 Chapter 4 - Natural Gas Distribution
CB Transportation GHG (tons/yr)	0	300	Based on 2006 IPCC Guidelines for National GHG Inventories, Volume 2 Chapter 3, Section 4 - Mobile Combustion: Railways
GHG Emissions (tons/yr)	230,800	288,600	
GHG Emissions (ton/mt pellets)	0.077	0.096	
Annual NG cost	$22,253,000	$10,325,000	
Annual CB cost	$0	$2,688,000	
Additional NG (cost/ton of GHG removed)	$200	N/A	
% Additional Operating Cost to Use NG Only	71%		(Annual Operating NG Only - Annual Operating NG+CB) ÷ Annual Operating NG+CB

Heat input information is based on engineering study for Magnetation and other induration furnace pellet plants. Existing plants have demonstrated that using coke breeze or anthracite coal will achieve a 30% reduction in heat input for natural gas. In addition, the furnace size length for a natural gas only furnace of equivalent production rates with a coke breeze/natural gas furnace is significantly large (approximately one-third).

The increase in GHG emissions from the use of coke breeze would by itself not trigger PSD permitting thresholds for either a new site (75,000 tons per year) or an existing site (100,000 tons per year). The use of coke breeze as a fuel results in an increase of approximately 60,000 tons per year of GHG emissions, compared to the use of only natural gas to produce the same volume of iron oxide pellets. However, the additional operating cost related to the increased usage of natural gas is equal to $200 per ton of GHG reduction or approximately $11,900,000 annually, using the 2010 annual average natural gas price for Indiana. Using the ten year Henry Hub average natural gas price of $5.83 per million cubic foot, the annual cost would increase to approximately $12,600,000. The annual operational cost of using only natural gas would be approximately 71% more than the annual cost for using a combination of coke breeze and natural gas. The Interim Phase I Report of the Climate Change Work Group identified a cost effectiveness range of $3 to $150 per ton of GHG reduction as guidance for evaluating BACT control. However, there have been few GHG BACT findings on the cost effectiveness for GHG

controls. In the Hyperion Energy Center BACT determination, a cost effectiveness of $43 per ton of GHG reduction for carbon sequestration was deemed not to be BACT.

The additional cost of natural gas as the sole fuel for the proposed pellet plant combined with the reduced energy efficiency and reduced thermal transfer efficiency of the process makes the use of only natural gas as a clean fuel option economically infeasible at $200 per ton of GHG removed. The annual fuel expense for natural gas alone would make the project less economically viable and would impact the cost of production of iron ore pellets. The additional capital cost to construct a natural gas only furnace or subsequent derating of the production capacity of the pellet furnace that is currently being proposed will only further negatively impact the economic viability of the project.

Lower Emitting Processes - SO_2 Removal Reagent
There are very few adverse energy, environmental, or economic impacts associated with the use of lime as a SO_2 control reagent. Magnetation intends to use lime, which is the lowest emitting GHG reagent.

Magnetation LLC BACT Proposal – Induration Furnace (GHG)

The Permittee has proposed that BACT for the GHG emissions from the induration furnace be as follows:

(1) Implementation of an energy efficient furnace design.

(2) Operation of the furnace at energy use rates consistent with the furnace design.

(3) Use of natural gas as fuel in the induration furnace.

(4) Use of coke breeze to offset the endothermic reaction requirements.

(5) Use of lime as an SO_2 removal reagent.

(6) A limit of 661,208 tpy CO_2e per 12-month rolling sum basis.

The design of the proposed facility meets GHG BACT requirement as follows:

(1) The energy efficiency of the proposed design on energy use on an MMBtu/short ton pellets basis (energy use per unit of production) is consistent with industry benchmarks for state-of-the-art energy efficient straight gates.

(2) The proposed design recovers as much waste heat as practicable (65-66%), and only low temperature waste heat remains in the gases exhausted from the furnace.

Step 5: Select BACT - Induration Furnace (GHG)

A detailed GHG BACT for the induration furnace is given in the BACT Conclusion for GHG.

(b) Combustion Units (GHG)

The following emission units associated with combustion processes are subject to GHG BACT requirements. This BACT analysis has been divided into three subsections: natural gas fired emergency generators, natural gas fired fire pumps, and natural gas fired heaters.

Combustion Processes with Associated Particulate Emissions			
Emission Unit		Fuels Fired	Associated Emission Point
Description	Unit No.		
Emergency Generator (619 hp)	EU017	Natural Gas	SV016
Fire Pump (300 hp)	EU018	Natural Gas	SV017
Space Heaters (7 @ 1 MMBtu/hr, each)	EU021	Natural Gas	N/A
Ground Limestone/Dolomite Additive System Air Heater (19 MMBtu/hr)	EU010	Natural Gas	SV010
Coke Breeze Additive System Air Heater (1.7 MMBtu/hr)	EU009	Natural Gas	SV009

(1) Natural Gas Fired Emergency Generator (GHG)
The Emergency Generator (EU017) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Emergency Generators (GHG)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired emergency generators. The table below summarizes these GHG BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for generators only used for emergency purposes.

GHG (Carbon Dioxide Equivalent) BACT Determinations - Emergency Generator					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Emergency Generator EU017 620 hp (500 kw)	CO_2e: Use of natural gas, good combustion practices, 144 tons/yr (12-month rolling total), 500 hours/year	NI	BACT-PSD
Existing GHG (Carbon Dioxide Equivalent) BACT Determinations - Emergency Generators					
Iowa Fertilizer Company: Wever, IA	IA-0105/ 12-219 (10/26/2012)	Emergency Generator - Diesel (2,000 kw)	CO_2e: Good combustion practices, 788.50 tons/yr	NI	BACT-PSD
Pyramax Ceramic, LLC: Rome, GA	GA-0147/ 3295-163-0035-P-01-0 (1/27/2012)	Emergency Generator - Natural Gas (1,818 hp)	CO_2e: 153.00 tons/yr (combined 12-month avg)	NI	BACT-PSD
Westlake Vinyls Company: Geismar, LA	LA-256/ PSD-LA-754 (12/6/2011)	(4) 500 kw Emergency Diesel Generators	CO_2e: Use of natural gas, good combustion practices, 1509.23 lb/hr, 39.24 tons/yr, 52 hours/yr	NI	BACT-PSD
Wolverine Power Supply Cooperative, Inc.: Sumpter, MI	MI-0402/ 81-11 (11/17/2011)	Diesel Fuel-Fired Combustion Engine (732 hp)	CO2e: Good combustion practices, 716.60 lb/hr	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Emergency Generator (GHG)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired emergency generators.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Emergency Generator (GHG)

The control technologies for natural gas fired emergency generators are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Emergency Generator (GHG)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired emergency generators is the restricted use of only natural gas and the use of good combustion practices. Most facilities express exhaust emission limitations in terms of tons per year of carbon dioxide equivalent.

GHG BACT for the natural gas fired fire pump has been determined to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 144 tons of CO_2e per 12-month period for the proposed generator.

Step 5: Select BACT - Natural Gas Fired Emergency Generator (GHG)

A detailed GHG BACT for the natural gas fired emergency generator is given in the BACT Conclusion for GHG.

(2) Natural Gas Fired Fire Pump (GHG)
The Fire Pump (EU018) will be fueled by natural gas.

Existing BACT Determinations – Natural Gas Fired Fire Pumps (GHG)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired fire pumps. The table below summarizes these GHG BACT determinations as provided by the RBLC. The search was limited to more recent entries from January 2003 to January 2013 for fire pumps only used for emergency purposes.

GHG (Carbon Dioxide Equivalent) BACT Determinations – Fire Pump					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Fire Pump EU018 300 hp (228 kw)	CO_2e: Use of natural gas, good combustion practices, 66 tons/yr (12-month rolling total), 500 hours/year	NI	BACT-PSD
Existing GHG (Carbon Dioxide Equivalent) BACT Determinations – Fire Pumps					
Iowa Fertilizer Company: Wever, IA	IA-0105/ 12-219 (10/26/2012)	Fire Pump - Diesel (235 kw)	CO_2e: Good combustion practices, 91.00 tons/yr (12-month rolling total)	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Fire Pumps (GHG)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired fire pumps.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Fire Pumps (GHG)

The control technologies for natural gas fired fire pumps are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Fire Pump (GHG)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired fire pumps is the restricted use of only natural gas and the use of good combustion practices. Most facilities express exhaust emission limitations in terms of tons per year of carbon dioxide equivalent.

GHG BACT for the natural gas fired fire pump has been determined to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit, which is 66 tons of CO_2e per 12-month period for the proposed fire pump.

Step 5: Select BACT - Natural Gas Fired Fire Pump (GHG)

A detailed GHG BACT for the natural gas fired fire pump is given in the BACT Conclusion for GHG.

(3) Natural Gas Fired Space Heaters and Air Heaters (GHG)
The Space Heaters (EU021), Ground Limestone/Dolomite Additive System Air Heater (EU010), and Coke Breeze Additive System Air Heater (EU009) will be fueled by natural gas.

Existing BACT Determinations - Natural Gas Fired Space Heaters and Air Heaters (GHG)
The U.S. EPA RBLC was reviewed to identify control requirements and limitations for natural gas fired space heaters and air heaters. The table below summarizes these GHG BACT determinations as provided by the RBLC. The search was limited to entries from January 2003 to January 2013 for space heaters, air heaters, and process heaters that combust only natural gas.

GHG (Carbon Dioxide Equivalent) BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Proposed BACT for Magnetation		Space Heaters (EU021) (7 @ 1 MMBtu/hr, each)	CO_2e: Use of natural gas, good combustion practices, 3587 tons/yr (12-month rolling total)	NI	BACT-PSD
Proposed BACT for Magnetation		Ground Limestone/Dolomite Additive System Air Heater (EU010) (19 MMBtu/hr)	CO_2e: Use of natural gas, good combustion practices, 9737 tons/yr (12-month rolling total)	NI	BACT-PSD
Proposed BACT for Magnetation		Coke Breeze Additive System Air Heater (EU009) (1.7 MMBtu/hr)	CO_2e: Use of natural gas, good combustion practices, 871 tons/yr (12-month rolling total)	NI	BACT-PSD

GHG (Carbon Dioxide Equivalent) BACT Determinations - Heaters Firing Natural Gas					
Facility: County, State	**RBLC ID/ Permit # (Issuance Date)**	**Process**	**Pollutant: Control, Emission Limits**	**Control Efficiency**	**Basis**
Existing GHG (Carbon Dioxide Equivalent) BACT Determinations - Heaters Firing Natural Gas					
Iowa Fertilizer Company: Wever, IA	IA-0105/ 12-219 (10/26/2012)	Startup Heater (110.12 MMBtu/hr)	CO_2e: Good combustion practices, 638.00 tons/yr (12-month rolling total)	NI	BACT-PSD
City of Palmdale: Palmdale, CA	CA-1212/ SE 09-01 (10/18/2011)	Auxiliary Heater (40 MMBtu/hr)	CO_2e: Annual boiler tuneups	NI	BACT-PSD

Step 2: Eliminate Technically Infeasible Options - Natural Gas Fired Space Heaters and Air Heaters (GHG)

No technologies were eliminated from consideration because of technical infeasibility for natural gas fired heaters.

Step 3: Rank the Remaining Control Technologies by Control Effectiveness - Natural Gas Fired Space Heaters and Air Heaters (GHG)

The control technologies for natural gas fired heaters are ranked as follows:

(1) Clean fuels

(2) Good combustion practices

(3) Usage limitations

Step 4: Evaluate the Most Effective Controls and Document the Results - Natural Gas Fired Space Heaters and Air Heaters (GHG)

Based on a review of the U.S. EPA RBLC and other Indiana permits, the primary control used for natural gas fired heaters is the use of good combustion practices. Most facilities express exhaust emission limitations in terms of tons per year of carbon dioxide equivalent.

GHG BACT for the natural gas fired fire pump has been determined to be the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with appropriate emission limits.

*Step 5: Select BACT - Natural Gas Fired Space Heaters and Air Heaters (*GHG*)*

A detailed GHG BACT for natural gas fired heaters is given in the BACT Conclusion for GHG.

<u>BACT Conclusion for GHG</u>

Pursuant to 326 IAC 2-2-3, the Best Available Control Technology (BACT) for GHG emissions shall be as follows:

(a) Induration Furnace

The induration furnace operations shall be limited as follows:

(1) Implementation of an energy efficient furnace design.

(2) Operation of the furnace at energy use rates consistent with the furnace design.

(3) Use of natural gas as fuel in the induration furnace.

(4) Use of coke breeze to offset the endothermic reaction requirements.

(5) Use of lime as an SO_2 removal reagent.

(6) A limit of 661,208 tpy CO_2e per 12-month rolling sum basis.

(b) Combustion Units

The combustion units shall be limited as follows:

(1) GHG emissions from the emergency generator (EU017) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 500 hours per year along with an emission limit of 144 tons of CO_2e per 12-month period.

(2) GHG emissions from the fire pump (EU018) shall be controlled through the restricted use of only natural gas, the use of good combustion practices, and an operation limit of 200 hours per year along with an emission limit of 66 tons of CO_2e per 12-month period.

(3) GHG emissions from the space heaters (EU021) shall be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 3,587 tons of CO_2e per 12-month period.

(4) GHG emissions from the ground limestone/dolomite additive system air heater (EU010) shall be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 9,737 tons of CO_2e per 12-month period.

(5) GHG emissions from the coke breeze additive system air heater (EU009) shall be controlled through the restricted use of only natural gas and the use of good combustion practices along with an emission limit of 871 tons of CO_2e per 12-month period.

Compliance with the above limits and conditions will satisfy the requirements of 326 IAC 2-2-3 (BACT) with regards to GHG (as CO_2e).

IDEM Contact

Questions regarding this BACT Analysis can be directed to John Haney at the Indiana Department Environmental Management, Office of Air Quality, 100 North Senate Avenue, MC 61-53, Room 1003, Indianapolis, Indiana 46204-2251 or by telephone at (317) 234-5328 or toll free at 1-800-451-6027 extension 4-5328.

Appendix C: Cost Analyses for Control Devices
Cost Summary
Table A-1

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Hood Exhaust SO_2 Control Cost Summary

Control Technology	SO_2 Control Effectiveness	Controlled Emissions (tons/yr)	Emission Reduction (tons/yr)	Installed Capital Cost	Annualized Operating Cost	Pollution Control Cost ($/ton)
Gas Suspension Absorber (GSA)	5 ppm SO2	67.58	27.36	$13,527,380	$2,259,790	$82,606
Gas Suspension Absorber (GSA) with Baghouse	5 ppm SO2	67.58	27.36	$21,629,184	$4,148,943	$151,663
Dry Sorbent Injection (DSI)	5 ppm SO2	56.96	37.98	$2,580,004	$2,124,482	$55,943
Dry Sorbent Injection (DSI) with Baghouse	5 ppm SO2	56.96	37.98	$11,533,154	$4,149,331	$109,262
Uncontrolled	0%	94.94				

Hood Exhaust NO_x Control Cost Summary

Control Technology	NO_x Control Effectiveness	Controlled Emissions (tons/yr)	Emission Reduction (tons/yr)	Installed Capital Cost	Annualized Operating Cost	Pollution Control Cost ($/ton)
Regenerative Selective Catalyic Reduction (RSCR)	2 ppm NOx	19.43	16.38	$27,172,374	$4,882,732	$298,097
Selective Catalytic Reduction (SCR) with Reheat	2 ppm NOx	19.43	16.38	$26,472,510	$5,358,165	$327,123
Uncontrolled	0%	35.81				

Windbox Exhaust NO_x Control Cost Summary

Control Technology	NO_x Control Effectiveness	Controlled Emissions (tons/yr)	Emission Reduction (tons/yr)	Installed Capital Cost	Annualized Operating Cost	Pollution Control Cost ($/ton)
Selective Catalytic Reduction (SCR) with Reheat	4 ppm NOx	49.91	391.70	$48,426,895	$9,517,900	$24,299
Regenerative Selective Catalyic Reduction (RSCR)	10.5 ppm NOx	110.40	331.21	$28,675,674	$5,990,912	$18,088
LoTOx	15 ppm NOx	187.17	254.44	$6,377,242	$7,189,695	$28,257
Uncontrolled	0%	441.61				

Appendix C: Cost Analyses for Control Devices
Summary of Utility, Chemical and Supply Costs
Table A-2a

Company Name: **Magnetation LLC**
Address City, IN Zip: **64 East 100 North, Reynolds, IN 47980**
Title V Operating Permit No.: **T181-32081-00054**
Permit Reviewer: **John Haney**
Date: **February 6, 2013**

Operating Unit: Indurator Hood Exhaust **Study Year** 2011
Emission Unit Number EU13
Stack/Vent Number SV013A

Item	Unit Cost	Units	Reference Cost	Year	Data Source	Notes
Operating Labor	32	$/hr			Average union labor rate for MN mining industry	
Maintenance Labor	32	$/hr			Average union labor rate for MN mining industry	
Electricity	0.0618	$/kwh	0.0618	2012	2011 Average electric price for industrial users in Indiana. US Energy Information Administration	
Natural Gas	5.65	$/mscf	5.65	2010	2010 Average natural gas price for industrial users in Indiana; 2011 data was not available. US Energy Information Administration	
Water	0.93	$/mgal	0.76	2004	Kaar Consulting MSI Cost Model	
Cooling Water	0.32	$/mgal	0.225	1999	EPA Air Pollution Control Cost Manual, 6th ed. Section 3.1 Ch 1	Ch 1 Carbon Absorbers, 1999 $0.15 - $0.30 Avg of 22.5 and 7 yrs and 3% inflation
Compressed Air	0.37	$/mscf	0.25	1998	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1	Example problem; Dried & Filtered, Ch 1.6 '98 cost adjusted for 3% inflation
Wastewater Disposal Neutralization	1.96	$/mgal	1.50	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 2 Chapter 2.5.5.5	Section 2 lists $1- $2/1000 gal. Cost adjusted for 3% inflation Sec 6 Ch 3 lists $1.30 - $2.15/1,000 gal
Wastewater Disposal Reverse Osmosis Treatment	92.70	$/mgal	90.00	2009	Barr Engineering Estimate	Ch 1lists $1.00 - $6.00 for municipal treatment, $3.80 is average. Cost adjusted for 3% inflation
Solid Waste Disposal	32.62	$/ton	25.00	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 2 Chapter 2.5.5.5	Section 2 lists $20 - $30/ton Used $25/ton. Cost adjusted for 3% inflation
Hazardous Waste Disposal	326.19	$/ton	250.00	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 2 Chapter 2.5.5.5	Section 2 lists $200 - $300/ton Used $250/ton. Cost adjusted for 3% inflation
Waste Transport	0.65	$/ton-mi	0.50	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 3	Example problem. Cost adjusted for 3% inflation
Internal Waste Recycle	1.38	$/ton	1.00	2000	Corus Study for MN Iron and Steel Project	Study use $1/ton to cover cost of materials movement
Chemicals & Supplies						
Lime	290.00	$/ton			Estimated from Siemens/Aker Proposal	
Caustic	334.33	$/ton	280	2005	Hawkins Chemical	50% solution (50 Deg Be) includes delivery
Urea	483.59	$/ton	405	2005	Hawkins Chemical	50% solution of urea in water, includes delivery
Soda Ash		$/ton				
Oxygen	1.72	Mscf	1.40	2004	Kaar Consulting MSI Cost Model	cost adjusted for 3% inflation
EPA Urea	179.1	$/ton				
Ammonia	0.101	$/lb				
Aqua Ammonia 19%	1.40	$/gal			May 2, 2011 Babcock Power Cost Estimate	
Catalyst & Replacement Parts						
SCR Catalyst	180	$/ft^3			April 26, 2011 cost estimatefor SCR catalyst from Cormetech	
CO Catalyst	650	$/ft^4			Vendor quote if needed	
Catalyst #3						
Catalyst #4						
Catalyst #5						
Filter Bags	43.98	$/bag	33.71	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6, Chapter 1	Example problem cost for 10 ft bags. Cost adjusted for 3% inflation
Tower Packing	100	$/ft^3				
Replacement Parts						
Replacement Parts						
Replacement Parts						
Other						
Sales Tax	7	%				
Interest Rate	7.00%	%				Estimated prime rate plus 3%
Operating Information						
Annual Op. Hrs	8,060	Hours				
Utilization Rate	NA					
Equipment Life	20	yrs				
Design Capacity	3,953,510	s-tons/yr				
Standardized Flow Rate	**288,534**	scfm @ 32º F				
Temperature	246	Deg F				
Moisture Content	4.7%					
Stack Pressure	14.02	psi				
Actual Flow Rate	**434,116**	acfm				
Standardized Flow Rate	**309,646**	scfm @ 68º F				
Dry Std Flow Rate	**295,062**	dscfm @ 68º F				
F-Factor Duty per Stack Flow	1,752.8	MMBtu/hr				
	Max Emis					
Pollutant	**TPY**					
PM10						
PM2.5						
PM						
Nitrous Oxides (NOx)	35.81					
Sulfur Dioxide (SO_2)	94.94					
Sulfuric Acid Mist						
Fluorides						
Volatile Organic Compounds (VOC)						
Carbon Monoxide (CO)						
Lead (Pb)						
Mercury (Hg)						

Appendix C: Cost Analyses for Control Devices
Summary of Utility, Chemical and Supply Costs
Table A-2b

Company Name: **Magnetation LLC**
Address City, IN Zip: **64 East 100 North, Reynolds, IN 47980**
Title V Operating Permit No.: **T181-32081-00054**
Permit Reviewer: **John Haney**
Date: **February 6, 2013**

Operating Unit: Indurator Windbox Exhaust **Study Year** 2011
Emission Unit Number EU 014
Stack/Vent Number SV013B

Item	Unit Cost	Units	Reference Cost	Year	Data Source	Notes
Operating Labor	32	$/hr			Average union labor rate for MN mining industry	
Maintenance Labor	32	$/hr			Average union labor rate for MN mining industry	
Electricity	0.0618	$/kwh	0.0618	2012	2011 Average electric price for industrial users in Indiana. US Energy Information Administration	
Natural Gas	5.65	$/mscf	5.65	2010	2010 Average natural gas price for industrial users in Indiana; 2011 data was not available. US Energy Information Administration	
Water	0.93	$/mgal	0.76	2004	Kaar Consulting MSI Cost Model	
Cooling Water	0.32	$/mgal	0.225	1999	EPA Air Pollution Control Cost Manual, 6th ed. Section 3.1 Ch 1	Ch 1 Carbon Absorbers, 1999 $0.15 - $0.30 Avg of 22.5 and 7 yrs and 3% inflation
Compressed Air	0.37	$/mscf	0.25	1998	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1	Example problem; Dried & Filtered, Ch 1.6 '98 cost adjusted for 3% inflation
Wastewater Disposal Neutralization	1.96	$/mgal	1.50	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 2 Chapter 2.5.5.5	Section 2 lists $1- $2/1000 gal. Cost adjusted for 3% inflation Sec 6 Ch 3 lists $1.30 - $2.15/1,000 gal
Wastewater Disposal Reverse Osmosis Treatment	92.70	$/mgal	90.00	2009	Barr Engineering Estimate	Ch 1lists $1.00 - $6.00 for municipal treatment, $3.80 is average. Cost adjusted for 3% inflation
Solid Waste Disposal	32.62	$/ton	25.00	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 2 Chapter 2.5.5.5	Section 2 lists $20 - $30/ton Used $25/ton. Cost adjusted for 3% inflation
Hazardous Waste Disposal	326.19	$/ton	250.00	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 2 Chapter 2.5.5.5	Section 2 lists $200 - $300/ton Used $250/ton. Cost adjusted for 3% inflation
Waste Transport	0.65	$/ton-mi	0.50	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 3	Example problem. Cost adjusted for 3% inflation
Internal Waste Recycle	1.38	$/ton	1.00	2000	Corus Study for MN Iron and Steel Project	Study use $1/ton to cover cost of materials movement
Chemicals & Supplies						
Lime	290.00	$/ton			Estimated from Siemens/Aker Proposal	
Caustic	334.33	$/ton	280	2005	Hawkins Chemical	50% solution (50 Deg Be) includes delivery
Urea	483.59	$/ton	405	2005	Hawkins Chemical	50% solution of urea in water, includes delivery
Soda Ash		$/ton				
Oxygen	1.72	Mscf	1.40	2004	Kaar Consulting MSI Cost Model	cost adjusted for 3% inflation
EPA Urea	179.1	$/ton				
Ammonia	0.101	$/lb				
Aqua Ammonia 19%	1.40	$/gal			May 2, 2011 Babcock Power Cost Estimate	
Catalyst & Replacement Parts						
SCR Catalyst	180	$/ft^3			April 26, 2011 cost estimatefor SCR catalyst from Cormetech	
CO Catalyst	650	$/ft^3			Vendor quote if needed	
Catalyst #3						
Catalyst #4						
Catalyst #5						
Filter Bags	43.98	$/bag	33.71	2002	EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6, Chapter 1	Example problem cost for 10 ft bags. Cost adjusted for 3% inflation
Tower Packing	100	$/ft^3				
Replacement Parts						
Replacement Parts						
Replacement Parts						
Other						
Sales Tax	7	%				
Interest Rate	7.00%	%				Estimated prime rate plus 3%
Operating Information	At Waste Gas Exhaust	At GSA/BH Exhaust				
Annual Op. Hrs	8060	8060	Hours			
Utilization Rate	NA	NA				
Equipment Life	20	20	yrs			
Design Capacity	3,953,510	3953510	s-tons/yr			
Standardized Flow Rate	**370,235**	**371,069**	scfm @ 32º F			
Temperature	170	156	Deg F			
Stack Pressure	14.40	14.40	psi			
Moisture Content	11.0%	11.2%				
Actual Flow Rate	**483,959**	**474,270**	acfm			
Standardized Flow Rate	**397,326**	**398,221**	scfm @ 68º F			
Dry Std Flow Rate	**353,620**	**353,620**	dscfm @ 68º F			
F-Factor Duty per Stack Flow	2100.7	2100.7	MMBtu/hr			
	Max Emis					
Pollutant	**TPY**					
PM10						
PM2.5						
PM						
Nitrous Oxides (NOx)	441.61	441.61				
Sulfur Dioxide (SO_2)	1170.90	85.89				
Sulfuric Acid Mist						
Fluorides						
Volatile Organic Compounds (VOC)						
Carbon Monoxide (CO)						
Lead (Pb)						
Mercury (Hg)						

Appendix C: Cost Analyses for Control Devices
SO2 Control Gas Suspension Absorbers (GSA) + Baghouse
Table A-3-1a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: Indurator Hood Exhaust

Emission Unit Number	EU13		Stack/Vent Number	SV013A	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	288,534	scfm @ 32º F
Expected Utilization Rate	NA		Temperature	246	0
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	4.7%	
Annual Interest Rate	7.0%		Actual Flow Rate	434,116	acfm
Expected Equipment Life	20	yrs	Standardized Flow Rate	309,646	scfm @ 68º F
			Dry Std Flow Rate	295,062	dscfm @ 68º F

CONTROL EQUIPMENT COSTS

Capital Costs								
Direct Capital Costs								
Purchased Equipment (A)								8,095,361
Purchased Equipment Total (B)	22%	of control device cost (A)						**9,876,340**
Installation - Standard Costs	74%	of purchased equip cost (B)						7,308,491
Installation - Site Specific Costs								NA
Installation Total								7,308,491
Total Direct Capital Cost, DC								17,184,831
Total Indirect Capital Costs, IC	45%	of purchased equip cost (B)						4,444,353
Total Capital Investment (TCI) = DC + IC								**21,629,184**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						1,271,320
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						2,877,623
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**4,148,943**

Emission Control Cost Calculation

Pollutant	Max Emis Lb/Hr	Annual T/Yr	Cont Eff %	Exit Conc.	Conc. Units	Cont Emis T/yr	Reduction T/yr	Cont Cost $/Ton Rem
PM10						0.0	-	NA
PM2.5						0.0	-	NA
Total Particulates						0.0	-	NA
Nitrous Oxides (NOx)						0.0	-	NA
Sulfur Dioxide (SO_2)	NA	94.94	29%	5	ppm	67.58	27.36	151,663
Sulfuric Acid Mist						0.00	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA
Lead (Pb)						0.00	-	NA

Notes & Assumptions

1. Cost estimate based on flow rate of 480,000 scfm
2. Cost includes GSA, Baghouse, and Lime injection system
3. Cost estimation basis 1351260 acfm. Used 0.6 power law factor to adjust price to calculated acfm
4. Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1
5. Compressed air for baghouse assumed to be 2 scfm / 1000 acfm EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1.5.1.8
6. Bag replacement at 10 min/bag EPA Cont Cost Manual 6th ed Section 6 Chapter 1.5.1.4 lists replacement times from 5 - 20 min per bag.
7. Lime consumption per vendor 1.56 lb lime / lb SO_2 removed
8. The control efficiencies for sulfuric acid mist, fluorides and lead are for example calculations and do not represent actual control efficiencies.
9. The temperature of 246 F shown above represents the temperature that is entering the control device.

Appendix C: Cost Analyses for Control Devices
SO2 Control Gas Suspension Absorbers (GSA) + Baghouse
Table A-3-1b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			**8,095,361**
Purchased Equipment Costs (A) - Absorber + packing + auxiliary equipment, EC			
Instrumentation	10%	of control device cost (A)	809,536
State Sales Taxes	7.0%	of control device cost (A)	566,675
Freight	5%	of control device cost (A)	404,768
Purchased Equipment Total (B)	22%		**9,876,340**
Installation			
Foundations & supports	4%	of purchased equip cost (B)	395,054
Handling & erection	50%	of purchased equip cost (B)	4,938,170
Electrical	8%	of purchased equip cost (B)	790,107
Piping	1%	of purchased equip cost (B)	98,763
Insulation	7%	of purchased equip cost (B)	691,344
Painting	4%	of purchased equip cost (B)	395,054
Installation Subtotal Standard Expenses	74%		**7,308,491**
Site Preparation, as required		Site Specific	NA
Buildings, as required		Site Specific	NA
Site Specific - Other		Site Specific	NA
Total Site Specific Costs			NA
Installation Total			**7,308,491**
Total Direct Capital Cost, DC			**17,184,831**
Indirect Capital Costs			
Engineering, supervision	10%	of purchased equip cost (B)	987,634
Construction & field expenses	20%	of purchased equip cost (B)	1,975,268
Contractor fees	10%	of purchased equip cost (B)	987,634
Start-up	1%	of purchased equip cost (B)	98,763
Performance test	1%	of purchased equip cost (B)	98,763
Model Studies	NA	of purchased equip cost (B)	NA
Contingencies	3%	of purchased equip cost (B)	296,290
Total Indirect Capital Costs, IC	45%	of purchased equip cost (B)	**4,444,353**
Total Capital Investment (TCI) = DC + IC			**21,629,184**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**20,438,784**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	32.00	$/Hr, 2.0 hr/8 hr shift, 8060 hr/yr	64,480
Supervisor	15%	15% of Operator Costs	9,672
Maintenance			
Maintenance Labor	32.00	$/Hr, 1.0 hr/8 hr shift, 8060 hr/yr	32,240
Maintenance Materials	100%	of maintenance labor costs	32,240
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 943 kW-hr, 8060 hr/yr,	469,666
NA	NA		-
Water	0.93	$/mgal, 27 gpm, 8060 hr/yr,	12,316
NA	NA		-
Comp Air	0.37	$/mscf, 2 scfm/kacfm, 8060 hr/yr,	154,151
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Lime	290.00	$/ton, 37 lb/hr, 8060 hr/yr,	42,951
NA	NA		-
NA	NA		-
NA	NA		-
Filter Bags	43.98	$/bag, 795 bags, 8060 hr/yr,	453,604
Total Annual Direct Operating Costs			**1,271,320**
Indirect Operating Costs			
Overhead	60%	of total labor and material costs	83,179
Administration (2% total capital costs)	2%	of total capital costs (TCI)	432,584
Property tax (1% total capital costs)	1%	of total capital costs (TCI)	216,292
Insurance (1% total capital costs)	1%	of total capital costs (TCI)	216,292
Capital Recovery	0.0944	for a 20- year equipment life and a 7% interest rate	1,929,277
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**2,877,623**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**4,148,943**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
SO2 Control Gas Suspension Absorbers (GSA) + Baghouse
Table A-3-1c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catalyst:		
Equipment Life	5	years
CRF	0.0000	
Rep part cost per unit	180	$/ft^3
Amount Required	0	ft^3
Total Rep Parts Cost	0	Cost adjusted for freight & sales tax
Installation Labor	0	Assume Labor = 15% of catalyst cost (basis labor for baghouse replacement)
Total Installed Cost	**0**	**Zero out if no replacement parts needed**
Annualized Cost	**0**	

Replacement Parts & Equipment:	**Filter bags & cages**		
Equipment Life	3	years	
CRF	0.3811		
Rep part cost per unit	33.711	$/bag	
Amount Required	795		
Total Rep Parts Cost		Cost adjusted for freight & sales tax	
Installation Labor		10 min per bag, Labor + Overhead (68% = $29.65/hr)	EPA Cont Cost Manual 6th ed Section 6 Chapter 1.5.1.4
Total Installed Cost	**1,190,400**	**Zero out if no replacement parts needed**	lists replacement times from 5 - 20 min per bag.
Annualized Cost	**453,604**		

Electrical Use	Flow acfm		D P in H2O	Efficiency	Hp	kW	
Blower, Baghouse	434,116		12			942.9	
Baghouse Shaker	0.0	Gross fabric area ft^2				0	EPA Cont Cost Manual 6th ed Section 6 Chapter 1 Eq 1.14
Other							
Other	27 gpm	6,178	kg/hr				
Other							
Other							
Other							
Total						942.9	

Baghouse Filter Cost							See Control Cost Manual Sec 6 Ch 1 Table 1.8 for bag costs
Gross BH Filter Area	10,661	ft^2					
Cages	10 ft long	5 in dia	13.42	area/cage ft^2	795 Cages	11.036	$/cage
Bags	1.69	$/ft2 of fabric				22.68	$/bag
Total						33.711	
Lime Use Rate	1.56	lb lime/lb SO2 removed		37	lb/hr Lime		

Operating Cost Calculations			**Annual hours of operation:**		**8,060**		
Item	**Unit Cost $**	**Unit of Measure**	**Use Rate**	**Unit of Measure**	**Annual Use***	**Annual Cost**	**Comments**
Operating Labor							
Op Labor	32	$/Hr	2.0	hr/8 hr shift	2,015	64,480	$/Hr, 2.0 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	9,672	15% of Operator Costs
Maintenance							
Maint Labor	32.00	$/Hr	1.0	hr/8 hr shift	1,008	32,240	$/Hr, 1.0 hr/8 hr shift, 8060 hr/yr
Maint Mtls	100	% of Maintenance Labor			NA	32,240	100% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	942.9	kW-hr	7,599,778	469,666	$/kwh, 943 kW-hr, 8060 hr/yr,
Natural Gas	5.65	$/mscf	0	scfm	0	0	$/mscf, 0 scfm, 8060 hr/yr,
Water	0.93	$/mgal	27.2	gpm	13,176	12,316	$/mgal, 27 gpm, 8060 hr/yr,
Cooling Water	0.32	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr,
Comp Air	0.37	$/mscf	2	scfm/kacfm	419,877	154,151	$/mscf, 2 scfm/kacfm, 8060 hr/yr,
WW Treat Neutralizatior	1.96	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr,
WW Treat Biotreatemen	92.70	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr,
SW Disposal	32.62	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr,
Haz W Disp	326	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr,
Waste Transport	0.65	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr,
Waste Recycle	1.38	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr,
Lime	290.00	$/ton	37	lb/hr	148	42,951	$/ton, 37 lb/hr, 8060 hr/yr,
Caustic	334.334643	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr,
Oxygen	1.72182341	Mscf	0.0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr,
SCR Catalyst	180	$/ft3	0	ft^3	0	0	$/ft3, 0 ft3, 8060 hr/yr,
Filter Bags	43.98	$/bag	795	bags	NA	453,604	$/bag, 795 bags, 8060 hr/yr,

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
SO2 Control Gas Suspension Absorbers (GSA)
Table A-3-2a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: **Indurator Hood Exhaust**

Emission Unit Number	EU13		Stack/Vent Number	SV013A	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	288,534	scfm @ 32º F
Expected Utilization Rate	NA		Temperature	246	0
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	4.7%	
Annual Interest Rate	7.0%		Actual Flow Rate	434,116	acfm
Expected Equipment Life	20	yrs	Standardized Flow Rate	309,646	scfm @ 68º F
			Dry Std Flow Rate	295,062	dscfm @ 68º F

CONTROL EQUIPMENT COSTS

Capital Costs								
Direct Capital Costs								
Purchased Equipment (A)								5,063,021
Purchased Equipment Total (B)	22%	of control device cost (A)						**6,176,886**
Installation - Standard Costs	74%	of purchased equip cost (B)						4,570,896
Installation - Site Specific Costs								NA
Installation Total								4,570,896
Total Direct Capital Cost, DC								10,747,781
Total Indirect Capital Costs, IC	45%	of purchased equip cost (B)						2,779,599
Total Capital Investment (TCI) = DC + IC								**13,527,380**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						527,269
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						1,732,521
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**2,259,790**

Emission Control Cost Calculation

Pollutant	Max Emis Lb/Hr	Annual T/Yr	Cont Eff %	Exit Conc.	Conc. Units	Cont Emis T/yr	Reduction T/yr	Cont Cost $/Ton Rem
PM10						0.0	-	NA
PM2.5						0.0	-	NA
Total Particulates						0.0	-	NA
Nitrous Oxides (NOx)						0.0	-	NA
Sulfur Dioxide (SO_2)	NA	94.94	29%	5	ppm	67.58	27.36	82,606
Sulfuric Acid Mist						0.00	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA
Lead (Pb)						0.00	-	NA

Notes & Assumptions

1. Cost estimate based on flow rate of 480,000 scfm
2. Cost includes GSA only no Baghouse
3. Cost estimation basis 1351260 acfm. Used 0.6 power law factor to adjust price to calculated acfm
4. Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1
5. Compressed air for baghouse assumed to be 2 scfm / 1000 acfm EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1.5.1.8
6. Bag replacement at 10 min/bag EPA Cont Cost Manual 6th ed Section 6 Chapter 1.5.1.4 lists replacement times from 5 - 20 min per bag.
7. Lime consumption per vendor 1.56 lb lime / lb SO_2 removed
8. The control efficiencies for sulfuric acid mist, fluorides and lead are for example calculations and do not represent actual control efficiencies.
9. The temperature of 246 F shown above represents the temperature that is entering the control device.

Appendix C: Cost Analyses for Control Devices
SO2 Control Gas Suspension Absorbers (GSA)
Table A-3-2b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			**5,063,021**
Purchased Equipment Costs (A) - Absorber + packing + auxiliary equipment, EC			
Instrumentation	10%	of control device cost (A)	506,302
State Sales Taxes	7.0%	of control device cost (A)	354,411
Freight	5%	of control device cost (A)	253,151
Purchased Equipment Total (B)	22%		**6,176,886**
Installation			
Foundations & supports	4%	of purchased equip cost (B)	247,075
Handling & erection	50%	of purchased equip cost (B)	3,088,443
Electrical	8%	of purchased equip cost (B)	494,151
Piping	1%	of purchased equip cost (B)	61,769
Insulation	7%	of purchased equip cost (B)	432,382
Painting	4%	of purchased equip cost (B)	247,075
Installation Subtotal Standard Expenses	74%		**4,570,896**
Site Preparation, as required		Site Specific	NA
Buildings, as required		Site Specific	NA
Site Specific - Other		Site Specific	NA
Total Site Specific Costs			NA
Installation Total			**4,570,896**
Total Direct Capital Cost, DC			**10,747,781**
Indirect Capital Costs			
Engineering, supervision	10%	of purchased equip cost (B)	617,689
Construction & field expenses	20%	of purchased equip cost (B)	1,235,377
Contractor fees	10%	of purchased equip cost (B)	617,689
Start-up	1%	of purchased equip cost (B)	61,769
Performance test	1%	of purchased equip cost (B)	61,769
Model Studies	NA	of purchased equip cost (B)	NA
Contingencies	3%	of purchased equip cost (B)	185,307
Total Indirect Capital Costs, IC	45%	of purchased equip cost (B)	**2,779,599**
Total Capital Investment (TCI) = DC + IC			**13,527,380**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**13,527,380**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	32.00	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr	16,120
Supervisor	15%	15% of Operator Costs	2,418
Maintenance			
Maintenance Labor	32.00	$/Hr, 1.0 hr/8 hr shift, 8060 hr/yr	32,240
Maintenance Materials	100%	of maintenance labor costs	32,240
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 471 kW-hr, 8060 hr/yr,	234,833
NA	NA		-
Water	0.93	$/mgal, 27 gpm, 8060 hr/yr,	12,316
NA	NA		-
Comp Air	0.37	$/mscf, 2 scfm/kacfm, 8060 hr/yr,	154,151
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Lime	290.00	$/ton, 37 lb/hr, 8060 hr/yr,	42,951
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Total Annual Direct Operating Costs			**527,269**
Indirect Operating Costs			
Overhead	60%	of total labor and material costs	49,811
Administration (2% total capital costs)	2%	of total capital costs (TCI)	270,548
Property tax (1% total capital costs)	0%	of total capital costs (TCI)	0
Insurance (1% total capital costs)	1%	of total capital costs (TCI)	135,274
Capital Recovery	0.0944	for a 20- year equipment life and a 7% interest rate	1,276,889
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**1,732,521**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**2,259,790**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
SO2 Control Gas Suspension Absorbers (GSA)
Table A-3-2c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catalyst:		
Equipment Life	5	years
CRF	0.0000	
Rep part cost per unit	180	$/ft^3
Amount Required	0	ft^3
Total Rep Parts Cost	0	Cost adjusted for freight & sales tax
Installation Labor	0	Assume Labor = 15% of catalyst cost (basis labor for baghouse replacement)
Total Installed Cost	**0**	**Zero out if no replacement parts needed**
Annualized Cost	**0**	

Replacement Parts & Equipment:	**Filter bags &**	**cages**	
Equipment Life	3	years	
CRF	0.3811		
Rep part cost per unit	33.711	$/bag	
Amount Required	795		
Total Rep Parts Cost		Cost adjusted for freight & sales tax	
Installation Labor		10 min per bag, Labor + Overhead (68% = $29.65/hr)	EPA Cont Cost Manual 6th ed Section 6 Chapter 1.5.1.4
Total Installed Cost	**0**	**Zero out if no replacement parts needed**	lists replacement times from 5 - 20 min per bag.
Annualized Cost	**0**		

Electrical Use	Flow acfm		D P in H2O	Efficiency	Hp	kW	
Blower, Baghouse	434,116		6			471.5	
Baghouse Shaker	0.0	Gross fabric area ft^2				0	EPA Cont Cost Manual 6th ed Section 6 Chapter 1 Eq 1.14
Other							
Other	27 gpm	6,178	kg/hr				
Other							
Other							
Other							
Total						471.5	

Baghouse Filter Cost							See Control Cost Manual Sec 6 Ch 1 Table 1.8 for bag costs
Gross BH Filter Area	10,661	ft^2					
Cages	10 ft long	5 in dia	13.42	area/cage ft^2	795 Cages	11.036	$/cage
Bags	1.69	$/ft2 of fabric				22.68	$/bag
Total						33.711	
Lime Use Rate	1.56	lb lime/lb SO2 removed		36.75	lb/hr Lime		

Operating Cost Calculations — **Annual hours of operation: 8,060**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32	$/Hr	0.5	hr/8 hr shift	504	16,120	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	2,418	15% of Operator Costs
Maintenance							
Maint Labor	32.00	$/Hr	1.0	hr/8 hr shift	1,008	32,240	$/Hr, 1.0 hr/8 hr shift, 8060 hr/yr
Maint Mtls	100	% of Maintenance Labor			NA	32,240	100% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	471.5	kW-hr	3,799,889	234,833	$/kwh, 471 kW-hr, 8060 hr/yr,
Natural Gas	5.65	$/mscf	0	scfm	0	0	$/mscf, 0 scfm, 8060 hr/yr,
Water	0.93	$/mgal	27.2	gpm	13,176	12,316	$/mgal, 27 gpm, 8060 hr/yr,
Cooling Water	0.32	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr,
Comp Air	0.37	$/mscf	2	scfm/kacfm	419,877	154,151	$/mscf, 2 scfm/kacfm, 8060 hr/yr,
WW Treat Neutralizatior	1.96	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr,
WW Treat Biotreatemen	92.70	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr,
SW Disposal	32.62	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr,
Haz W Disp	326	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr,
Waste Transport	0.65	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr,
Waste Recycle	1.38	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr,
Lime	290.00	$/ton	37	lb/hr	148	42,951	$/ton, 37 lb/hr, 8060 hr/yr,
Caustic	334.334643	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr,
Oxygen	1.72182341	Mscf	0.0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr,
SCR Catalyst	180	$/ft3	0	ft^3	0	0	$/ft3, 0 ft3, 8060 hr/yr,
Filter Bags	43.98	$/bag	795	bags	NA	0	$/bag, 795 bags, 8060 hr/yr,

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
SO2 Control Dry Sorbent Injection (DSI) with Baghouse
Table A-4-1a

Company Name: **Magnetation LLC**
Address City, IN Zip: **64 East 100 North, Reynolds, IN 47980**
Title V Operating Permit No.: **T181-32081-00054**
Permit Reviewer: **John Haney**
Date: **February 6, 2013**

Operating Unit: **Indurator Hood Exhaust**

Emission Unit Number	EU13		Stack/Vent Number	SV013A	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	288,534	scfm @ 32º F
Expected Utilization Rate	NA		Temperature	246	0
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	4.7%	
Annual Interest Rate	7.0%		Actual Flow Rate	434,116	acfm
Expected Equipment Life	20	yrs	Standardized Flow Rate	309,646	scfm @ 68º F
			Dry Std Flow Rate	295,062	dscfm @ 68º F

CONTROL EQUIPMENT COSTS

Capital Costs								
Direct Capital Costs								
Purchased Equipment (A)								4,316,623
Purchased Equipment Total (B)	22%	of control device cost (A)						**5,266,280**
Installation - Standard Costs	74%	of purchased equip cost (B)						3,897,047
Installation - Site Specific Costs								NA
Installation Total								3,897,047
Total Direct Capital Cost, DC								9,163,328
Total Indirect Capital Costs, IC	45%	of purchased equip cost (B)						2,369,826
Total Capital Investment (TCI) = DC + IC								**11,533,154**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						2,628,543
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						1,520,788
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**4,149,331**

Emission Control Cost Calculation

Pollutant	Max Emis Lb/Hr	Annual T/Yr	Cont Eff %	Exit Conc.	Conc. Units	Cont Emis T/yr	Reduction T/yr	Cont Cost $/Ton Rem
PM10						0.0	-	NA
PM2.5						0.0	-	NA
Total Particulates						0.0	-	NA
Nitrous Oxides (NOx)						0.0	-	NA
Sulfur Dioxide (SO_2)	NA	94.94	40%			56.96	37.98	109,262
Sulfuric Acid Mist						0.00	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA
Lead (Pb)						0.00	-	NA

Notes & Assumptions

1 Cost estimate based on flow rate of 1,054,344 Nm3/hr 665,994 scfm cost basis
2 Cost includes DSI and Baghouse.
3 Cost estimation basis 1351260 acfm. Used 0.6 power law factor to adjust price to calculated acfm
4 Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1
5 Compressed air for baghouse assumed to be 2 scfm / 1000 acfm EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1.5.1.8
6 Bag replacement at 10 min/bag EPA Cont Cost Manual 6th ed Section 6 Chapter 1.5.1.4 lists replacement times from 5 - 20 min per bag.
7 Lime consumption per vendor 1.56 lb lime / lb SO_2 removed
8 The temperature of 246 F shown above represents the temperature that is entering the control device.

Appendix C: Cost Analyses for Control Devices
SO2 Control Dry Sorbent Injection (DSI) with Baghouse
Table A-4-1b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			**4,316,623**
Purchased Equipment Costs (A) - Absorber + packing + auxiliary equipment, EC			
Instrumentation	10%	of control device cost (A)	431,662
State Sales Taxes	7.0%	of control device cost (A)	302,164
Freight	5%	of control device cost (A)	215,831
Purchased Equipment Total (B)	22%		**5,266,280**
Installation			
Foundations & supports	4%	of purchased equip cost (B)	210,651
Handling & erection	50%	of purchased equip cost (B)	2,633,140
Electrical	8%	of purchased equip cost (B)	421,302
Piping	1%	of purchased equip cost (B)	52,663
Insulation	7%	of purchased equip cost (B)	368,640
Painting	4%	of purchased equip cost (B)	210,651
Installation Subtotal Standard Expenses	74%		**3,897,047**
Site Preparation, as required		Site Specific	NA
Buildings, as required		Site Specific	NA
Site Specific - Other		Site Specific	NA
Total Site Specific Costs			NA
Installation Total			**3,897,047**
Total Direct Capital Cost, DC			**9,163,328**
Indirect Capital Costs			
Engineering, supervision	10%	of purchased equip cost (B)	526,628
Construction & field expenses	20%	of purchased equip cost (B)	1,053,256
Contractor fees	10%	of purchased equip cost (B)	526,628
Start-up	1%	of purchased equip cost (B)	52,663
Performance test	1%	of purchased equip cost (B)	52,663
Model Studies	NA	of purchased equip cost (B)	NA
Contingencies	3%	of purchased equip cost (B)	157,988
Total Indirect Capital Costs, IC	45%	of purchased equip cost (B)	**2,369,826**
Total Capital Investment (TCI) = DC + IC			**11,533,154**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**10,342,754**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	32.00	$/Hr, 2.0 hr/8 hr shift, 8060 hr/yr	64,480
Supervisor	15%	15% of Operator Costs	9,672
Maintenance			
Maintenance Labor	32.00	$/Hr, 1.0 hr/8 hr shift, 8060 hr/yr	32,240
Maintenance Materials	100%	of maintenance labor costs	32,240
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 786 kW-hr, 8060 hr/yr	391,389
NA	NA		-
Water	0.93	$/mgal, 3,203 gpm, 8060 hr/yr	1,447,817
NA	NA		-
Comp Air	0.37	$/mscf, 2 scfm/kacfm, 8060 hr/yr	154,151
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Lime	290.00	$/ton, 37 lb/hr, 8060 hr/yr	42,951
NA	NA		-
NA	NA		-
NA	NA		-
Filter Bags	43.98	$/bag, 0 bags, 8060 hr/yr	453,604
Total Annual Direct Operating Costs			**2,628,543**
Indirect Operating Costs			
Overhead	60%	of total labor and material costs	83,179
Administration (2% total capital costs)	2%	of total capital costs (TCI)	230,663
Property tax (1% total capital costs)	1%	of total capital costs (TCI)	115,332
Insurance (1% total capital costs)	1%	of total capital costs (TCI)	115,332
Capital Recovery	0.0944	for a 20- year equipment life and a 7% interest rate	976,283
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**1,520,788**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**4,149,331**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
SO2 Control Dry Sorbent Injection (DSI) with Baghouse
Table A-4-1c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catalyst:		
Equipment Life	5	years
CRF	0.0000	
Rep part cost per unit	180	$/ft^3
Amount Required	0	ft^3
Total Rep Parts Cost	0	Cost adjusted for freight & sales tax
Installation Labor	0	Assume Labor = 15% of catalyst cost (basis labor for baghouse replacement)
Total Installed Cost	**0**	**Zero out if no replacement parts needed**
Annualized Cost	**0**	

Replacement Parts & Equipment:	**Filter bags & cages**		
Equipment Life	3	years	
CRF	0.3811		
Rep part cost per unit		$/bag	
Amount Required			
Total Rep Parts Cost		Cost adjusted for freight & sales tax	
Installation Labor		10 min per bag, Labor + Overhead (68% = $29.65/hr)	EPA Cont Cost Manual 6th ed Section 6 Chapter 1.5.1.4
Total Installed Cost	**1,190,400**	**Zero out if no replacement parts needed**	lists replacement times from 5 - 20 min per bag.
Annualized Cost	**453,604**	Total installed cost is from Siemens Aker quote	

Electrical Use							
	Flow acfm		D P in H2O	Efficiency	Hp	kW	
Blower, Baghouse	434,116		10			785.8	
Baghouse Shaker	0.0	Gross fabric area ft^2				0	EPA Cont Cost Manual 6th ed Section 6 Chapter 1 Eq 1.14
Other							
Other	3203 gpm	50850	kg/hr				
Other							
Other							
Other							
Total						785.8	

Baghouse Filter Cost					See Control Cost Manual Sec 6 Ch 1 Table 1.8 for bag costs
Gross BH Filter Area					
Cages					
Bags					
Total					
Lime Use Rate	1.56	lb lime/lb SO2 removed	37	lb/hr Lime	

Operating Cost Calculations — **Annual hours of operation: 8,060**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32	$/Hr	2.0	hr/8 hr shift	2,015	64,480	$/Hr, 2.0 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	9,672	15% of Operator Costs
Maintenance							
Maint Labor	32.00	$/Hr	1.0	hr/8 hr shift	1,008	32,240	$/Hr, 1.0 hr/8 hr shift, 8060 hr/yr
Maint Mtls	100	% of Maintenance Labor			NA	32,240	100% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	785.8	kW-hr	6,333,148	391,389	$/kwh, 786 kW-hr, 8060 hr/yr
Natural Gas	5.65	$/mscf	0	scfm	0	0	$/mscf, 0 scfm, 8060 hr/yr
Water	0.93	$/mgal	3,203.0	gpm	1,548,957	1,447,817	$/mgal, 3,203 gpm, 8060 hr/yr
Cooling Water	0.32	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
Comp Air	0.37	$/mscf	2	scfm/kacfm	419,877	154,151	$/mscf, 2 scfm/kacfm, 8060 hr/yr
WW Treat Neutralization	1.96	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
WW Treat Biotreatement	92.70	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
SW Disposal	32.62	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Haz W Disp	326	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Waste Transport	0.65	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr
Waste Recycle	1.38	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Lime	290.00	$/ton	37	lb/hr	148	42,951	$/ton, 37 lb/hr, 8060 hr/yr
Caustic	334.334643	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Oxygen	1.72182341	Mscf	0.0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr
SCR Catalyst	180	$/ft3	0	ft^3	0	0	$/ft3, 0 ft3, 8060 hr/yr
Filter Bags	43.98	$/bag	0	bags	NA	453,604	$/bag, 0 bags, 8060 hr/yr

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
SO2 Control Dry Sorbent Injection (DSI) only
Table A-4-2a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: Indurator Hood Exhaust

Emission Unit Number	EU13		Stack/Vent Number	SV013A	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	288,534	scfm @ 32º F
Expected Utilization Rate	NA		Temperature	246	0
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	4.7%	
Annual Interest Rate	7.0%		Actual Flow Rate	434,116	acfm
Expected Equipment Life	20	yrs	Standardized Flow Rate	309,646	scfm @ 68º F
			Dry Std Flow Rate	295,062	dscfm @ 68º F

CONTROL EQUIPMENT COSTS

Capital Costs								
Direct Capital Costs								
Purchased Equipment (A)								965,643
Purchased Equipment Total (B)	22%	of control device cost (A)						**1,178,084**
Installation - Standard Costs	74%	of purchased equip cost (B)						871,782
Installation - Site Specific Costs								NA
Installation Total								871,782
Total Direct Capital Cost, DC								2,049,866
Total Indirect Capital Costs, IC	45%	of purchased equip cost (B)						530,138
Total Capital Investment (TCI) = DC + IC								**2,580,004**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						1,727,937
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						396,545
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**2,124,482**

Emission Control Cost Calculation

Pollutant	Max Emis Lb/Hr	Annual T/Yr	Cont Eff %	Exit Conc.	Conc. Units	Cont Emis T/yr	Reduction T/yr	Cont Cost $/Ton Rem
PM10						0.0	-	NA
PM2.5						0.0	-	NA
Total Particulates						0.0	-	NA
Nitrous Oxides (NOx)						0.0	-	NA
Sulfur Dioxide (SO_2)	NA	94.94	40%			56.96	37.98	55,943
Sulfuric Acid Mist						0.00	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA
Lead (Pb)						0.00	-	NA

Notes & Assumptions

1. Cost estimate based on flow rate of 1,054,344 Nm3/hr 665,994 scfm cost basis
2. Cost includes DSI only and no Baghouse.
3. Cost estimation basis 1351260 acfm. Used 0.6 power law factor to adjust price to calculated acfm
4. Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1
5. Compressed air for baghouse assumed to be 2 scfm / 1000 acfm EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 6 Chapter 1.5.1.8
6. Bag replacement at 10 min/bag EPA Cont Cost Manual 6th ed Section 6 Chapter 1.5.1.4 lists replacement times from 5 - 20 min per bag.
7. Lime consumption per vendor 1.56 lb lime / lb SO_2 removed
8. The temperature of 246 F shown above represents the temperature that is entering the control device.

Appendix C: Cost Analyses for Control Devices
SO2 Control Dry Sorbent Injection (DSI) only
Table A-4-2b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			**965,643**
Purchased Equipment Costs (A) - Absorber + packing + auxiliary equipment, EC			
Instrumentation	10%	of control device cost (A)	96,564
State Sales Taxes	7.0%	of control device cost (A)	67,595
Freight	5%	of control device cost (A)	48,282
Purchased Equipment Total (B)	22%		**1,178,084**
Installation			
Foundations & supports	4%	of purchased equip cost (B)	47,123
Handling & erection	50%	of purchased equip cost (B)	589,042
Electrical	8%	of purchased equip cost (B)	94,247
Piping	1%	of purchased equip cost (B)	11,781
Insulation	7%	of purchased equip cost (B)	82,466
Painting	4%	of purchased equip cost (B)	47,123
Installation Subtotal Standard Expenses	74%		**871,782**
Site Preparation, as required		Site Specific	NA
Buildings, as required		Site Specific	NA
Site Specific - Other		Site Specific	NA
Total Site Specific Costs			NA
Installation Total			**871,782**
Total Direct Capital Cost, DC			**2,049,866**
Indirect Capital Costs			
Engineering, supervision	10%	of purchased equip cost (B)	117,808
Construction & field expenses	20%	of purchased equip cost (B)	235,617
Contractor fees	10%	of purchased equip cost (B)	117,808
Start-up	1%	of purchased equip cost (B)	11,781
Performance test	1%	of purchased equip cost (B)	11,781
Model Studies	NA	of purchased equip cost (B)	NA
Contingencies	3%	of purchased equip cost (B)	35,343
Total Indirect Capital Costs, IC	45%	of purchased equip cost (B)	**530,138**
Total Capital Investment (TCI) = DC + IC			**2,580,004**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**2,580,004**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	32.00	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr	16,120
Supervisor	15%	15% of Operator Costs	2,418
Maintenance			
Maintenance Labor	32.00	$/Hr, 1.0 hr/8 hr shift, 8060 hr/yr	32,240
Maintenance Materials	100%	of maintenance labor costs	32,240
Utilities, Supplies, Replacements & Waste Management			
NA	NA		-
NA	NA		-
Water	0.93	$/mgal, 3,203 gpm, 8060 hr/yr	1,447,817
NA	NA		-
Comp Air	0.37	$/mscf, 2 scfm/kacfm, 8060 hr/yr	154,151
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Lime	290.00	$/ton, 37 lb/hr, 8060 hr/yr	42,951
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Total Annual Direct Operating Costs			**1,727,937**
Indirect Operating Costs			
Overhead	60%	of total labor and material costs	49,811
Administration (2% total capital costs)	2%	of total capital costs (TCI)	51,600
Property tax (1% total capital costs)	1%	of total capital costs (TCI)	25,800
Insurance (1% total capital costs)	1%	of total capital costs (TCI)	25,800
Capital Recovery	0.0944	for a 20- year equipment life and a 7% interest rate	243,534
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**396,545**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**2,124,482**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
SO2 Control Dry Sorbent Injection (DSI) only
Table A-4-2c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catalyst:		
Equipment Life	5	years
CRF	0.0000	
Rep part cost per unit	180	$/ft^3
Amount Required	0	ft^3
Total Rep Parts Cost	0	Cost adjusted for freight & sales tax
Installation Labor	0	Assume Labor = 15% of catalyst cost (basis labor for baghouse replacement)
Total Installed Cost	**0**	**Zero out if no replacement parts needed**
Annualized Cost	**0**	

Replacement Parts & Equipment:	**Filter bags & cages**			
Equipment Life	3	years		
CRF	0.3811			
Rep part cost per unit		$/bag		
Amount Required				
Total Rep Parts Cost		Cost adjusted for freight & sales tax		
Installation Labor		10 min per bag, Labor + Overhead (68% = $29.65/hr)		EPA Cont Cost Manual 6th ed Section 6 Chapter 1.5.1.4
Total Installed Cost	**0**	**Zero out if no replacement parts needed**		lists replacement times from 5 - 20 min per bag.
Annualized Cost	**0**	Total installed cost is from Siemens Aker quote		

Electrical Use							
	Flow acfm		D P in H2O	Efficiency	Hp	kW	
Blower, Baghouse	434,116		0			0.0	
Baghouse Shaker	0.0	Gross fabric area ft^2				0	EPA Cont Cost Manual 6th ed Section 6 Chapter 1 Eq 1.14
Other							
Other	3203 gpm	50850	kg/hr				
Other							
Other							
Other							
Total						0.0	

Baghouse Filter Cost					See Control Cost Manual Sec 6 Ch 1 Table 1.8 for bag costs
Gross BH Filter Area					
Cages					
Bags					
Total					
Lime Use Rate	1.56	lb lime/lb SO2 removed	36.75	lb/hr Lime	

Operating Cost Calculations — **Annual hours of operation: 8,060**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32	$/Hr	0.5	hr/8 hr shift	504	16,120	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	2,418	15% of Operator Costs
Maintenance							
Maint Labor	32.00	$/Hr	1.0	hr/8 hr shift	1,008	32,240	$/Hr, 1.0 hr/8 hr shift, 8060 hr/yr
Maint Mtls	100	% of Maintenance Labor			NA	32,240	100% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	0.0	kW-hr	0	0	$/kwh, 0 kW-hr, 8060 hr/yr
Natural Gas	5.65	$/mscf	0	scfm	0	0	$/mscf, 0 scfm, 8060 hr/yr
Water	0.93	$/mgal	3,203.0	gpm	1,548,957	1,447,817	$/mgal, 3,203 gpm, 8060 hr/yr
Cooling Water	0.32	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
Comp Air	0.37	$/mscf	2	scfm/kacfm	419,877	154,151	$/mscf, 2 scfm/kacfm, 8060 hr/yr
WW Treat Neutralization	1.96	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
WW Treat Biotreatement	92.70	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
SW Disposal	32.62	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Haz W Disp	326	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Waste Transport	0.65	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr
Waste Recycle	1.38	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Lime	290.00	$/ton	37	lb/hr	148	42,951	$/ton, 37 lb/hr, 8060 hr/yr
Caustic	334.334643	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Oxygen	1.72182341	Mscf	0.0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr
SCR Catalyst	180	$/ft3	0	ft^3	0	0	$/ft3, 0 ft3, 8060 hr/yr
Filter Bags	43.98	$/bag	0	bags	NA	0	$/bag, 0 bags, 8060 hr/yr

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Hood Exhaust NOx Control - Regenerative Selective Catalytic Reduction (RSCR)
Table A-5a

Company Name: **Magnetation LLC**
Address City, IN Zip: **64 East 100 North, Reynolds, IN 47980**
Title V Operating Permit No.: **T181-32081-00054**
Permit Reviewer: **John Haney**
Date: **February 6, 2013**

Operating Unit: **Indurating Hood Exhaust**

Emission Unit Number	EU13		Stack/Vent Number	SV013A		**Chemical Engineering**	
Desgin Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	288,534	scfm @ 32º F	**Chemical Plant Cost Index**	
Expected Utiliztion Rate	NA		Temperature	246	Deg F	2009	NA
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	4.7%		Dec-10	NA
Annual Interest Rate	7.0%		Actual Flow Rate	434,116	acfm	Inflation Adj	NA
Expected Equipment Life	20	yrs	Standardized Flow Rate	309,646	scfm @ 68º F		
			Dry Std Flow Rate	295,062	dscfm @ 68º F		

CONTROL EQUIPMENT COSTS

Capital Costs			Duty MMBtu/hr	Control Eff	NOx in lb/MMBtu		Year	
Direct Capital Costs (from vendor)								
Purchased Equipment (A)								
Purchased Equipment Total (B)	0%	of control device cost (A)					2011	**18,530,855**
Installation - Standard Costs	15%	of purchased equip cost (B)						3,474,535
Installation - Site Specific Costs								0
Installation Total								0
Total Direct Capital Cost, DC								0
Total Indirect Capital Costs, IC	0%	of purchased equip cost (B)						0
Total Capital Investment (TCI) = DC + IC								**27,172,374**
Total Capital Investment (TCI) + Retrofit								27,172,374
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						2,317,852
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						2,564,880
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**4,882,732**

Emission Control Cost Calculation

Pollutant	**Max Emis Lb/Hr**	**Annual T/Yr**	**Cont Eff %**	**Exit Conc**	**Conc Units**	**Cont Emis T/yr**	**Reduction T/yr**	**Cont Cost $/Ton Rem**
PM10						0.0	-	NA
Total Particulates						0.0	-	NA
Nitrous Oxides (NOx)	NA	35.81	46%	2	ppm	19.43	16.38	298,097
Sulfur Dioxide (SO_2)						0.0	-	NA
Sulfuric Acid Mist						0.0	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA
Lead (Pb)						0.0	-	NA

Notes & Assumptions

1 May 2, 2011 cost estimate from Babcock Power to treat an indurating furnace waste gas exhaust 474,270 acfm cost basis
2 Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2
3 Capital Cost per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.36 -2.43
4 Reagent Use per vendor quote and EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.32 - 2.35
5 SCR Catalyst Replacement per vendor quote.
6 SCR Electrical Demand per vendor estimates for reheat.
7 SCR Maintenance Costs EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.46
8 Capital cost and natural gas usage have been ratioed off of original estimate from Vogt Power to account for higher flow rate and increased natural gas usage for reheat option. Original cost estimate was $5,500,000.
9 The temperature of 246 F shown above represents the temperature that is entering the control device. Because no SO2 control is proposed for the hood exhaust, this is also assumed to be the temperature entering the NOx control device.

Appendix C: Cost Analyses for Control Devices
Hood Exhaust NOx Control - Regenerative Selective Catalytic Reduction (RSCR)
Table A-5b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			
Purchased Equipment Costs (A) - Absorber + packing + auxillary equipment, EC			**18,530,855**
Instrumentation	10%	of control device cost (A)	NA
State Sales Taxes	7.0%	of control device cost (A)	NA
Freight	5%	of control device cost (A)	NA
Purchased Equipment Total (A)			**18,530,855**
Indirect Installation			
Installation Costs (from vendor)	25%	of purchased equip cost (A)	4,632,714
Total Indirect Installation Costs (B)	25%	of purchased equip cost (A)	**4,632,714**
Project Contingeny (C)	15%	of (A + B)	**3,474,535**
Total Plant Cost D		A + B + C	**26,638,104**
Allowance for Funds During Construction (E)		0 for SNCR	**0**
Royalty Allowance (F)		0 for SNCR	**0**
Pre Production Costs (G)	2%	of (D+E))	**532,762**
Inventory Capital		Reagent Vol * $/gal	**1,508**
Intial Catalyst and Chemicals		0 for SNCR	**0**
Total Capital Investment (TCI) = DC + IC		D + E + F + G +H + I	**27,172,374**
Retrofit Factor	0%	of TCI	**0**
Total Capital Investment (TCI) + Retrofit Factor			**27,172,374**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**NA**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	3200%		-
Supervisor	15%		-
Maintenance			
Maintenance Total	1.5	% of Total Capital Investment	407,586
Maintenance Materials	NA	% of Maintenance Labor	-
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 780 kW-hr, 6072 hr/yr, 100% utilization	812,076
Natural Gas	5.65	$/mscf, 918 scfh, 6072 hr/yr, 100% utilization	223,899
NA	NA		-
NA	NA		-
Comp Air	NA	$/mscf, 0 scfm/kscfm, 6072 hr/yr, 100% utilization	-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Ammonia	1.40	$/lb, 745 lb/hr, 6072 hr/yr, 100% utilization	39,307
NA	NA		-
SCR Catalyst	180.00	$/ft3, 0 ft3, 6072 hr/yr, 100% utilization	834,985
NA	NA		-
Total Annual Direct Operating Costs			**2,317,852**
Indirect Operating Costs			
Overhead	NA	of total labor and material costs	NA
Administration (2% total capital costs)	NA	of total capital costs (TCI)	NA
Property tax (1% total capital costs)	NA	of total capital costs (TCI)	NA
Insurance (1% total capital costs)	NA	of total capital costs (TCI)	NA
Capital Recovery	0	for a 20- year equipment life and a 7% interest rate	2,564,880
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**2,564,880**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**4,882,732**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Hood Exhaust NOx Control - Regenerative Selective Catalytic Reduction (RSCR)
Table A-5c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catayst			
Equipment Life	70,000	hours per vendor	
FCW	0.1739		
Rep part cost per unit	NA	$/ft^3	
Replacement Factor	28,128	Hours of labor from vendor	
Catalyst Cost	4,801,780	From vendor for waste gas RSCR	From Vendor
Y catalyst life factor	5	Years, from vendor	From Vendor
Annualized Cost	**834,985**		

Electrical Use					
Duty	-	**MMBtu/hr**	Estimate from Vendor		
NOx Cont Eff	-	(as faction)	Power	kW	
NOx in	-	lb/MMBtu	Fan	1,459	Vendor data for waste gas system ratiod to Hood flow
n catalyst layers	-	layers	Air Cmpressor	31	
Press drop catalyst	-	in H_2O per layer	Fans, punps, heat trace	140	
Press drop duct	-	in H_2O			
Total				1,630	

Reagent Use & Other Operating Costs							
			Natural Gas U		5.01	MMBtu/hr	Vendor data for waste gas system ratiod to Hood temp
NOx in	0.00	lb/MMBtu			4,917	scfh	and flow, Hood exhaust hotter; so less natural gas needed
Efficiency	0.00		Ammonia Use				
Duty	0.00	MMBtu/hr	19%	solution	58	lb/ft^3	Density
			28,076	gal/yr - vendor est for waste gas reduced by ratio of uncontrolled NOx emis.			
		Volume 14 day inventory	1,077	gal	1,507.7		Inventory Cost

Operating Cost Calculations — **Annual hours of operation: 8060.0**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32.00	$/Hr	0.1	hr/8 hr shift	100.75	3224	$/Hr, 0.1 hr/8 hr shift, 0 hr/yr
Supervisor	0.15	of Op.			NA	483.6	15% of Operator Costs
Maintenance							
Maintenance Total	1.5	% of Total Capital Investment				407,586	% of Total Capital Investment, 0.0 , 0 hr/yr
Maint Mtls	0	% of Maintenance Labor			NA	0	0% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	1,630	kW-hr	13,140,381	812,076	$/kwh, 1,630 kW-hr, 8060 hr/yr
Natural Gas	5.650	$/mscf	4,917	scfh	39,628,168	223,899	$/mscf, 4,917 scfh, 8060 hr/yr
Water	0.935	$/mgal	0	gph	0	0	$/mgal, 0 gph, 8060 hr/yr
Cooling Water	0.321	$/mgal	0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
Comp Air	0.367	$/mscf	0	scfm/kscfm	0	0	$/mscf, 0 scfm/kscfm, 8060 hr/yr
WW Treat Neutralization	1.957	$/mgal	0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
WW Treat Biotreatement	92.70	$/mgal	0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
SW Disposal	32.62	$/ton	0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Haz W Disp	326.19	$/ton	0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Waste Transport	0.6524	$/ton-mi	0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr
Waste Recycle	1.384	$/ton	0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Lime	290.00	$/ton	0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Aqua Ammonia	1.40	$/gal	28,076	gal/yr	28,076	39,307	$/gal, 28,076 gal/yr, 8060 hr/yr
Oxygen	1.72	Mscf	0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr
SCR Catalyst	180	$/ft3	0	ft^3	0	834,985	$/ft3, 0 ft3, 8060 hr/yr
Filter Bags	43.98	$/bag	0	bags	0	0	$/bag, 0 bags, 8060 hr/yr

** Std Air use is 2 scfm/kacfm

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Hood Exhaust NOx Control - Catalytic Reduction (SCR) + Reheat
Table A-6a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: Indurator Hood Exhaust

Emission Unit Number	EU13		Stack/Vent Number	SV013A		**Chemical Engineering**	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	288,534	scfm @ 32º F	**Chemical Plant Cost Index**	
Expected Utilization Rate	NA		SCR Rx Temperature	246	0	1998/1999	390
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	4.7%		Dec-11	588.8
Annual Interest Rate	7.0%		Actual Flow Rate at SCR Rx	414,035	acfm	Inflation Adj	1.51
Expected Equipment Life	20	yrs	Standardized Flow Rate	309,646	scfm @ 68º F		
			Dry Std Flow Rate	295,062	dscfm @ 68º F		

CONTROL EQUIPMENT COSTS

Capital Costs							Year	
Direct Capital Costs	EPRI Correlation						1998	11,754,201
Purchased Equipment (A)							2011	17,745,829
Purchased Equipment Total (B)	0%	of control device cost (A)						**17,745,829**
Installation - Standard Costs	15%	of purchased equip cost (B)						3,194,249
Installation - Site Specific Costs								0
Installation Total								0
Total Direct Capital Cost, DC								0
Total Indirect Capital Costs, IC	0%	of purchased equip cost (B)						0
Total Capital Investment (TCI) = DC + IC							SCR + Reheat	**26,472,510**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.					SCR + Reheat	2,769,158
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost					SCR + Reheat	2,589,008
Total Annual Cost (Annualized Capital Cost + Operating Cost)							SCR + Reheat	**5,358,165**

Emission Control Cost Calculation

Pollutant	Max Emis Lb/Hr	Annual T/Yr	Cont Eff %	Exit Conc.	Conc. Units	Cont Emis T/yr	Reduction T/yr	Cont Cost $/Ton Rem
PM10						0.0	-	NA
Total Particulates						0.0	-	NA
Lead (Pb)						0.0	-	NA
Nitrous Oxides (NOx)	NA	35.81	46%	2	ppm	19.43	16.38	327,123
Sulfur Dioxide (SO_2)	NA					0.0	-	NA
Sulfuric Acid Mist						0.0	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA

Notes & Assumptions

1 Capital Cost per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.36 -2.43
2 Reagent Use per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.32 - 2.35
3 SCR Catalyst Volume per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.18 - 2.24
4 SCR Reactor Size per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.25 - 2.31
5 SCR Catalyst Replacement per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.50 - 2.53
6 SCR Electrical Demand per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.48
7 SCR Maintenance Costs EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.46
8 SCR operating Temperature 465 F. Typical tail end SCR operation temperature range 400 F to 540 F; avgerage = 470 F - Johnson Matthey Catalysts presentation "New FGD and De NOx Approaches" McIlvaine webinar April 7, 2011. Babcok Power RSCR design operting temperature 465 F

Appendix C: Cost Analyses for Control Devices
Hood Exhaust NOx Control - Catalytic Reduction (SCR) + Reheat
Table A-6b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			
Purchased Equipment Costs (A)			**17,745,829**
Instrumentation	10%	of control device cost (A)	NA
State Sales Taxes	7.0%	of control device cost (A)	NA
Freight	5%	of control device cost (A)	NA
Purchased Equipment Total (A)			**17,745,829**
Indirect Installation			
General Facilities	5%	of purchased equip cost (A)	887,291
Engineering & Home Office	10%	of purchased equip cost (A)	1,774,583
Process Contingency	5%	of purchased equip cost (A)	887,291
Total Indirect Installation Costs (B)	20%	of purchased equip cost (A)	**3,549,166**
Project Contingency (C)	15%	of (A + B)	**3,194,249**
Total Plant Cost D		A + B + C	**24,489,244**
Allowance for Funds During Construction (E)		0 for SCR	**0**
Royalty Allowance (F)		0 for SCR	**0**
Pre Production Costs (G)	2%	of (D+E))	**489,785**
Inventory Capital		Reagent Vol * $/gal	**404**
Initial Catalyst and Chemicals		0 for SCR	**0**
Total Capital Investment (TCI) = DC + IC		D + E + F + G +H + I	**24,979,433**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**NA**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	NA		-
Supervisor	NA		-
Maintenance			
Maintenance Total	1.50	% of Total Capital Investment	374,692
Maintenance Materials	NA	% of Maintenance Labor	-
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 2,215 kW-hr, 8060 hr/yr	1,103,083
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Ammonia	0.10	$/lb, 12 lb/hr, 8060 hr/yr, 0% utilization	9,694
NA	NA		-
SCR Catalyst	180.00	$/ft3, 0 ft3, 8060 hr/yr, 0% utilization	105,725
NA	NA		-
Total Annual Direct Operating Costs			**1,593,193**
Indirect Operating Costs			
Overhead	NA	of total labor and material costs	NA
Administration (2% total capital costs)	NA	of total capital costs (TCI)	NA
Property tax (1% total capital costs)	NA	of total capital costs (TCI)	NA
Insurance (1% total capital costs)	NA	of total capital costs (TCI)	NA
Capital Recovery	0.0944	for a 20- year equipment life and a 7% interest rate	2,357,882
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**2,357,882**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**3,951,075**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Hood Exhaust NOx Control - Catalytic Reduction (SCR) + Reheat
Table A-6c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catalyst				
Equipment Life	32,240	hours		
FCW	0.2252			
Rep part cost per unit	180	$/ft^3	# of Layers	20
Replacement Factor	10	ayers replaced per year =		2
Amount Required	2,608	ft^3		
Catalyst Cost	469,411			
Y catalyst life factor	4	Years		
Annualized Cost	**105,725**			

SCR Capital Cost per EPRI Method 1998 $'s		**11,754,201**					
Duty	1,753	MMBtu/hr	Catalyst Area	431	ft^2	556	*f*(h SCR)
Q flue gas	414,035	acfm	Rx Area	496		-46	*f*(h NH_3)
NOx Cont Eff	46%	(as faction)	Rx Height	22.3	ft	-728	*f*(h New) new= -728, Retrofit = 0
NOx in	0.005	lb/MMBtu	n layer	20	layers	N	Bypass? Y or N
Ammonia Slip	2	ppm	h layer	21.2	ft	0	*f*(h Bypass)
Fuel Sulfur	0.000	wt % (as %)	n total	21	layers	4,694,113	*f*(vol catalyst)
Temperature	246	Deg F	h SCR	122	ft		
Catalyst Volume	**26,078**	ft^3	New/Retrofit	N	N or R		

Electrical Use				
Duty	1,753	MMBtu/hr		kW
NOx Cont Eff	46%	(as faction)	Power	2,214.5
NOx in	0.01	lb/MMBtu		
n catalyst layers	21	layers		
Press drop catalyst	1	in H_2O per layer		
Press drop duct	3	in H_2O		
Total				2214.5

Reagent Use & Other Operating Costs			Ammonia Use			
NOx in	0.0051	lb/MMBtu	3	lb/hr Neat		
Efficiency	46%		29%	solution	56.0	lb/ft^3 Density
Duty	1,753	MMBtu/hr	12	lb/hr	1.6	gal/hr
		Volume 14 day inventory	535	gal	$404	Inventory Cost

Operating Cost Calculations — **Annual hours of operation: 8,060**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32	$/Hr	0.0	hr/8 hr shift	0	0	$/Hr, 0.0 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	-	15% of Operator Costs
Maintenance							
Maintenance Total	1.5	% of Total Capital Investment				374,692	% of Total Capital Investment
Maint Mtls	0	% of Maintenance Labor			NA	0	0% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	2214.5	kW-hr	17,849,241	1,103,083	$/kwh, 2,215 kW-hr, 8060 hr/yr
Natural Gas	5.65	$/mscf	0.0	scfh	0	0	$/mscf, 0 scfh, 8060 hr/yr, 0% utilization
Water	0.93	$/mgal	0.0	gph	0	0	$/mgal, 0 gph, 8060 hr/yr, 0% utilization
Cooling Water	0.32	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr, 0% utilization
Comp Air	0.37	$/mscf	0.0	scfm/kacfm**	0	0	$/mscf, 0 scfm/kacfm**, 8060 hr/yr, 0% utilization
WW Treat Neutralizatior	1.96	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr, 0% utilization
WW Treat Biotreatemen	92.70	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr, 0% utilization
SW Disposal	32.62	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr, 0% utilization
Haz W Disp	326	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr, 0% utilization
Waste Transport	0.65	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr, 0% utilization
Waste Recycle	1.38	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr, 0% utilization
Lime	290	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr, 0% utilization
Ammonia	0.101	$/lb	12	lb/hr	95,982	9,694	$/lb, 12 lb/hr, 8060 hr/yr, 0% utilization
Oxygen	1.72	Mscf	0.0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr, 0% utilization
SCR Catalyst	180	$/ft3	0	ft^3	0	105,725	$/ft3, 0 ft3, 8060 hr/yr, 0% utilization
Filter Bags	43.98	$/bag	0	bags	0	0	$/bag, 0 bags, 8060 hr/yr, 0% utilization

** Std Air use is 2 scfm/kacfm
*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Hood Exhaust NOx Control - Catalytic Reduction (SCR) + Reheat
Table A-6d

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Selective Catalytic Reduction -SCR Catalyst Volume Calculation

$Vol_{catalyst}$ (ft^3)= 2.81 x Q_B x η_{adj} x $Slip_{adj}$ x NOx_{adj} x S_{adj} x T_{adj}/N_{SCR}

η_{adj} = 0.2869 + (1.058 x η)

NOx_{adj} = 0.8524 + (0.3208 x NOx_{in})

$Slip_{adj}$ = 1.2835 - (0.0567 x Slip)

S_{adj} = 0.9636 + (0.0455 x S)

T_{adj} = 15.16 - (0.03937 x T) + (2.74e-5 x T^2)

Q_B	Heat Rate (MMBtu/hr)	1,753
η	NOx control efficiency	46%
NOx_{in}	Uncontrolled NOx Conc (lb/MMBtu)	0.005
Slip	Acceptable Ammonia Slip (ppm)	2
S	Sulfur Content of Fuel by Weight Fraction (%)	0.000
T	SCR Inlet flue gas temperature (°F)	246
N_{SCR}	Number of SCRs	1

η_{adj} = 0.771
NOx_{adj} = 0.854
$Slip_{adj}$ = 1.170
S_{adj} = 0.964
Tadj = 7.133

$Vol_{catalyst}$ = 26,078 ft^3

Source: EPA Air Pollution Control Cost Manual (EPA 452/B-02-001)
Section 4.2 NOx Post-Control Chapter 2 - Selective Catalytic Reduction
http://www.epa.gov/ttn/catc/dir1/cs4-2ch2.pdf

0.0 lb SO2/hr
1,753 MMBtu/hr
175,284 lb/hr Coal @10,000 Btu/lb coal
0.000 wt % S coal equivalent

Appendix C: Cost Analyses for Control Devices
Cost of Hood Exhaust Re-Heating (Thermal Oxidizer)
Table A-7a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: Indurator Hood Exhaust

Emission Unit Number	EU13		Stack/Vent Number	SV013A		**Chemical Engineering**	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	288,534	scfm @ 32º F	**Chemical Plant Cost Index**	
Expected Utilization Rate	NA		Reheat Inlet Temperature	246	Deg F	1998/1999	390
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	4.7%		Dec-11	588.8
Annual Interest Rate	7.0%		Actual Flow Rate	434,116	acfm	Inflation Adj	1.51
Expected Equipment Life	20	yrs	Standardized Flow Rate	309,646	scfm @ 68º F		
			Dry Std Flow Rate	295,062	dscfm @ 68º F		

CONTROL EQUIPMENT COSTS

Capital Costs								
Direct Capital Costs								
Purchased Equipment (A)								760,145
Purchased Equipment Total (B)	22%	of control device cost (A)						**927,377**
Installation - Standard Costs	30%	of purchased equip cost (B)						278,213
Installation - Site Specific Costs								NA
Installation Total								278,213
Total Direct Capital Cost, DC								1,205,590
Total Indirect Capital Costs, IC	31%	of purchased equip cost (B)						287,487
Total Capital Investment (TCI) = DC + IC								**1,493,077**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						1,175,965
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						231,126
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**1,407,090**

Notes & Assumptions

1 Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 3.2 Chapter 2
2 Equipment cost estimate EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 3.2 Chapter 2.5.1
3 EPA control cost guideline for catalytic oxidizers used for operating cost analysis. EPA Air Pollution Control Cost Manual 6th Ed 2002
4 The temperature of 246 F shown above represents the temperature that is entering the control device.
5 The temperature of the waste gas entering the NOx control device (246 F) is used to calculate the reheat requirements of the SCR system.
6 Reheat temperature = 465 F to meet tail end SCR catalyst opearting temperature requirements. Typical tail end SCR operation temperature range 400 F to 540 F; averaage = 470 F - Johnson Matthey Catalysts presentation webinar McIlvaine April 7, 2011. Babcok Power RSCR operting temperature = 465 F.

Appendix C: Cost Analyses for Control Devices
Cost of Hood Exhaust Re-Heating (Thermal Oxidizer)
Table A-7b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			**760,145**
Purchased Equipment Costs (A) - Absorber + packing + auxiliary equipment, EC			
Instrumentation	10%	of control device cost (A)	76,014
State Sales Taxes	7.0%	of control device cost (A)	53,210
Freight	5%	of control device cost (A)	38,007
Purchased Equipment Total (B)	22%		**927,377**
Installation			
Foundations & supports	8%	of purchased equip cost (B)	74,190
Handling & erection	14%	of purchased equip cost (B)	129,833
Electrical	4%	of purchased equip cost (B)	37,095
Piping	2%	of purchased equip cost (B)	18,548
Insulation	1%	of purchased equip cost (B)	9,274
Painting	1%	of purchased equip cost (B)	9,274
Installation Subtotal Standard Expenses	30%		**278,213**
Site Preparation, as required		Site Specific	NA
Buildings, as required		Site Specific	NA
Site Specific - Other		Site Specific	NA
Total Site Specific Costs			NA
Installation Total			**278,213**
Total Direct Capital Cost, DC			**1,205,590**
Indirect Capital Costs			
Engineering, supervision	10%	of purchased equip cost (B)	92,738
Construction & field expenses	5%	of purchased equip cost (B)	46,369
Contractor fees	10%	of purchased equip cost (B)	92,738
Start-up	2%	of purchased equip cost (B)	18,548
Performance test	1%	of purchased equip cost (B)	9,274
Model Studies		of purchased equip cost (B)	0
Contingencies	3%	of purchased equip cost (B)	27,821
Total Indirect Capital Costs, IC	31%	of purchased equip cost (B)	**287,487**
Total Capital Investment (TCI) = DC + IC			**1,493,077**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**1,493,077**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	32.00	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr	16,120
Supervisor	15%	15% of Operator Costs	2,418
Maintenance			
Maintenance Labor	32.00	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr	16,120
Maintenance Materials	100%	of maintenance labor costs	16,120
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 1,608 kW-hr, 8060 hr/yr	801,157
Natural Gas	5.65	$/mscf, 119 scfm, 8060 hr/yr	324,029
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Total Annual Direct Operating Costs			**1,175,965**
Indirect Operating Costs			
Overhead	60%	of total labor and material costs	30,467
Administration (2% total capital costs)	2%	of total capital costs (TCI)	29,862
Property tax (1% total capital costs)	1%	of total capital costs (TCI)	14,931
Insurance (1% total capital costs)	1%	of total capital costs (TCI)	14,931
Capital Recovery	0.0944	for a 20- year equipment life and a 7% interest rate	140,936
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**231,126**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**1,407,090**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Cost of Hood Exhaust Re-Heating (Thermal Oxidizer)
Table A-7c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catalyst:	**Catalyst**	
Equipment Life	2	years
CRF	0.0000	
Rep part cost per unit	650	$/ft^3
Amount Required	0	ft^3
Catalyst Cost	0	Cost adjusted for freight & sales tax
Installation Labor	0	Assume Labor = 15% of catalyst cost (basis labor for baghouse replacement)
Total Installed Cost	**0**	**Zero out if no replacement parts needed**
Annualized Cost	**0**	

Replacement Parts & Equipment:			
Equipment Life	3		
CRF	0.3811		
Rep part cost per unit	43.98	$ each	
Amount Required	0	Number	
Total Rep Parts Cost	0	Cost adjusted for freight & sales tax	
Installation Labor	0	10 min per bag (13 hr total) Labor at $29.65/hr	OAQPS list replacement times from 5 - 20 min per bag.
Total Installed Cost	**0**	**Zero out if no replacement parts needed**	
Annualized Cost	**0**		

Electrical Use

	Flow acfm		D P in H2O	Efficiency	Hp	kW	
Blower, Thermal	434,116		19	0.6		1,608.4	EPA Cost Cont Manual 6th ed - Oxidizers Chapter 2.5.2.1
Blower, Catalytic	434,116		23	0.6		1,947.0	EPA Cost Cont Manual 6th ed - Oxidizers Chapter 2.5.2.1
Oxidizer Type	**thermal**	(catalytic or thermal)				1608.4	

Reagent Use & Other Operating Costs Oxidizers - NA

Operating Cost Calculations — **Annual hours of operation: 8,060**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32	$/Hr	0.5	hr/8 hr shift	504	16,120	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	2,418	15% of Operator Costs
Maintenance							
Maint Labor	32.00	$/Hr	0.5	hr/8 hr shift	504	16,120	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr
Maint Mtls	100	% of Maintenance Labor			NA	16,120	100% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	1608.4	kW-hr	12,963,710	801,157	$/kwh, 1,608 kW-hr, 8060 hr/yr
Natural Gas	5.650	$/mscf	119	scfm	57,350	324,029	$/mscf, 119 scfm, 8060 hr/yr
Water	0.935	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
Cooling Water	0.321	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
Comp Air	0.367	$/mscf	0	Mscfm	0	0	$/mscf, 0 Mscfm, 8060 hr/yr
WW Treat Neutralizatio	1.957	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
WW Treat Biotreatemer	92.7	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
SW Disposal	32.6	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Haz W Disp	326.2	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Waste Transport	0.652	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr
Waste Recycle	1.384	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Lime	290.00	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Ammonia	334.33	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Oxygen	1.72	Mscf	0.0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr
CO Catalyst	650	$/ft3	0	ft^3	0	0	$/ft3, 0 ft3, 8060 hr/yr
Filter Bags	43.98	$/bag	0	bags	0	0	$/bag, 0 bags, 8060 hr/yr

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Cost of Hood Exhaust Re-Heating (Thermal Oxidizer)
Table A-7d

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Flue Gas Re-Heat Equipment Cost Estimate Basis Thermal Oxidizer with 70% Heat Recovery

Auxiliary Fuel Use Equation 3.19

T_{wi}	246	Deg F - Temperature of waste gas into heat recovery
T_{fi}	246	Deg F - Temperature of Flue gas into of heat recovery
T_{ref}	77	Deg F - Reference temperature for fuel combustion calculations
FER	70%	Factional Heat Recovery % Heat recovery section efficiency
T_{wo}	246	Deg F - Temperature of waste gas out of heat recovery
T_{fo}	246	Deg F - Temperature of flue gas into of heat recovery
$-h_{caf}$	21502	Btu/lb Heat of combustion auxiliary fuel (methane)
$-h_{wg}$	0	Btu/lb Heat of combustion waste gas
$C_{p\ wg}$	0.2684	Btu/lb - Deg F Heat Capacity of waste gas (air)
ρ_{wg}	0.0739	lb/scf - Density of waste gas (air) at 77 Deg F
ρ_{af}	0.0408	lb/scf - Density of auxiliary fuel (methane) at 77 Deg F
Q_{wg}	309,646	scfm - Flow of waste gas
Q_{af}	119	scfm - Flow of auxiliary fuel

Year 2005 Inflation Rate 3.0%
Cost Calculations 309,765 scfm Flue Gas Cost in 1989 $'s $503,493
Current Cost Using CHE Plant Cost Index $760,145

Heat Rec %	A	B	
0	10,294	0.2355	Exponents per equation 3.24
0.3	13,149	0.2609	Exponents per equation 3.25
0.5	17,056	0.2502	Exponents per equation 3.26
0.7	21,342	0.2500	Exponents per equation 3.27

Indurator Flue Gas Heat Capacity - Basis Typical Composition

100 scfm 359 scf/lbmole

	Gas Composition	lb/hr f	wt %	Cp Gas	Cp Flue
28 mw CO	0 v %	0			
44 mw CO2	15 v %	184	22.0%	0.24	0.0528
18 mw H2O	10 v %	50	6.0%	0.46	0.0276
28 mw N2	60 v %	468	56.0%	0.27	0.1512
32 mw O2	15 v %	134	16.0%	0.23	0.0368
Cp Flue Gas	100 v %	836	100.0%		0.2684

Reference: OAQPS Control Cost Manual 5th Ed Feb 1996 - Chapter 3 Thermal & Catalytic Incinerators (EPA 453/B-96-001)

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - LoTOx
Table A-8a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: **Indurator Windbox Exhaust**

Emission Unit Number	EU 014		Stack/Vent Number	SV013B		**Chemical Engineering**	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	371,069	scfm @ 32º F	**Chemical Plant Cost Index**	
Expected Utilization Rate	NA		Temperature	156	Deg F	2005	465
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	11.2%		Dec-11	588.8
Annual Interest Rate	7.0%		Actual Flow Rate	474,270	acfm	Inflation Adj	1.27
Expected Equipment Life	20	yrs	Standardized Flow Rate	398,221	scfm @ 68º F		
			Dry Std Flow Rate	353,620	dscfm @ 68º F		

CONTROL EQUIPMENT COSTS

Capital Costs								
Direct Capital Costs								
Purchased Equipment (A)								2,145,628
Purchased Equipment Total (B)	0%	of control device cost (A)						**2,145,628**
Installation - Standard Costs	85%	of purchased equip cost (B)						1,823,784
Installation - Site Specific Costs								NA
Installation Total								1,823,784
Total Direct Capital Cost, DC								3,969,412
Total Indirect Capital Costs, IC	35%	of purchased equip cost (B)						750,970
Total Capital Investment (TCI) = DC + IC								**6,377,242**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						6,302,172
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						887,523
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**7,189,695**

Emission Control Cost Calculation

Pollutant	**Max Emis Lb/Hr**	**Annual T/Yr**	**Cont Eff %**	**Exit Conc.**	**Conc. Units**	**Cont Emis T/yr**	**Reduction T/yr**	**Cont Cost $/Ton Rem**
PM10						0.0	-	NA
Total Particulates						0.0	-	NA
Nitrous Oxides (NOx)		441.61	58%	15	ppm	187.17	254.44	28,257
Sulfur Dioxide (SO_2)						0.0	-	NA
Sulfuric Acid Mist						0.0	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA
Lead (Pb)						0.0	-	NA

Notes & Assumptions

1 Sept 2005 Cost Estimate Procedure from **BOC Gases** and adjusted for inflation based on Chemical Engineering Plant Cost Index 834,629 acfm cost basis
2 Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 5.2 Chapter 1 (absorbers)
3 Liquid/Gas ratio = 10 L/G = Gal/1,000 acf
4 Water Makeup Rate/Wastewater Discharge = 20% of circulating water rate
5 Scrubber Cost per Barr Engineering 2004 Scrubber Project. Adjusted prices per Chemical Engineering Magazine PCI
6 Wastewater treatment costs provided by Nalco 6/8/06 email for reverse osmosis system, evaporator and crystallizer
7 The temperature of 156 F shown above represents the temperature that is entering the control device.

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - LoTOx
Table A-8b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			**2,145,628**
Purchased Equipment Costs (A) - Absorber + packing + auxiliary equipment, EC			
Instrumentation	10%	of control device cost (A)	NA
State Sales Taxes	7.0%	of control device cost (A)	NA
Freight	5%	of control device cost (A)	NA
Purchased Equipment Total (B)			**2,145,628**
Installation			
Foundations & supports	12%	of purchased equip cost (B)	257,475
Handling & erection	40%	of purchased equip cost (B)	858,251
Electrical	1%	of purchased equip cost (B)	21,456
Piping	30%	of purchased equip cost (B)	643,689
Insulation	1%	of purchased equip cost (B)	21,456
Painting	1%	of purchased equip cost (B)	21,456
Installation Subtotal Standard Expenses	85%		**1,823,784**
Site Preparation, as required		Site Specific	NA
Buildings, as required		Site Specific	NA
Site Specific - Other		Site Specific	NA
Total Site Specific Costs			NA
Installation Total			**1,823,784**
Total Direct Capital Cost, DC			**3,969,412**
Indirect Capital Costs			
Engineering, supervision	10%	of purchased equip cost (B)	214,563
Construction & field expenses	10%	of purchased equip cost (B)	214,563
Contractor fees	10%	of purchased equip cost (B)	214,563
Start-up	1%	of purchased equip cost (B)	21,456
Performance test	1%	of purchased equip cost (B)	21,456
Model Studies	NA	of purchased equip cost (B)	NA
Contingencies	3%	of purchased equip cost (B)	64,369
Total Indirect Capital Costs, IC	35%	of purchased equip cost (B)	**750,970**
Ozone Generator, Installed Cost			**1,656,859**
Total Capital Investment (TCI) = DC + IC			**6,377,242**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**6,377,242**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	32.00	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr	16,120
Supervisor	15%	15% of Operator Costs	2,418
Maintenance			
Maintenance Labor	32.00	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr	16,120
Maintenance Materials	100%	of maintenance labor costs	16,120
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 1,753 kW-hr, 8060 hr/yr	872,965
NA	NA		-
Water	0.93	$/mgal, 204 gpm, 8060 hr/yr	92,262
Cooling Water	0.32	$/mgal, 493 gpm, 8060 hr/yr	76,500
NA	NA		-
NA	NA		-
WW Treat R/O	92.70	$/mgal, 109 gpm, 8060 hr/yr	4,902,572
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Oxygen	1.72	Mscf, 22 Mscf/hr, 8060 hr/yr	307,096
NA	NA		-
NA	NA		-
Total Annual Direct Operating Costs			**6,302,172**
Indirect Operating Costs			
Overhead	60%	of total labor and material costs	30,467
Administration (2% total capital costs)	2%	of total capital costs (TCI)	127,545
Property tax (1% total capital costs)	1%	of total capital costs (TCI)	63,772
Insurance (1% total capital costs)	1%	of total capital costs (TCI)	63,772
Capital Recovery	0.0944	for a 20- year equipment life and a 7% interest rate	601,967
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**887,523**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**7,189,695**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - LoTOx
Table A-8c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Parts & Equipment:		
Equipment Life	5	years
CRF	0.0000	
Rep part cost per unit	180	$/ft^3
Amount Required	0	ft^3
Packing Cost	0	Cost adjusted for freight & sales tax
Installation Labor	0	Assume Labor = 15% of catalyst cost (basis labor for baghouse replacement)
Total Installed Cost	**0**	**Zero out if no replacement parts needed**
Annualized Cost	**0**	

Replacement Parts & Equipment:			
Equipment Life	3		
CRF	0.3811		
Rep part cost per unit	43.983904	$ each	
Amount Required	0	Number	
Total Rep Parts Cost	0	Cost adjusted for freight & sales tax	
Installation Labor	0	10 min per bag (13 hr total) Labor at $29.65/hr	OAQPS list replacement times from 5 - 20 min per bag.
Total Installed Cost	**0**	**Zero out if no replacement parts needed**	
Annualized Cost	**0**		

Electrical Use							
	Flow acfm		D P in H2O	**Efficiency**	**Hp**	**kW**	
Blower, Scrubber	474,270		10	0.7	-	792.7	EPA Cont Cost Manual 6th ed Section 5.2 Chapter 1 Eq 1.48
	Flow	**Liquid SPGR**	**D P ft H2O**	**Efficiency**	**Hp**	**kW**	
Circ Pump	4,374 gpm	1	60	0.7	-	70.5	EPA Cont Cost Manual 6th ed Section 5.2 Chapter 1 Eq 1.49
H2O WW Disch	109 gpm	1	60	0.7	-	1.8	EPA Cont Cost Manual 6th ed Section 5.2 Chapter 1 Eq 1.49
LTO Electric Use	4.5	kW/lb O_3				888	
Total						1752.6	

Reagent Use & Other Operating Costs							
Ozone Needed	2	lb O3/lb NOx	197.2	lb/hr O3			
Oxygen Needed	0.10	wt O2 to O3 conversion		1972.45161	lb/hr O2	22,128	scfh O2
LTO Cooling Water	$150	gal/lb O3	493	gpm			
Ozone Generator	$350	lb O3/day	$1,656,859	Installed	Installed cost factor per BOC.		
Scrubber Cost	10	$/scfm Gas	$3,710,693		Incremental cost per BOC. Need to increase vessel size over standard absorber.		
Scrubber Outlet Flow	437,439	acfm					
Scrubber Outlet Temp	120	°F					
Liquid/Gas ratio	10.0	* L/G = Gal/1,000 acf					
Circulating Water Rate	4,374	gpm					
Waste WaterDisch =	2.5%	of circulating water rate =		109 gpm			
Evap H2O Loss				95 gpm			
Water Makeup Rate				204 gpm			

Operating Cost Calculations — **Annual hours of operation: 8,060**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32	$/Hr	0.5	hr/8 hr shift	504	16,120	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	2,418	15% of Operator Costs
Maintenance							
Maint Labor	32.00	$/Hr	0.5	hr/8 hr shift	504	16,120	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr
Maint Mtls	100	% of Maintenance Labor			NA	16,120	100% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	1752.6	kW-hr	14,125,640	872,965	$/kwh, 1,753 kW-hr, 8060 hr/yr
Natural Gas	5.650	$/mscf	0	scfm	0	0	$/mscf, 0 scfm, 8060 hr/yr
Water	0.935	$/mgal	204.1	gpm	98,707	92,262	$/mgal, 204 gpm, 8060 hr/yr
Cooling Water	0.321	$/mgal	493.1	gpm	238,469	76,500	$/mgal, 493 gpm, 8060 hr/yr
Comp Air	0.367	$/mscf	0	Mscfm	0	0	$/mscf, 0 Mscfm, 8060 hr/yr
WW Treat Neutralizatior	1.957	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
WW Treat R/O	92.700	$/mgal	109.4	gpm	52,886	4,902,572	$/mgal, 109 gpm, 8060 hr/yr
SW Disposal	32.619	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Haz W Disp	326.193	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Waste Transport	0.652	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr
Waste Recycle	1.384	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Lime	290.00	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Caustic	334.33	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Oxygen	1.72	Mscf	22.1	Mscf/hr	178,355	307,096	Mscf, 22 Mscf/hr, 8060 hr/yr
SCR Catalyst	180	$/ft3	0	ft^3	0	0	$/ft3, 0 ft3, 8060 hr/yr
Filter Bags	43.98	$/bag	0	bags	0	0	$/bag, 0 bags, 8060 hr/yr

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - Regenerative Selective Catalytic Reduction (RSCR)
Table A-9a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: Indurator Windbox Exhaust

Emission Unit Number	EU 014		Stack/Vent Number	SV013B		**Chemical Engineering Chemical Plant Cost Index**	
Desgin Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	371,069	scfm @ 32º F		
Expected Utiliztion Rate	NA		Temperature	156	Deg F	2009	NA
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	11.2%		Dec-10	NA
Annual Interest Rate	7.0%		Actual Flow Rate	474,270	acfm	Inflation Adj	NA
Expected Equipment Life	20	yrs	Standardized Flow Rate	398,221	scfm @ 68º F		
			Dry Std Flow Rate	353,620	dscfm @ 68º F		

CONTROL EQUIPMENT COSTS

Capital Costs			Duty MMBtu/hr	Control Eff	NOx in lb/MMBtu		Year	
Direct Capital Costs (from vendor)								
Purchased Equipment (A)								
Purchased Equipment Total (B)	0%	of control device cost (A)					2011	**19,541,015**
Installation - Standard Costs	15%	of purchased equip cost (B)						3,663,940
Installation - Site Specific Costs								0
Installation Total								0
Total Direct Capital Cost, DC								0
Total Indirect Capital Costs, IC	0%	of purchased equip cost (B)						0
Total Capital Investment (TCI) = DC + IC								**28,675,674**
Total Capital Investment (TCI) + Retrofit								28,675,674
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						3,284,131
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						2,706,781
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**5,990,912**

Emission Control Cost Calculation

Pollutant	**Max Emis Lb/Hr**	**Annual T/Yr**	**Cont Eff %**	**Exit Conc**	**Conc Units**	**Cont Emis T/yr**	**Reduction T/yr**	**Cont Cost $/Ton Rem**
PM10						0.0	-	NA
Total Particulates						0.0	-	NA
Nitrous Oxides (NOx)	NA	441.61	75%	10.5	ppm	110.40	331.21	18,088
Sulfur Dioxide (SO_2)						0.0	-	NA
Sulfuric Acid Mist						0.0	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA
Lead (Pb)						0.0	-	NA

Notes & Assumptions

1. May 2, 2011 cost estimate from Babcock Power to treat an indurating furnace waste gas exhaust
2. Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2
3. Capital Cost per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.36 -2.43
4. Reagent Use per vendor quote and EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.32 - 2.35
5. SCR Catalyst Replacement per vendor quote.
6. SCR Electrical Demand per vendor estimates for reheat.
7. SCR Maintenance Costs EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.46
8. Capital cost and natural gas usage have been ratioed off of original estimate from Vogt Power to account for higher flow rate and increased natural gas usage for reheat option. Original cost estimate was $5,500,000.
9. The temperature of 156 F shown above represents the temperature that is entering the control device.

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - Regenerative Selective Catalytic Reduction (RSCR)
Table A-9b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			
Purchased Equipment Costs (A) - Absorber + packing + auxillary equipment, EC			**19,541,015**
Instrumentation	10%	of control device cost (A)	NA
State Sales Taxes	7.0%	of control device cost (A)	NA
Freight	5%	of control device cost (A)	NA
Purchased Equipment Total (A)			**19,541,015**
Indirect Installation			
Installation Costs (from vendor)	25%	of purchased equip cost (A)	4,885,254
Total Indirect Installation Costs (B)	25%	of purchased equip cost (A)	**4,885,254**
Project Contingeny (C)	15%	of (A + B)	**3,663,940**
Total Plant Cost D		A + B + C	**28,090,209**
Allowance for Funds During Construction (E)		0 for SNCR	**0**
Royalty Allowance (F)		0 for SNCR	**0**
Pre Production Costs (G)	2%	of (D+E))	**561,804**
Inventory Capital		Reagent Vol * $/gal	**23,661**
Intial Catalyst and Chemicals		0 for SNCR	**0**
Total Capital Investment (TCI) = DC + IC		D + E + F + G +H + I	**28,675,674**
Retrofit Factor	0%	of TCI	**0**
Total Capital Investment (TCI) + Retrofit Factor			**28,675,674**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**NA**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	3200%		-
Supervisor	15%		-
Maintenance			
Maintenance Total	1.5	% of Total Capital Investment	430,135
Maintenance Materials	NA	% of Maintenance Labor	-
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 780 kW-hr, 6072 hr/yr, 100% utilization	955,677
Natural Gas	5.65	$/mscf, 918 scfh, 6072 hr/yr, 100% utilization	441,564
NA	NA		-
NA	NA		-
Comp Air	NA	$/mscf, 0 scfm/kscfm, 6072 hr/yr, 100% utilization	-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Ammonia	1.40	$/lb, 745 lb/hr, 6072 hr/yr, 100% utilization	616,879
NA	NA		-
SCR Catalyst	180.00	$/ft3, 0 ft3, 6072 hr/yr, 100% utilization	839,876
NA	NA		-
Total Annual Direct Operating Costs			**3,284,131**
Indirect Operating Costs			
Overhead	NA	of total labor and material costs	NA
Administration (2% total capital costs)	NA	of total capital costs (TCI)	NA
Property tax (1% total capital costs)	NA	of total capital costs (TCI)	NA
Insurance (1% total capital costs)	NA	of total capital costs (TCI)	NA
Capital Recovery	0	for a 20- year equipment life and a 7% interest rate	2,706,781
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**2,706,781**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**5,990,912**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - Regenerative Selective Catalytic Reduction (RSCR)
Table A-9c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catayst				
Equipment Life	70,000	hours per vendor		
FCW	0.1739			
Rep part cost per unit	NA	$/ft^3		
Cat Replace Labor	28,128	Hours of labor from vendor		
Catalyst Cost	4,801,780	From vendor		From Vendor
Y catalyst life factor	5	Years, from vendor		From Vendor
Annualized Cost	**839,876**			

Electrical Use					
Duty	-	**MMBtu/hr**	Estimate from Vendor		
NOx Cont Eff	-	(as faction)	Power	kW	
NOx in	-	lb/MMBtu	Fan	1,594	
n catalyst layers	-	layers	Air Cmpressor	31	
Press drop catalyst	-	in H_2O per layer	Fans, punps, heat trace	140	
Press drop duct	-	in H_2O			
Total				1,765	

Reagent Use & Other Operating Costs			Natural Gas Use		9.1	MMBtu/hr	Vendor Data
NOx in	0.00	lb/MMBtu		8,922	scfh		
Efficiency	0.00		Ammonia Use				
Duty	0.00	MMBtu/hr	19%	solution		58	lb/ft^3 Density
			440,628	gal/yr - vendor estimate			
		Volume 14 day inventory	16,901	gal	23,661.1		Inventory Cost

Operating Cost Calculations — **Annual hours of operation: 8760.0**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32.00	$/Hr	0.1	hr/8 hr shift	109.5	3504	$/Hr, 0.1 hr/8 hr shift, 0 hr/yr
Supervisor	0.15	of Op.			NA	525.6	15% of Operator Costs
Maintenance							
Maintenance Total	1.5	% of Total Capital Investment				430,135	% of Total Capital Investment, 0.0 , 0 hr/yr
Maint Mtls	0	% of Maintenance Labor			NA	0	0% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	1765.3	kW-hr	15,464,028	955,677	$/kwh, 1,765 kW-hr, 8760 hr/yr
Natural Gas	5.650	$/mscf	8,922	scfh	78,152,941	441,564	$/mscf, 8,922 scfh, 8760 hr/yr
Water	0.935	$/mgal	0	gph	0	0	$/mgal, 0 gph, 8760 hr/yr
Cooling Water	0.321	$/mgal	0	gpm	0	0	$/mgal, 0 gpm, 8760 hr/yr
Comp Air	0.367	$/mscf	0	scfm/kscfm	0	0	$/mscf, 0 scfm/kscfm, 8760 hr/yr
WW Treat Neutralization	1.957	$/mgal	0	gpm	0	0	$/mgal, 0 gpm, 8760 hr/yr
WW Treat Biotreatement	92.70	$/mgal	0	gpm	0	0	$/mgal, 0 gpm, 8760 hr/yr
SW Disposal	32.62	$/ton	0	ton/hr	0	0	$/ton, 0 ton/hr, 8760 hr/yr
Haz W Disp	326.19	$/ton	0	ton/hr	0	0	$/ton, 0 ton/hr, 8760 hr/yr
Waste Transport	0.652	$/ton-mi	0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8760 hr/yr
Waste Recycle	1.384	$/ton	0	ton/hr	0	0	$/ton, 0 ton/hr, 8760 hr/yr
Lime	290.00	$/ton	0	lb/hr	0	0	$/ton, 0 lb/hr, 8760 hr/yr
Aqua Ammonia	1.40	$/gal	440,628	gal/yr	440,628	616,879	$/gal, 440,628 gal/yr, 8760 hr/yr
Oxygen	1.72	Mscf	0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8760 hr/yr
SCR Catalyst	180	$/ft3	0	ft^3	0	839,876	$/ft3, 0 ft3, 8760 hr/yr
Filter Bags	43.98	$/bag	0	bags	0	0	$/bag, 0 bags, 8760 hr/yr

** Std Air use is 2 scfm/kacfm

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - EPA/EPRI Method Catalytic Reduction (SCR) + Reheat
Table A-10a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: Indurator Windbox Exhaust

Emission Unit Number	EU 014		Stack/Vent Number	SV013B		**Chemical Engineering**	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	370,235	scfm @ 32º F	**Chemical Plant Cost Index**	
Expected Utilization Rate	NA		SCR Rx Temperature	156	0	1998/1999	390
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	11.0%		Dec-11	588.8
Annual Interest Rate	7.0%		Actual Flow Rate at SCR Rx	463,547	acfm	Inflation Adj	1.51
Expected Equipment Life	20	yrs	Standardized Flow Rate	397,326	scfm @ 68º F		
			Dry Std Flow Rate	353,620	dscfm @ 68º F		

CONTROL EQUIPMENT COSTS

Capital Costs							Year	
Direct Capital Costs	EPRI Correlation						1998	22,037,813
Purchased Equipment (A)							2011	33,271,447
Purchased Equipment Total (B)	0%	of control device cost (A)						**33,271,447**
Installation - Standard Costs	15%	of purchased equip cost (B)						5,988,860
Installation - Site Specific Costs								0
Installation Total								0
Total Direct Capital Cost, DC								0
Total Indirect Capital Costs, IC	0%	of purchased equip cost (B)						0
Total Capital Investment (TCI) = DC + IC							SCR + Reheat	**48,426,895**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.					SCR + Reheat	4,852,716
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost					SCR + Reheat	4,665,184
Total Annual Cost (Annualized Capital Cost + Operating Cost)							SCR + Reheat	**9,517,900**

Emission Control Cost Calculation

Pollutant	Max Emis Lb/Hr	Annual T/Yr	Cont Eff %	Exit Conc.	Conc. Units	Cont Emis T/yr	Reduction T/yr	Cont Cost $/Ton Rem
PM10						0.0	-	NA
Total Particulates						0.0	-	NA
Lead (Pb)						0.0	-	NA
Nitrous Oxides (NOx)	NA	441.61	89%	4	ppm	49.91	391.70	24,299
Sulfur Dioxide (SO_2)	NA	1,170.90				1170.90	-	NA
Sulfuric Acid Mist						0.0	-	NA
Fluorides						0.0	-	NA
Volatile Organic Compounds (VOC)						0.0	-	NA
Carbon Monoxide (CO)						0.0	-	NA

Notes & Assumptions

1 Capital Cost per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.36 -2.43
2 Reagent Use per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.32 - 2.35
3 SCR Catalyst Volume per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.18 - 2.24
4 SCR Reactor Size per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.25 - 2.31
5 SCR Catalyst Replacement per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.50 - 2.53
6 SCR Electrical Demand per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.48
7 SCR Maintenance Costs EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 4.2 Chapter 2 Eq 2.46
8 SCR operating Temperature 465 F. Typical tail end SCR operation temperature range 400 F to 540 F; avgerage = 470 F - Johnson Matthey Catalysts presentation "New FGD and De NOx Approaches" McIlvaine webinar April 7, 2011. Babcok Power RSCR design operting temperature 465 F

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - EPA/EPRI Method Catalytic Reduction (SCR) + Reheat
Table A-10b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS		
Direct Capital Costs		
Purchased Equipment (A) (1)		
Purchased Equipment Costs (A)		**33,271,447**
Instrumentation	10% of control device cost (A)	NA
State Sales Taxes	7.0% of control device cost (A)	NA
Freight	5% of control device cost (A)	NA
Purchased Equipment Total (A)		**33,271,447**
Indirect Installation		
General Facilities	5% of purchased equip cost (A)	1,663,572
Engineering & Home Office	10% of purchased equip cost (A)	3,327,145
Process Contingency	5% of purchased equip cost (A)	1,663,572
Total Indirect Installation Costs (B)	20% of purchased equip cost (A)	**6,654,289**
Project Contingency (C)	15% of (A + B)	**5,988,860**
Total Plant Cost D	A + B + C	**45,914,596**
Allowance for Funds During Construction (E)	0 for SCR	**0**
Royalty Allowance (F)	0 for SCR	**0**
Pre Production Costs (G)	2% of (D+E))	**918,292**
Inventory Capital	Reagent Vol * $/gal	**4,984**
Initial Catalyst and Chemicals	0 for SCR	**0**
Total Capital Investment (TCI) = DC + IC	D + E + F + G +H + I	**46,837,872**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost		**NA**
OPERATING COSTS		
Direct Annual Operating Costs, DC		
Operating Labor		
Operator	NA	-
Supervisor	NA	-
Maintenance		
Maintenance Total	1.50 % of Total Capital Investment	702,568
Maintenance Materials	NA % of Maintenance Labor	-
Utilities, Supplies, Replacements & Waste Management		
Electricity	0.06 $/kwh, 5,538 kW-hr, 8060 hr/yr	2,758,733
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
NA	NA	-
Ammonia	0.10 $/lb, 147 lb/hr, 8060 hr/yr	119,548
NA	NA	-
SCR Catalyst	180.00 $/ft3, 0 ft3, 8060 hr/yr	151,709
NA	NA	-
Total Annual Direct Operating Costs		**3,732,559**
Indirect Operating Costs		
Overhead	NA of total labor and material costs	NA
Administration (2% total capital costs)	NA of total capital costs (TCI)	NA
Property tax (1% total capital costs)	NA of total capital costs (TCI)	NA
Insurance (1% total capital costs)	NA of total capital costs (TCI)	NA
Capital Recovery	0.0944 for a 20- year equipment life and a 7% interest rate	4,421,164
Total Annual Indirect Operating Costs	Sum indirect oper costs + capital recovery cost	**4,421,164**
Total Annual Cost (Annualized Capital Cost + Operating Cost)		**8,153,722**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - EPA/EPRI Method Catalytic Reduction (SCR) + Reheat
Table A-10c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catalyst				
Equipment Life	32,240	hours		
FCW	0.2252			
Rep part cost per unit	180	$/ft^3	# of Layers	46
Replacement Factor	18	.ayers replaced per year =		2.5
Amount Required	3,742	ft^3		
Catalyst Cost	673,581			
Y catalyst life factor	4	Years		
Annualized Cost	**151,709**			

SCR Capital Cost per EPRI Method 1998 $'s		**22,037,813**					
Duty	2,101	MMBtu/hr	Catalyst Area	483	ft^2	1,227	*f*(h SCR)
Q flue gas	463,547	acfm	Rx Area	555		-39	*f*(h NH_3)
NOx Cont Eff	89%	(as faction)	Rx Height	23.6	ft	-728	*f*(h New) new= -728, Retrofit = 0
NOx in	0.052	lb/MMBtu	n layer	46	layers	N	Bypass? Y or N
Ammonia Slip	2	ppm	h layer	48.5	ft	0	*f*(h Bypass)
Fuel Sulfur	0.0636	wt % (as %)	n total	47	layers	12,393,888	*f*(vol catalyst)
Temperature	156	Deg F	h SCR	231	ft		
Catalyst Volume	**68,855**	ft^3	New/Retrofit	N	N or R		

Electrical Use				
Duty	2,101	MMBtu/hr		kW
NOx Cont Eff	89%	(as faction)	Power	5,538.4
NOx in	0.05	lb/MMBtu		
n catalyst layers	47	layers		
Press drop catalyst	1	in H_2O per layer		
Press drop duct	3	in H_2O		
Total				5538.4

Reagent Use & Other Operating Costs			Ammonia Use			
NOx in	0.0522	lb/MMBtu	43	lb/hr Neat		
Efficiency	89%		29%	solution	56.0	lb/ft^3 Density
Duty	2,101	MMBtu/hr	147	lb/hr	19.6	gal/hr
		Volume 14 day inventory	6,592	gal	$4,984	Inventory Cost

Operating Cost Calculations — **Annual hours of operation: 8,060**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32	$/Hr	0.0	hr/8 hr shift	0	0	$/Hr, 0.0 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	-	15% of Operator Costs
Maintenance							
Maintenance Total	1.5	% of Total Capital Investment				702,568	% of Total Capital Investment
Maint Mtls	0	% of Maintenance Labor			NA	0	0% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	5538.4	kW-hr	44,639,688	2,758,733	$/kwh, 5,538 kW-hr, 8060 hr/yr
Natural Gas	5.65	$/mscf	0.0	scfh	0	0	$/mscf, 0 scfh, 8060 hr/yr
Water	0.93	$/mgal	0.0	gph	0	0	$/mgal, 0 gph, 8060 hr/yr
Cooling Water	0.32	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
Comp Air	0.37	$/mscf	0.0	scfm/kacfm**	0	0	$/mscf, 0 scfm/kacfm**, 8060 hr/yr
WW Treat Neutralizatio	1.96	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
WW Treat Biotreatemer	92.70	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
SW Disposal	32.62	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Haz W Disp	326	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Waste Transport	0.65	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr
Waste Recycle	1.38	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Lime	290	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Ammonia	0.101	$/lb	147	lb/hr	1,183,648	119,548	$/lb, 147 lb/hr, 8060 hr/yr
Oxygen	1.72	Mscf	0.0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr
SCR Catalyst	180	$/ft3	0	ft^3	0	151,709	$/ft3, 0 ft3, 8060 hr/yr
Filter Bags	43.98	$/bag	0	bags	0	0	$/bag, 0 bags, 8060 hr/yr

** Std Air use is 2 scfm/kacfm
*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Windbox Exhaust NOx Control - EPA/EPRI Method Catalytic Reduction (SCR) + Reheat
Table A-10d

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Selective Catalytic Reduction -SCR Catalyst Volume Calculation

$Vol_{catalyst}$ (ft^3)= 2.81 x Q_B x η_{adj} x $Slip_{adj}$ x NOx_{adj} x S_{adj} x T_{adj}/N_{SCR}

η_{adj} = 0.2869 + (1.058 x η)

NOx_{adj} = 0.8524 + (0.3208 x NOx_{in})

$Slip_{adj}$ = 1.2835 - (0.0567 x Slip)

S_{adj} = 0.9636 + (0.0455 x S)

T_{adj} = 15.16 - (0.03937 x T) + (2.74e-5 x T^2)

Q_B	Heat Rate (MMBtu/hr)	2,101
η	NOx control efficiency	89%
NOx_{in}	Uncontrolled NOx Conc (lb/MMBtu)	0.052
Slip	Acceptable Ammonia Slip (ppm)	2
S	Sulfur Content of Fuel by Weight Fraction (%)	0.064
T	SCR Inlet flue gas temperature (°F)	156
N_{SCR}	Number of SCRs	1

η_{adj} = 1.225
NOx_{adj} = 0.869
$Slip_{adj}$ = 1.170
S_{adj} = 0.966
Tadj = 9.685

$Vol_{catalyst}$ = 68,855 ft^3

Source: EPA Air Pollution Control Cost Manual (EPA 452/B-02-001)
Section 4.2 NOx Post-Control Chapter 2 - Selective Catalytic Reduction
http://www.epa.gov/ttn/catc/dir1/cs4-2ch2.pdf

267.33 lb SO2/hr, annual average
2,101 MMBtu/hr
210,071 lb/hr Coal @10,000 Btu/lb coal
0.064 wt % S coal equivalent

Appendix C: Cost Analyses for Control Devices
Cost of Windbox Exhaust Re-Heating (Thermal Oxidizer)
Table A-11a

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Operating Unit: **Indurator Windbox Exhaust**

Emission Unit Number	EU 014		Stack/Vent Number	SV013B		**Chemical Engineering**	
Design Capacity	3,953,510	s-tons/yr	Standardized Flow Rate	370,235	scfm @ 32º F	**Chemical Plant Cost Index**	
Expected Utilization Rate	NA		Reheat Inlet Temperature	156	Deg F	1998/1999	390
Expected Annual Hours of Operation	8,060	Hours	Moisture Content	11.0%		Dec-11	588.8
Annual Interest Rate	7.0%		Actual Flow Rate	474,270	acfm	Inflation Adj	1.51
Expected Equipment Life	20	yrs	Standardized Flow Rate	397,326	scfm @ 68º F		
			Dry Std Flow Rate	353,620	dscfm @ 68º F		

CONTROL EQUIPMENT COSTS

Capital Costs								
Direct Capital Costs								
Purchased Equipment (A)								808,992
Purchased Equipment Total (B)	22%	of control device cost (A)						**986,971**
Installation - Standard Costs	30%	of purchased equip cost (B)						296,091
Installation - Site Specific Costs								NA
Installation Total								296,091
Total Direct Capital Cost, DC								1,283,062
Total Indirect Capital Costs, IC	31%	of purchased equip cost (B)						305,961
Total Capital Investment (TCI) = DC + IC								**1,589,023**
Operating Costs								
Total Annual Direct Operating Costs		Labor, supervision, materials, replacement parts, utilities, etc.						1,120,157
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost						244,020
Total Annual Cost (Annualized Capital Cost + Operating Cost)								**1,364,177**

Notes & Assumptions

1. Calculations per EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 3.2 Chapter 2
2. Equipment cost estimate EPA Air Pollution Control Cost Manual 6th Ed 2002, Section 3.2 Chapter 2.5.1
3. EPA control cost guideline for catalytic oxidizers used for operating cost analysis. EPA Air Pollution Control Cost Manual 6th Ed 2002
4. The temperature of 156 F shown above represents the temperature that is entering the control device.
5. The temperature of the waste gas entering the NOx control device (156 F) is used to calculate the reheat requirements of the SCR system.
6. Reheat temperature = 465 F to meet tail end SCR catalyst opearting temperature requirements. Typical tail end SCR operation temperature range 400 F to 540 F; averaage = 470 F - Johnson Matthey Catalysts presentation webinar McIlvaine April 7, 2011. Babcok Power RSCR operting temperature = 465 F.

Appendix C: Cost Analyses for Control Devices
Cost of Windbox Exhaust Re-Heating (Thermal Oxidizer)
Table A-11b

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

CAPITAL COSTS			
Direct Capital Costs			
Purchased Equipment (A) (1)			**808,992**
Purchased Equipment Costs (A) - Absorber + packing + auxiliary equipment, EC			
Instrumentation	10%	of control device cost (A)	80,899
State Sales Taxes	7.0%	of control device cost (A)	56,629
Freight	5%	of control device cost (A)	40,450
Purchased Equipment Total (B)	22%		**986,971**
Installation			
Foundations & supports	8%	of purchased equip cost (B)	78,958
Handling & erection	14%	of purchased equip cost (B)	138,176
Electrical	4%	of purchased equip cost (B)	39,479
Piping	2%	of purchased equip cost (B)	19,739
Insulation	1%	of purchased equip cost (B)	9,870
Painting	1%	of purchased equip cost (B)	9,870
Installation Subtotal Standard Expenses	30%		**296,091**
Site Preparation, as required		Site Specific	NA
Buildings, as required		Site Specific	NA
Site Specific - Other		Site Specific	NA
Total Site Specific Costs			NA
Installation Total			**296,091**
Total Direct Capital Cost, DC			**1,283,062**
Indirect Capital Costs			
Engineering, supervision	10%	of purchased equip cost (B)	98,697
Construction & field expenses	5%	of purchased equip cost (B)	49,349
Contractor fees	10%	of purchased equip cost (B)	98,697
Start-up	2%	of purchased equip cost (B)	19,739
Performance test	1%	of purchased equip cost (B)	9,870
Model Studies		of purchased equip cost (B)	0
Contingencies	3%	of purchased equip cost (B)	29,609
Total Indirect Capital Costs, IC	31%	of purchased equip cost (B)	**305,961**
Total Capital Investment (TCI) = DC + IC			**1,589,023**
Adjusted TCI for Replacement Parts (Catalyst, Filter Bags, etc) for Capital Recovery Cost			**1,589,023**
OPERATING COSTS			
Direct Annual Operating Costs, DC			
Operating Labor			
Operator	32.00	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr	16,120
Supervisor	15%	15% of Operator Costs	2,418
Maintenance			
Maintenance Labor	32.00	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr	16,120
Maintenance Materials	100%	of maintenance labor costs	16,120
Utilities, Supplies, Replacements & Waste Management			
Electricity	0.06	$/kwh, 1,757 kW-hr, 8060 hr/yr	875,260
Natural Gas	5.65	$/mscf, 71 scfm, 8060 hr/yr	194,119
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
NA	NA		-
Total Annual Direct Operating Costs			**1,120,157**
Indirect Operating Costs			
Overhead	60%	of total labor and material costs	30,467
Administration (2% total capital costs)	2%	of total capital costs (TCI)	31,780
Property tax (1% total capital costs)	1%	of total capital costs (TCI)	15,890
Insurance (1% total capital costs)	1%	of total capital costs (TCI)	15,890
Capital Recovery	0.0944	for a 20- year equipment life and a 7% interest rate	149,993
Total Annual Indirect Operating Costs		Sum indirect oper costs + capital recovery cost	**244,020**
Total Annual Cost (Annualized Capital Cost + Operating Cost)			**1,364,177**

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Cost of Windbox Exhaust Re-Heating (Thermal Oxidizer)
Table A-11c

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Capital Recovery Factors		
Primary Installation		
Interest Rate	7.00%	
Equipment Life	20	years
CRF	0.0944	

Replacement Catalyst:	**Catalyst**	
Equipment Life	2	years
CRF	0.0000	
Rep part cost per unit	650	$/ft^3
Amount Required	0	ft^3
Catalyst Cost	0	Cost adjusted for freight & sales tax
Installation Labor	0	Assume Labor = 15% of catalyst cost (basis labor for baghouse replacement)
Total Installed Cost	**0**	**Zero out if no replacement parts needed**
Annualized Cost	**0**	

Replacement Parts & Equipment:			
Equipment Life	3		
CRF	0.3811		
Rep part cost per unit	43.98	$ each	
Amount Required	0	Number	
Total Rep Parts Cost	0	Cost adjusted for freight & sales tax	
Installation Labor	0	10 min per bag (13 hr total) Labor at $29.65/hr	OAQPS list replacement times from 5 - 20 min per bag.
Total Installed Cost	**0**	**Zero out if no replacement parts needed**	
Annualized Cost	**0**		

Electrical Use	Flow acfm	D P in H2O	Efficiency	Hp	kW	
Blower, Thermal	474,270	19	0.6		1,757.2	EPA Cost Cont Manual 6th ed - Oxidizers Chapter 2.5.2.1
Blower, Catalytic	474,270	23	0.6		2,127.1	EPA Cost Cont Manual 6th ed - Oxidizers Chapter 2.5.2.1
Oxidizer Type	**thermal**	(catalytic or thermal)			1757.2	

Reagent Use & Other Operating Costs Oxidizers - NA

Operating Cost Calculations **Annual hours of operation: 8,060**

Item	Unit Cost $	Unit of Measure	Use Rate	Unit of Measure	Annual Use*	Annual Cost	Comments
Operating Labor							
Op Labor	32	$/Hr	0.5	hr/8 hr shift	504	16,120	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr
Supervisor	15%	of Op.			NA	2,418	15% of Operator Costs
Maintenance							
Maint Labor	32.00	$/Hr	0.5	hr/8 hr shift	504	16,120	$/Hr, 0.5 hr/8 hr shift, 8060 hr/yr
Maint Mtls	100	% of Maintenance Labor			NA	16,120	100% of Maintenance Labor
Utilities, Supplies, Replacements & Waste Management							
Electricity	0.062	$/kwh	1757.2	kW-hr	14,162,788	875,260	$/kwh, 1,757 kW-hr, 8060 hr/yr
Natural Gas	5.650	$/mscf	71	scfm	34,357	194,119	$/mscf, 71 scfm, 8060 hr/yr
Water	0.935	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
Cooling Water	0.321	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
Comp Air	0.367	$/mscf	0	Mscfm	0	0	$/mscf, 0 Mscfm, 8060 hr/yr
WW Treat Neutralizatior	1.957	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
WW Treat Biotreatemen	92.7	$/mgal	0.0	gpm	0	0	$/mgal, 0 gpm, 8060 hr/yr
SW Disposal	32.6	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Haz W Disp	326.2	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Waste Transport	0.652	$/ton-mi	0.0	ton/hr	0	0	$/ton-mi, 0 ton/hr, 8060 hr/yr
Waste Recycle	1.384	$/ton	0.0	ton/hr	0	0	$/ton, 0 ton/hr, 8060 hr/yr
Lime	290.00	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Ammonia	334.33	$/ton	0.0	lb/hr	0	0	$/ton, 0 lb/hr, 8060 hr/yr
Oxygen	1.72	Mscf	0.0	Mscf/hr	0	0	Mscf, 0 Mscf/hr, 8060 hr/yr
CO Catalyst	650	$/ft3	0	ft^3	0	0	$/ft3, 0 ft3, 8060 hr/yr
Filter Bags	43.98	$/bag	0	bags	0	0	$/bag, 0 bags, 8060 hr/yr

*annual use rate is in same units of measurement as the unit cost factor

See Summary page for notes and assumptions

Appendix C: Cost Analyses for Control Devices
Cost of Windbox Exhaust Re-Heating (Thermal Oxidizer)
Table A-11d

Company Name: Magnetation LLC
Address City, IN Zip: 64 East 100 North, Reynolds, IN 47980
Title V Operating Permit No.: T181-32081-00054
Permit Reviewer: John Haney
Date: February 6, 2013

Flue Gas Re-Heat Equipment Cost Estimate Basis Thermal Oxidizer with 70% Heat Recovery

Auxiliary Fuel Use Equation 3.19

T_{wi}	156	Deg F	- Temperature of waste gas into heat recovery
T_{fi}	156	Deg F	- Temperature of Flue gas into of heat recovery
T_{ref}	77	Deg F	- Reference temperature for fuel combustion calculations
FER	70%	Factional Heat Recovery %	Heat recovery section efficiency
T_{wo}	156	Deg F	- Temperature of waste gas out of heat recovery
T_{fo}	156	Deg F	- Temperature of flue gas into of heat recovery
$-h_{caf}$	21502	Btu/lb	Heat of combustion auxiliary fuel (methane)
$-h_{wg}$	0	Btu/lb	Heat of combustion waste gas
$C_{p\ wg}$	0.2684	Btu/lb - Deg F	Heat Capacity of waste gas (air)
ρ_{wg}	0.0739	lb/scf	- Density of waste gas (air) at 77 Deg F
ρ_{af}	0.0408	lb/scf	- Density of auxiliary fuel (methane) at 77 Deg F
Q_{wg}	397,326	scfm	- Flow of waste gas
Q_{af}	71	scfm	- Flow of auxiliary fuel

Year 2005 Inflation Rate 3.0%
Cost Calculations 397,397 scfm Flue Gas Cost in 1989 $'s $535,848
Current Cost Using CHE Plant Cost Index $808,992

Heat Rec %	A	B	
0	10,294	0.2355	Exponents per equation 3.24
0.3	13,149	0.2609	Exponents per equation 3.25
0.5	17,056	0.2502	Exponents per equation 3.26
0.7	21,342	0.2500	Exponents per equation 3.27

Indurator Flue Gas Heat Capacity - Basis Typical Composition

100 scfm 359 scf/lbmole

	Gas Composition	lb/hr f	wt %	Cp Gas	Cp Flue
28 mw CO	0 v %	0			
44 mw CO2	15 v %	184	22.0%	0.24	0.0528
18 mw H2O	10 v %	50	6.0%	0.46	0.0276
28 mw N2	60 v %	468	56.0%	0.27	0.1512
32 mw O2	15 v %	134	16.0%	0.23	0.0368
Cp Flue Gas	100 v %	836	100.0%		0.2684

Reference: OAQPS Control Cost Manual 5th Ed Feb 1996 - Chapter 3 Thermal & Catalytic Incinerators (EPA 453/B-96-001)

Appendix D
Air Quality Analysis

Magnetation LLC
Reynolds, Indiana (White County)
Tracking and Plant ID: 181-32081-00054

Proposed Project

Magnetation LLC (Magnetation) first submitted their PSD modeling in October 2012. This was followed by other modeling submittals sent in November and December 2012.

Magnetation proposes to construct and operate an iron oxide pellet production facility at 64 East 100 North, Reynolds, Indiana. Reynolds is located in White County. The proposed project will produce iron oxide pellets from iron concentrate and will be designed to process material sufficient to generate three (3) million metric tons of screened iron oxide pellets per year.

Keramida was the consultant that prepared the modeling portion of the permit application for Magnetation. This technical support document provides the air quality analysis review of the submitted modeling by Keramida for Magnetation.

Analysis Summary

Based on the potential emissions after controls, a PSD air quality analysis was triggered for SO_2, PM_{10}, $PM_{2.5,}$ NO_2, and fluorides. The significant impact analysis for $SO_{2,}$ determined that modeling concentrations did not exceed the significant impact levels for the 3-hour, 24-hour, and annual standards. A refined analysis was required for all the other standards for PM_{10}, $PM_{2.5,}$ NO_2, and 1-hour SO_2. The refined modeling showed NAAQS violations for 1-hour SO_2 but Magnetation was below significance whenever the violations occurred. Pre-construction monitoring requirements were not necessary since existing monitoring is available and Magnetation was below the monitoring significance levels. An additional impact analysis was conducted and showed no significant impact. A Hazardous Air Pollutant (HAP) analysis was performed since one HAP was above the 10 ton per year threshold.

Air Quality Impact Objectives

The purpose of the air quality impact analysis in the permit application is to accomplish the following objectives. Each objective is individually addressed in this document in each section outlined below.

A. Establish which pollutants require an air quality analysis based on PSD significant emission rates.

B. Provide analyses of actual stack heights with respect to Good Engineering Practice (GEP), the meteorological data used, a description of the model used in the analysis, and the receptor grid utilized for the analyses.

C. Determine the significant impact level, the area impacted by the source's emissions, and background air quality levels.

D. Demonstrate that the source will not cause or contribute to a violation of the National

Ambient Air Quality Standard (NAAQS) or PSD increment if the applicant exceeds significant impact levels.

E. Perform a secondary ozone analysis if the applicant is major for NO_2 and/or VOCs.

F. Perform a secondary $PM_{2.5}$ analysis if the applicant is major for NO_2 and SO_2.

G. Perform a qualitative analysis of the source's impact on general growth, soils, vegetation, and visibility in the impact area with emphasis on any Class I areas. The nearest Class I area is Kentucky's Mammoth Cave National Park.

H. Perform a HAP screening for informational purposes.

I. Summarize the Air Quality Analysis.

Section A - Pollutants Analyzed for Air Quality Impact

Applicability

The PSD requirements, 326 IAC 2-2, apply in attainment and unclassifiable areas and require an air quality impact analysis of each regulated pollutant emitted in significant amounts by a major stationary source or modification. Significant emission levels for each pollutant are defined in 326 IAC 2-2-1 and in the Code of Federal Regulations (CFR) 52.21(b)(23)(i).

Proposed Project Emissions

PM_{10}, $PM_{2.5,}$ NO_2, SO_2, CO, and fluorides are the main pollutants that will be emitted from Magnetation and are summarized below in Table 1. PM_{10}, $PM_{2.5,}$ NO_2, SO_2, and fluorides potential emissions after controls exceed the PSD significant emission rates and require an air quality analysis.

TABLE 1
Significant Emission Rates for PSD

POLLUTANT	**SOURCE EMISSION RATE** (Facility totals in tons/year)	**SIGNIFICANT EMISSION RATE** (tons/year)	**PRELIMINARY AQ ANALYSIS REQUIRED**
NO_2	491.7	40	Yes
CO	50.5	100	No
PM_{10}	214.3	10	Yes
$PM_{2.5}$	214.0	40	Yes
SO_2	361.3	40	Yes
Fluorides	61.3	3	Yes

Magnetation's emission rates were taken from Table 1 of their application.

Section B – Good Engineering Practice (GEP), Met Data, Model Used, Receptor

Grid and Terrain

Stack Height Compliance with Good Engineering Practice (GEP)

Applicability

Stacks should comply with GEP requirements established in 326 IAC 1-7-4. If stacks are lower than GEP, excessive ambient concentrations due to aerodynamic downwash may occur. Dispersion modeling credit for stacks taller than 65 meters (213 feet) is limited to GEP for the purpose of establishing emission limitations. The GEP stack height takes into account the distance and dimensions of nearby structures, which affects the downwind wake of the stack. The downwind wake is considered to extend five times the lesser of the structure's height or width. A GEP stack height is determined for each nearby structure by the following formula:

$$Hg = H + 1.5L$$

Where: Hg is the GEP stack height
H is the structure height
L is the structure's lesser dimension (height or width)

New Stacks

Since some of the new stack heights for Magnetation are below GEP stack height, the effect of aerodynamic downwash is accounted for in the air quality analysis for the project.

Meteorological Data

The National Weather Service (NWS) 1-minute Automated Surface Observation Station (ASOS) meteorological data used in AERMOD consisted of 2006 through 2010 surface data from South Bend, Indiana and upper air measurements taken at Lincoln, Illinois. The meteorological data was preprocessed using the latest versions of AERMINUTE, AERSURFACE, and AERMET at that time the permit was prepared.

Model Description

Keramida used AERMOD Version 12060. The Office of Air Quality (OAQ) used the same model version in their air quality analysis review to determine maximum off-property concentrations or impacts for each pollutant. All regulatory default options were utilized in the U.S. EPA approved model, as listed in the 40 Code of Federal Register Part 51, Appendix W “Guideline on Air Quality Models”.

Receptor Grid

OAQ modeling used the same receptor grids generated by Keramida. The receptor grid is outlined below to determine the significant impact area for each pollutant:

- 100 meter spacing along the facility’s property boundary,
- 100 meter spacing out to 1 kilometers,
- 250 meters spacing out to 3 kilometers.
- 500 meters spacing out to 10 kilometers.
- 1000 meters spacing out to 50 kilometers.

NAAQs and increment modeling used a subset of these receptors depending upon the extent of each pollutants significant impact area.

Treatment of Terrain

Receptor terrain elevation inputs were interpolated from NED (National Elevation Dataset) data obtained from the USGS. NED terrain data was preprocessed using AERMAP.

Section C - Significant Impact Level/Area (SIA) and Background Air Quality Levels

A significant impact analysis was conducted to determine if the source would exceed the PSD significant impact levels (concentrations). If the source's concentrations exceed these levels, further air quality analysis is required. Refined modeling for $PM_{2.5}$, PM_{10}, 1-hour SO_2, and NO_2, was required because the results did exceed significant impact levels. Keramida modeled the worst case operating scenario to predict maximum concentrations. Significant impact levels are defined by the following time periods in Table 2 below with all maximum-modeled concentrations from the worst case operating scenario. A Tier II 80% conversion of NO to NO_2 was assumed based on the March 01, 2011, Tyler Fox memorandum.

TABLE 2
Significant Impact Analysis[4]

POLLUTANT	TIME AVERAGING PERIOD	MAXIMUM MODELED IMPACTS (µg/m^3)	SIGNIFICANT IMPACT LEVEL (µg/m^3)	REFINED AQ ANALYSIS REQUIRED
NO_2	Annual[1]	1.58[5]	1	Yes
NO_2	1 hour[2]	33.8[5]	7.55	Yes
PM_{10}	Annual[1]	3.13	1	Yes
PM_{10}	24 hour[1]	14.51	5	Yes
$PM_{2.5}$	Annual[3]	1.24	.3	Yes
$PM_{2.5}$	24 hour[3]	5.89	1.2	Yes
SO_2	3 hour[1]	15.47	25	No
SO_2	24 hour[1]	8.38	5	No
SO_2	Annual[1]	.4	1	No
SO_2	1 hour[2]	13.55	7.80	Yes
Fluorides	24 hour[1]	1.79	N/A[6]	No

[1] The first highest values per the EPA NSR manual dated October 1990.
[2] In accordance with recent U.S. EPA guidance, the highest of the five year modeled averages predicted each year at each receptor. See the March 01, 2011, memorandum.
[3] In accordance with recent U.S. EPA guidance, the highest modeled average over the five years at each receptor. See the March 23, 2010, memorandum.
[4] Impacts are from Magnetation only.
[5] NO_2 values were multiplied by .8.
[6] There is no significant impact level for fluorides. This value exceeds the monitoring threshold of .25 µg/m^3 as stated in 326 IAC 2-2-4. There is no way to monitor for fluorides and no standard to monitor against.

Pre-construction Monitoring Analysis

Applicability

The PSD rule, 326 IAC 2-2-4, requires an air quality analysis of the new source or the major modification to determine if the pre-construction monitoring threshold is triggered. In most cases, monitoring data taken from a similar geographic location can satisfy this requirement if the pre-construction monitoring threshold has been exceeded. Also, post construction monitoring could be required if the air quality in that area could be adversely impacted by applicant's emissions.

Modeling Results

The modeling results were compared to the PSD preconstruction monitoring thresholds. The results are shown in the table below.

TABLE 3
Preconstruction Monitoring Analysis

POLLUTANT	TIME AVERAGING PERIOD	MAXIMUM MODELED IMPACTS (µg/m^3)	DEMINIMIS LEVEL (µg/m3)	ABOVE DE MINIMIS LEVEL
NO_2	Annual[1]	1.58	14	No
PM_{10}	24 hour[1]	14.51	10	Yes
$PM_{2.5}$	24 hour[2]	5.89	4	Yes
SO_2	24 hour[1]	8.38	13	No

[1] The first highest values per the EPA NSR manual dated October 1990. Maximum modeled impacts are from Magnetation only.
[2] In accordance with recent U.S. EPA guidance, the highest average over the five years at each receptor. See the March 23, 2010, memorandums from EPA.

PM_{10} and $PM_{2.5}$ did trigger the preconstruction monitoring threshold level. Magnetation can satisfy the preconstruction monitoring requirement since there is air quality monitoring data representative of the area in other counties.

Background Concentrations

Applicability

EPA's "Ambient Monitoring Guidelines for Prevention of Significant Deterioration" (EPA-450/4-87-007) Section 2.4.1 is cited for approval of the monitoring sites chosen for this area.

Background Monitors

Background data was taken from representative monitoring stations for Magnetation. The background design value was used for $PM_{2.5}$. It was agreed between Magnetation and OAQ that this approach could be taken in place of the preconstruction monitoring requirement.

TABLE 4
Existing Monitoring Data Used For Background Concentrations (ug/m^3)

Pollutant	Averaging Period	Location	Monitoring Site	Monitored Design Values
NO_2	Annual	St. Joseph County - South Bend	18-141-0015	20.9
NO_2	1 hour	St. Joseph County - South Bend	18-141-0015	69.6
PM_{10}	Annual	Porter County - Portage	18-127-0023	20.9
PM_{10}	24 hour	Porter County - Portage	18-127-0023	61.6
$PM_{2.5}$	Annual	Tippecanoe County - Lafayette	18-157-0008	11
$PM_{2.5}$	24 hour	Tippecanoe County - Lafayette	18-157-0008	24
SO_2	1 hour	Lima, Ohio[1]	33-003-0009	47.9
SO_2	3 hour	Lima, Ohio[1]	33-003-0009	36.8
SO_2	24 hour	Lima, Ohio[1]	33-003-0009	17.0
SO_2	Annual	Lima, Ohio[1]	33-003-0009	4.9

[1] EPA approved the use of the Lima, Ohio monitor with the Synergy application. This is more representative of a rural location.
*$PM_{2.5}$ used the design value.

Section D - NAAQS and PSD Increment

OAQ supplied emission inventories of all point sources in Indiana within a 50-kilometer radius of Magnetation. The NAAQS inventories are generated from EMITS (Emission Inventory Tracking System) in accordance with 326 IAC 2-6. The PSD increment inventories include sources that affect the increment and are compiled from permits issued by OAQ. All sources with the potential to cause a significant impact in the vicinity of the proposed facility were explicitly included in the modeling.

NAAQS Compliance Analysis and Results

NAAQs modeling for the appropriate time-averaging periods for NO_2, PM_{10}, $PM_{2.5}$, and SO_2 was conducted and compared to the respective NAAQs limit. OAQ modeling results are shown in Table 5. All maximum-modeled concentrations were compared to the respective NAAQS limit. Not all maximum-

modeled concentrations during the five years were below the NAAQS limits and further modeling was required.

TABLE 5[3]
NAAQS Analysis

Pollutant	Year	Time-Averaging Period	Maximum Concentration ug/m3	Background Concentration ug/m3	Total ug/m3	NAAQS Limit ug/m3	NAAQS Violation
NO_2	2010	Annual[1]	1.58	20.9	22.48	100	No
NO_2	2006-2010	1 hour[4]	132.74	69.6	202.34	188.68	Yes
PM_{10}	2010	Annual[1]	3.13	20.9	28.43	50	No
PM_{10}	2006-2010	24 hour[3]	13.02	61.6	74.62	150	No
$PM_{2.5}$	2006-2010	Annual	1.24	11	12.24	15	No
$PM_{2.5}$	2006-2010	24 hour	5.89	24	29.89	35	No
SO_2	2006-2010	1 hour[5]	81.06	47.9	128.96	195.0	No
SO_2	n/a	3 Hour[2]	Not Required	36.8	n/a	1300	No
SO_2	n/a	24 hour[2]	Not Required	17.0	n/a	365	No
SO_2	n/a	Annual[1]	Not Required	4.9	n/a	80	No

[1] First highest values per EPA NSR manual October 1990.
[2] High 2nd high values per EPA NSR manual October 1990.
[3] High 6th High
[4] Any differences between the maximum concentration numbers in Tables 5 and 6 are due to different sources used for the NAAQS and the increment inventories. Table 3 maximum concentrations are from Magnetation only.
[5] Based on the new 1-hour design values.

Further modeling was conducted to determine if Magnetation was culpable during a NAAQs violation. The results are shown in Table 5a.

Table 5a[1]
1-Hour Culpability Analysis for NO_2

Highest Predicted 1-hour NO_2 Concentration from Cumulative Analysis ($\mu g/m^3$)						
Maximum Modeled Concentration Magnetation + Inventory Sources	Background Design Value	Concentration (modeled + background)	Contribution from Modeled Nearby Sources to Total	Contribution from Modeled Magnetation to Total	Is the Total Concentration ≥ NAAQS of 188.679 µg/m3?	Is the Magnetation contribution ≥ SIL of 7.55 µg/m3?
132.74	69.6	**202.34**	132.734	**0.0016**	Yes	**No**

[1]This follows the recent U.S. EPA guidance in the March 23, 2010, memorandum on page 8 which explains how to determine significant contributions to modeled violations.

Even though the model predicts a NAAQS violation, Magnetation was not significant at the same receptor and time period. Therefore, Magnetation does not cause or contribute to a violation of the NAAQS. Magnetation's highest contribution is 0.00572 μ/m^3 during a NAAQs violation and is well below the significant impact level (SIL). This concentration does not contribute to any violation of the standard.

Every receptor over the standard was evaluated below the maximum modeled concentration until there was no longer a NAAQS violation and showed Magnetation was below significance and did not cause or contribute to a violation of the NAAQS. Also, Magnetation's modeled concentrations above the SIL occur when there are no NAAQs violations present.

Analysis and Results of Source Impact on the PSD Increment

Applicability

Maximum allowable increases (PSD increments) are established by 326 IAC 2-2-6. This rule also limits a source to no more than 80 percent of the available PSD increment to allow for future growth.

Source Impact

Since Magnetation impacts for $PM_{2.5}$, PM_{10}, and NO_2 modeled greater than or equal to significant impact levels, a PSD increment analysis for Magnetation was required. Because $PM_{2.5}$ increment values were established in 2010 and the PM_{10} surrogacy policy was removed, the baseline date for the increment is within the last few years. The 1-hour SO_2 and NO_2 have no increment standards.

Results of the increment modeling are summarized in Table 6 below.

TABLE 6[1]
Increment Analysis

Pollutant	Year	Time-Averaging Period	Maximum Concentration µg/m3	PSD Increment µg/m3	Percent Impact on the PSD Increment	Increment Violation
$PM_{2.5}$	2007	24-hour[2]	5.86	9	65.1%	No
$PM_{2.5}$	2010	Annual[3]	1.33	4	33.3%	No
PM_{10}	2009	24-hour	13.79	30	46%	No
PM_{10}	2010	Annual	3.13	17	18.4%	No
NO_2	2010	Annual	1.58	25	39.5%	No

[1]Any differences between the maximum concentration numbers in Tables 5 and 6 are due to different sources used for the NAAQS and the increment inventories, and different averaging techniques to obtain maximum concentrations. Tables 3 and 6 maximum concentrations are from Magnetation only.
[2]In accordance with the Federal Register dated October 20, 2010; the high 2nd high is used.
[3]In accordance with the Federal Register dated October 20, 2010; the highest annual average is used from any of the years modeled.

The results of the increment analysis show all pollutants for all averaging periods were below 80% of the available increment. No further analysis is required.

Part E - Secondary Ozone Formation Analysis

Because of the well established relationship between nitrogen oxides (NO_x), volatile organic compounds (VOCs), and the regional transport formation of ozone, U.S. EPA recently finalized the Cross

State Air Pollution Rule (CSAPR) to assist states to meet the ozone NAAQS. This rule included extensive modeling to support the emissions reductions necessary in each state to achieve the ozone NAAQS in the eastern U.S. The source category responsible for these reductions is Electric Generating Units (EGUs). While the U.S. Court of Appeals for the D.C. Circuit issued a decision vacating CSAPR on August 21, 2012, the modeling analysis conducted by U.S. EPA is considered valid and will be used for the ozone analysis.

U.S. EPA used a regional model, Comprehensive Air Quality Model with extensions (CAMx), and the Air Quality Assessment Tool (AQAT) to determine levels of reduction from EGUs necessary to achieve the NAAQS at every site. The documentation includes extensive tables showing impacts at all ozone monitors in the eastern U.S. and emission reduction levels necessary to achieve those results. To examine the possible impact of Magnetation, results from the modeling U.S. EPA conducted to establish the 2012 and 2014 base case emissions in CSAPR were used for this analysis. The CSAPR website is located at http://www.epa.gov/crossstaterule/techinfo.html.

Information regarding the NO_x emissions modeled for CSAPR can be found in the "EmissionsSummaries.xlsx" spreadsheet under the Emissions Inventory Final Rule TSD section at EPA's CSAPR website for technical information http://www.epa.gov/crossstaterule/techinfo.html. The spreadsheet shows the base case annual NO_x emissions for Indiana by 2012 at 455,325 tons and base case annual NO_x emissions by 2014 at 431,342 tons. Indiana's total NO_x emission reduction between these scenarios totals 23,983 tons. All surrounding states make similar significant reductions. Magnetation' proposed emissions would be 491.7 tons per year of NO_x.

8-Hour Ozone Modeling Results

The nearest ozone monitor to Magnetation is the Flora ozone monitor in Carroll County. The current design value for 2010-2012 is 71 parts per billion (ppb), below the 8-hour NAAQS of 75 ppb. The maximum modeled 8-hour ozone concentration for Carroll County is 67.3 ppb for the 2012 base case and 65.7 ppb for the 2014 base case. This is a decrease of 1.6 ppb as a result of NO_x emission adjustments between 2012 and 2014 base case emission calculations, based on emission growth factors. In order for this modeled 8-hour ozone concentration reduction to occur, Indiana's 2014 NO_x emissions were reduced from the 2012 base case emissions by 23,983 tons. The Carroll County monitoring site is not necessarily impacted by every EGU in Indiana, but in the surrounding states, thousands of tons of annual NO_x emission reductions are projected to occur by 2014, many of which would impact this site. Therefore, to estimate the impact of Magnetation on modeled concentrations, the ratio of Magnetation's NO_x emissions to Indiana's 2012 to 2014 base case NO_x emission reduction was calculated. This ratio was then compared to the modeled ozone impact from the difference between the CSAPR 2012 and 2014 base case modeling results.

1) **491.7 tons** Magnetation NO_x emissions / **23,983 tons** of Indiana's NO_x base case emissions reduced from 2012 to 2014 = **2.05%** ratio of Magnetation's NOx compared to Indiana's NOx emissions

2) **1.6 ppb** maximum 8-hour 2012 to 2014 Base Case modeled results for Carroll County * **2.05%** Magnetation emission ratio = **0.033 ppb** of Magnetation 8-hour ozone impact

3) **0.033 ppb** of Magnetation 8-hour ozone impact / **65.7 ppb** at Carroll County ozone monitor from 2014 base case maximum modeled results = **0.05%** Magnetation's impact on the 2014 base case modeled concentration.

Tables are located in CSAPR_AQModeling.pdf, Appendix B, pages B-10 and B-12, for 8-hour ozone design values that show the base case 2012 ozone concentrations at surrounding monitoring sites

versus projected base case 2014 ozone concentrations. 2012 Base Case represents modeled results taken from the 2012 and 2014 Base Case emissions, represents the 2014 Base emissions with emission adjustments from growth factors factored into the modeling. Table 7 below shows the CSAPR modeling results for the Carroll County monitor and the potential impact from Magnetation.

Table 7
EPA's Cross-State Air Pollution Rule - 8-Hour Ozone Modeling Results

Monitor ID	County	2012 Base (ppb)	2014 Base (ppb)	2012 - 2014 Base (ppb)	Anticipated Source Impact (ppb)	Source Impact on 2014 Base Results (%)
180150002	Carroll	67.3	65.7	1.6	0.033	0.05%

Summary of Ozone Results

Magnetation's NO_x emissions were compared with U.S. EPA CSAPR modeling for 8-hour ozone to determine what impacts may occur as a result of ozone formation. When Magnetation emissions were compared with the amount of NO_x emission reductions realized from emission estimates associated with base case emissions for CSAPR and compared with CSAPR modeling results for 8-hour ozone, the impacts from Magnetation on the Carroll County ozone monitor are anticipated to be minimal and will not have a significant impact on the attainment status of Carroll County.

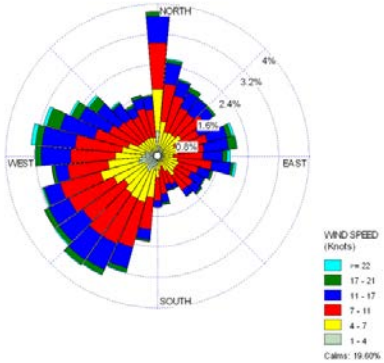
Part F - Secondary $PM_{2.5}$ formation Analysis

In addition to direct emissions of $PM_{2.5}$; other pollutants, chiefly NO_x and SO_2, can lead to formation of $PM_{2.5}$ further downwind. The photochemical reactions that transform these pollutants into particulate nitrates and sulfates, which become the major species of $PM_{2.5}$, take place over hours or days. Dispersion modeling for these two primary pollutants shows that concentrations are below Significant Impact Levels (SIL) for their respective NAAQS and further diminish within the modeling domain of 50 km. Since the NO_x and SO_2 standards are extremely restrictive, being below the SILs would likely prevent the pollutants from impacting secondary formation significantly enough to result in a violation of the $PM_{2.5}$ standards.

However, it is possible that some transformation into nitrates and sulfates from this source may occur and be transported downwind. No peer-reviewed regulatory model presently exists to examine the photochemical impacts of an individual source of SO_2 and NO_x. All photochemical models are regional scale and a source of this size would not show any measurable impact. Therefore, other available information from emissions inventories, meteorological analyses, and other modeling projects can be used to estimate the impact from this source.

The 2011 wind rose taken from the Purdue Airport in West Lafayette shows the winds typically blow from the southwest and west.

West Lafayette 2011



The 2009 – 2011 annual $PM_{2.5}$ design value at the Tippecanoe County $PM_{2.5}$ monitor is 11.0 µg/m^3, well below the annual $PM_{2.5}$ NAAQS of 15.0 0 µg/m3. The 2009 – 2011 24-hour $PM_{2.5}$ design value at the Tippecanoe County $PM_{2.5}$ monitor is 24.0 µg/m^3, below the 24-hour $PM_{2.5}$ NAAQS of 35.0 µg/m$^{3.}$

Secondary $PM_{2.5}$ Weight of Evidence Analysis based on EPA's CSAPR Modeling

Because of the well established relationship between NO_x and SO_2, and the regional transport and formation of $PM_{2.5}$, U.S. EPA recently finalized the Cross State Air Pollution Rule (CSAPR) to assist states to meet the $PM_{2.5}$ NAAQS. This rule included extensive modeling to support the emissions reductions necessary in each state to achieve the $PM_{2.5}$ NAAQS in the eastern U.S. The source category responsible for these reductions is Electric Generating Units (EGUs). While the U.S. Court of Appeals for the D.C. Circuit issued a decision vacating CSAPR on August 21, 2012, the modeling analysis conducted by U.S. EPA is considered valid and will be used for the secondary $PM_{2.5}$ analysis.

U.S. EPA used a regional model, Comprehensive Air Quality Model with extensions (CAMx), and the Air Quality Assessment Tool (AQAT) to determine levels of reduction from EGUs necessary to achieve the NAAQS at every site. The documentation includes extensive tables showing impacts at all $PM_{2.5}$ monitoring sites in the eastern U.S. and emission reduction levels necessary to achieve those results. To examine the possible impact of Magnetation, results from the modeling U.S. EPA conducted to establish the final 2014 budgets in CSAPR were used for this analysis. The CSAPR website is located at http://www.epa.gov/crossstaterule/techinfo.html.

Information regarding SO_2 and NO_x emission reductions necessary to achieve the future year modeled design values can be found in the "EmissionsSummaries.xlsx" spreadsheet under the Emissions Inventory Final Rule TSD section at EPA's CSPAR website for technical information : http://www.epa.gov/crossstaterule/techinfo.html. The spreadsheet shows the base case annual SO_2 and NO_x emissions for Indiana in 2012 and 2014. Indiana's total SO_2 and NO_x emission reductions between these two base case scenarios are 89,222 tons, summarized in Table 10 below. All surrounding states make similar significant reductions. Potentials to emit after controls for Magnetation are 491.7 tons per year of NO_x and 361.3 tons per year of SO_2.

Table 8
EPA's Cross-State Air Pollution Rule Emission Summary for Indiana

	Pollutant	2012 Base Case Emissions (tons/year)	2014 Base Case Emissions (tons/year)	2012-2014 Difference (tons/year)
Indiana	SO_2	929,162	863,923	65,239
Indiana	NO_x	455,325	431,342	23,983
TOTAL				**89,222**

Annual $PM_{2.5}$ Modeling Results

The maximum annual $PM_{2.5}$ modeled concentration for Tippecanoe County is 12.87 µg/m^3 for the 2012 base case and 12.42 µg/m^3 for the 2014 base case results. This is a decrease of 0.45 µg/m^3. Indiana's 2014 SO_2 emissions from EGUs were adjusted by 65,239 tons from the 2012 base case emissions and 2014 NO_x emissions were reduced by 23,983 for a total of 89,222 tons of SO_2 and NO_x. This particular monitoring site is not necessarily impacted by every EGU in Indiana, but in the surrounding states, hundreds of thousands of tons of annual SO_2 and NO_x emission reductions would occur by 2014, many of which would impact the Tippecanoe County monitor. Therefore, to estimate the impact of Magnetation on modeled concentrations, the ratio of Magnetation's SO_2 and NO_x emissions to Indiana's SO_2 and NO_x decreases from 2012 and 2014 base case CSAPR emissions was calculated. This ratio was then compared to the modeled annual $PM_{2.5}$ impact from the difference between the CSAPR 2012 and 2014 base case annual $PM_{2.5}$ modeling results.

1) **853 tons** Magnetation's SO_2 and NO_x emissions / **89,222** tons of SO_2 and NO_x emissions reduced through CSAPR modeling = 0.956%

2) **0.45 µg/m^3** modeled annual $PM_{2.5}$ CSAPR results * **0.956%** Magnetation SO_2/NOx emission ratio = **0.0043 µg/m^3** of Magnetation annual $PM_{2.5}$ impact

3) **0.0043 µg/m^3** Magnetation's annual $PM_{2.5}$ impact /**12.42 µg/m^3** of 2014 Base Case annual $PM_{2.5}$ modeled results = **0.005%** Magnetation's impact on the 2014 modeled Base Case annual $PM_{2.5}$ results.

Tables showing projected base case 2014 $PM_{2.5}$ concentrations at existing monitoring sites versus control strategy $PM_{2.5}$ concentrations are located in CSAPR_AQModeling.pdf, Appendix B, pages B-41 and B-42 for annual design values and pages B-70 to B-72 for 24-hour design values. The 2014 Base represents anticipated 2014 emissions. The 2014 Remedy represents the 2014 Base emissions with emission reductions from CSAPR factored into the modeling. Table 9 below shows the CSAPR annual $PM_{2.5}$ modeled concentrations at the Tippecanoe County ozone monitors and Magnetation anticipated impacts.

Table 9
EPA's Cross-State Air Pollution Rule - Annual $PM_{2.5}$ Modeling Results

Monitor ID	County	2012 Base	2014 Base	2012 - 2014 Base (µg/m^3)	Anticipated Source Impact (µg/m^3)	Source Impact on 2014 Base Case Results (%)
181570008	Tippecanoe	12.87	12.42	0.45	0.0043	0.035%

24-Hour $PM_{2.5}$ Modeling Results

The same emissions and impact analysis methodology used for the annual $PM_{2.5}$ impacts were used to determine the 24-hour $PM_{2.5}$ impacts from Magnetation. The maximum 24-hour modeled concentrations for Tippecanoe County are 33.9 µg/m^3 for the 2012 base case and 32.1 µg/m^3 for the 2014 base case. This is a reduction of modeled concentration of 1.8 µg/m^3. To estimate the 24-hour impact of Magnetation on modeled concentrations, the ratio of Magnetation SO_2 and NO_x emissions and the CSAPR SO_2 and NO_x emission reductions was calculated. This ratio was then compared to the modeled 24-hour $PM_{2.5}$ impact from the difference between the CSAPR 2012 and 2014 base case 24-hour $PM_{2.5}$ modeling results.

1) **853 tons** Magnetation SO_2 and NO_x emissions / **89,222 tons** of SO_2 and NO_x emissions reduced through CSAPR modeling = **0.956%**

2) **1.8 µg/m^3** modeled 24-hour $PM_{2.5}$ CSAPR results * **0.956%** Magnetation SO_2/NOx emission ratio = **0.0172 µg/m^3** of Magnetation 24-hour $PM_{2.5}$ impact

3) **0.0172 µg/m^3** Magnetation 24-hour $PM_{2.5}$ impact /**32.1 µg/m^3** of 2014 Base Case 24-hour $PM_{2.5}$ modeled results = **0.054%** Magnetation's impact on the 2014 modeled Base Case 24-hour $PM_{2.5}$ concentration.

Modeling results below in Table 10 show 2012 and 2014 Base Case modeled 24-hour concentrations and the anticipated Magnetation impacts, based on the emissions comparison and estimated impacts.

Table 10
EPA's Cross-State Air Pollution Rule - 24-Hour $PM_{2.5}$ Modeling Results

Monitor ID	County	2012 Base	2014 Base	2012 - 2014 Base (µg/m^3)	Anticipated Source Impact (µg/m^3)	Source Impact on 2014 Base Case Results (%)
181570008	Tippecanoe	33.9	32.1	1.8	0.0172	0.054%

Summary Annual and 24-Hour $PM_{2.5}$

Magnetation's SO_2 and NO_x emissions were compared with U.S. EPA CSAPR modeling for annual and 24-hour $PM_{2.5}$ to determine what impacts on $PM_{2.5}$ may occur as a result of secondary $PM_{2.5}$ formation. When the Magnetation emissions are compared with the amount of SO_2 and NO_x emission reductions realized from the CSAPR modeling analysis and compared with CSAPR modeling results for annual and 24-hour, the impacts from Magnetation on the nearest $PM_{2.5}$ monitor is anticipated to be minimal and will not have an effect on the attainment status of any $PM_{2.5}$ monitors in the area.

Part G – Qualitative Analysis

Additional Impact Analysis

All PSD permit applicants must prepare an additional impact analysis for each pollutant subject to regulation under the Act. This analysis assesses the impacts on growth, soils and vegetation, endangered species, and visibility caused by any increase in emissions of any regulated pollutant from the source. The Magnetation modeling submittal provided an additional impact analysis performed by Keramida.

Economic Growth

The purpose of the growth analysis is to quantify project associated growth and estimate the air quality impacts from this growth either quantitatively or qualitatively.

It is estimated that approximately 100 to 120 additional jobs will be created as a result of the proposed project. Most of the employees will be drawn from surrounding areas. Since the area is predominately rural, it is not expected the growth impacts will cause a violation of the NAAQS or the PSD increment.

Soils and Vegetation Analysis

A list of soil types present in the general area was determined. Soil types include the following: Loamy Glacial Till, Moderate Thick Loess over Loamy Glacial Till and Thin Loess over Loamy Glacial Till.

Due to the agricultural nature of the land, crops in the White County area consist mainly of corn, sorghum, wheat, soybeans, and oats (2002 Agricultural Census for White County). The maximum modeled concentrations for Magnetation are well below the threshold limits necessary to have adverse impacts on the surrounding vegetation such as autumn bent, nimblewill, barnyard grass, bishops cap and horsetail, and milkweed (Flora of Indiana – Charles Deam). Livestock in White County consist mainly of hogs, cattle, and sheep (2002 Agricultural Census for White County) and will not be adversely impacted from the facility. Trees in the area are mainly hardwoods. These are hardy trees and no significant adverse impacts are expected due to modeled concentrations.

Federal and State Endangered Species Analysis

Federal and state endangered are listed by the U.S. Fish and Wildlife Service; Division of Endangered Species for Indiana. For White County this includes 8 mollusks, 4 reptiles, 8 birds, and 1 mammal which have habitat within the county. The mollusks, certain species of birds and mammals are found along rivers and lakes, while the other species of birds and mammals are found in forested areas. The facility is not expected to have any additional adverse effects on the habitats of the species than what has already occurred from the industrial, farming, and residential activities in the area.

Federal and state endangered plants are listed by the U.S. Fish and Wildlife Service, Division of Endangered Species for Indiana. At this time 5 state endangered plant species are found in White County. The endangered plants do not thrive in industrialized and residential areas. The facility is not expected to adversely affect any plant on the endangered species list.

Visibility Analysis

The Federal Class I areas include national parks and national wilderness areas and are considered environments for which minimal air quality degradation is allowed.

The nearest Class 1 area to Magnetation is Mammoth Cave National Park which is approximately 395 km from the plant. Pursuant to a new federal guidance document (Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase 1 Report – Revised November 2010), the Magnetation facility would not be required to conduct a Class 1 area analysis since the combined emissions of visibility impairing pollutants are less the screening threshold. The threshold is calculated by dividing the emissions by distance for sources more than 50 km from a Class 1 area. If the number is less than 10 then a visibility analysis is not required. Magnetation did not exceed that threshold.

A local visibility analysis was performed using VISCREEN. VISCREEN is designed to calculate two visual effect parameters for a plume as observed from a given vantage point:

1. The color difference parameter (Delta-E) was develop to specify the perceived magnitude of color and brightness changes and is used as the primary basis for determining the perceptibility of plume visual impacts in the screening analysis. The screening threshold is 2.0.
2. Plume (green) contrast is part of the light spectrum measured in wavelengths. The separation of visible light into different colors is known as dispersion. Green is in the middle of wavelength of light. The screening threshold for plume contrast is .55 micrometers or .05.

The primary visibility impairment pollutants are PM_{10}, SO_2, and NO_x. Proposed potential emissions of these pollutants from Magnetation were examined for source contribution to visibility impairment.

The modeling results show that neither of the above thresholds was exceeded. Therefore, Magnetation will not contribute to visibility impairment at the local level, which is at White County airport and Interstate 65.

Additional Analysis Conclusions

Finally, the results of the additional impact analysis conclude the operation of the facility will have no significant impact on economic growth, soils, vegetation, or visibility in the immediate vicinity or on any Class I area.

Part H – HAPs Analysis

OAQ currently requests data concerning the emission of 189 HAPs listed in the 1990 Clean Air Act Amendments (CAAA) that are either carcinogenic or otherwise considered toxic and may be used by industries in the State of Indiana. These substances are listed as air toxic compounds on the State of Indiana, Department of Environmental Management, Office of Air Quality's construction permit application Form GSD-08.

The single HAP with the highest emissions is hydrofluoric acid with estimated annual emissions greater than 10 tons per year.

For Magnetation, a full HAP analysis was completed comparing the maximum estimated concentrations of each pollutant with the Unit Risk Factor (URF) or the Inhalation Unit Risk, and the Reference Concentration (RfC). This analysis offers a refined, up to date site specific analysis that takes into account the different potencies and health effects that each pollutant presents to the public.

The URF is the upper-bound excess lifetime cancer risk estimated to result from continuous inhalation exposure to a pollutant over a 70 year lifetime. Multiplying the estimated concentration by the URF will produce a cancer risk estimate. The cancer risk estimate is the conservative probability of developing cancer from exposure to a pollutant or a mixture of pollutants over a 70 year lifetime, usually expressed as the number of additional cancer cases in a given number of people, e.g., one in a million. For screening purposes at Magnetation, the cancer estimates for each pollutant are considered to be additive when deriving the cumulative maximum individual cancer risk.

Non-cancer health effects are determined using the Reference Concentration (RfC). The RfC is an estimate of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Dividing the

estimated pollutant concentration by the RfC will determine the pollutant's Hazard Quotient (HQ). All of the HAPs' Hazard Quotients were added together to determine Magnetation's Hazard Index (HI).

This HAP screening analysis uses health protective assumptions that overestimate the actual risk associated with emissions from Magnetation. Estimates 1) assume a 70 year exposure time, 2) assume that all carcinogens cause the same type of cancer, 3) assume that all non-carcinogens have additive health effects, 4) assume maximum permit allowable emissions from the facility, and 5) use conservatively derived dose-response information. The risk analysis cannot accurately predict whether there will be observed health problems around Magnetation; rather it identifies possible avenues of risk.

The results of the HAP modeling are in Table 11.

TABLE 11
Hazardous Air Pollutant Modeling Results

Compound	CAS Number	Annual Concentration (µg/m3)	Cancer URF, (µg/m3)-1	Source	Cancer Risk	Non-Cancer Chronic RfC, µg/m3	Source of IDEM RfC	Hazard Quotient
Hydrofluoric acid	7664393	0.09				20.00	IRIS	0.005
				∑ Cancer Risk	**0.0000**		**Hazard Index (HI)**	**0.0045**
				IDEM Standard	**1.0000E-06**		**IDEM Standard**	**1.00+00**
				Comparison	**Below**			**Below**

* Further information on URFs and RfCs can be found at the following EPA web site: http://www.epa.gov/ttn/atw/toxsource/chronicsources.html

The Hazard Index for the project does not exceed 1. Pollutants with a Hazard Quotient (HQ) greater than 1 are considered to be at concentrations that could represent a health concern. Hazard Quotients above 1 do not represent areas where adverse health effects will be observed but indicate that the potential exists.

The additive cancer risk estimate from hydrofluoric acid is 0 additional cancer causes in ten million people. Hydrofluoric acid is not a carcinogen. This means if an individual was exposed to this HAP continuously for 70 years, the risk of getting cancer from this exposure would be 0 in ten million. The US EPA considers one in ten thousand (1.0E-04) excess cancer risks to be the upper range of acceptability with an ample margin of safety. The probability for the general public to be exposed to this HAP for 24 hours a day, seven days a week, and 52 weeks a year for 70 years is minimal.

Part I - Summary of Air Quality Analysis

Keramida prepared the modeling portion of the PSD application. White County is designated as attainment for all criteria pollutants. PM_{10}, NO_2, SO_2, CO, $PM_{2.5}$, and fluorides emission rates associated with the proposed facility exceeded the respective significant emission rates. Modeling results taken from AERMOD model showed PM_{10}, NO_2, SO_2, and $PM_{2.5}$ impacts were predicted to be greater than the significant impact levels. Magnetation did trigger the preconstruction monitoring threshold level but can satisfy the preconstruction monitoring requirement since there is existing air quality monitoring data representative of the area. The NAAQS modeling for 1-hour NO_2 showed violations of the standard, but Magnetation was not significant during those violations. Magnetation was below eighty percent of

available increment modeling. Secondary $PM_{2.5}$ and ozone formation will be below measureable values. The nearest Class I area is Mammoth Cave National Park in Kentucky, just under 395 kilometers away from the source, but emissions are below the Federal Land Manager guidance screening threshold. An additional impact analysis was performed and the operation of the proposed facility will have no significant impact. A HAP analysis was performed and showed no likely adverse impact.

Indiana Department of Environmental Management
Office of Air Quality

Appendix E
Maximum Available Control Technology (MACT) Analysis Determination

Source Description and Location

Source Name:	Magnetation LLC
Source Location:	64 East 100 North, Reynolds, Indiana 47980
County:	White
SIC Code:	1011
Operation Permit No.:	T181-32081-00054
Permit Reviewer:	John Haney

Background Information

The Office of Air Quality (OAQ) has performed a maximum achievable control technology (MACT) review relating to the operation of an iron ore pelletizing plant at Magnetation LLC, in Reynolds, Indiana.

Magnetation LLC submitted an application on July 2, 2012 to construct and operate an induration machine, consisting of a furnace hood exhaust (identified as EU013), a furnace windbox exhaust (identified as EU014), and a furnace discharge system (identified as EU015). The proposed unit has potential hydrogen fluoride (HF) emissions greater than ten (10) tons per year. Therefore, the operation of the new induration furnace is subject to the requirements of 326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants (HAP)).

A case-by-case MACT analysis is required when potential emissions of a hazardous air pollutant (HAP) indicate that a process is a major source of HAP and USEPA has not promulgated a specific NESHAP for that process. In general, a MACT analysis is similar to a BACT analysis. IDEM, OAQ conducts MACT analyses in accordance with the “Guidelines for MACT Determinations under Section 112(j) Requirements." These guidelines offer a step-by-step process for making a MACT determination consistent with the above two principles. The process can be summarized as follows:

Step 1: Identify the MACT-affected emissions unit;

Step 2: Make a MACT floor finding;

Step 3: List all available/reasonable applicable control technologies;

Step 4: Eliminate control technologies that are not technically feasible and not cost effective;

Step 5: Determine efficiency of applicable control technologies

Step 6: Identify the maximum emission reduction control technology

The following information resources are available and may be consulted in searching for varied control alternatives for the analyzed emission sources:

(a) On-line USEPA RACT/BACT/LAER Clearinghouse (RBLC) System;

(b) USEPA/State/Local Air Quality Permits;

(c) Federal/State/Local Permit Engineers;

(d) Control Technology Vendors; and

(e) Inspection/Performance Test Reports.

MACT Analysis

Step One: Identify the MACT-affected emissions unit

The following units are considered the MACT-affected emissions units:

(n) One (1) induration machine, approved in 2013 for construction, consisting of one (1) natural gas fired pellet hardening furnace, with a maximum heat input capacity of 436 MMBtu per hour and a maximum throughput rate of 450 tons per hour of iron oxide pellets, equipped with the following:

(2) One (1) furnace windbox exhaust (WBE), identified as EU014, using one (1) gas suspension absorber (GSA) (CE015) and one (1) WBE baghouse (CE016) as control, exhausting to stack SV013B.

Step Two: Make a MACT floor finding

A MACT floor refers to the level of emission control that is achieved in practice by the best controlled similar source. There are two sources in the RBLC database that have a similar process, Essar Steel Minnesota LLC (RBLC ID: MN-0085) and Minnesota Steel Industries, LLC (RBLC ID: MN-0070). The corresponding waste gas exhausts at these sources have existing PSD BACT limits for total fluorides. However, the NSR reform rule promulgation preamble (67 FR 80240, 12/31/2002) states: "As today's regulations provide, the following pollutants currently regulated under the Act are subject to Federal PSD review and permitting requirements: Fluorides (excluding hydrogen fluoride)". Therefore, "fluorides" for purposes of the NSR/PSD significant emission increase rate for major sources includes all inorganic fluoride compounds, except hydrogen fluoride (HF). Consequently, these existing PSD BACT limits for total fluorides should not be used in establishing the MACT floor for hydrogen fluoride. Upon further review of the RBLC database, EPA has not made a MACT determination concerning only hydrogen fluoride for this type of facility.

Magnetation LLC intends to meet the MACT determination using information from the BACT analysis (see Appendix B of this Technical Support Document). This approach is consistent with regulatory requirements for establishing a case-by-case MACT. The use of recent case-by-case emission control equipment standards, including BACT, is an option for meeting MACT requirements allowed pursuant to 40 CFR 63.41. Magnetation LLC proposes to use SO_2 as a surrogate for inorganic HAPs, specifically hydrogen fluoride. The rationale for using a surrogate is the same as the rationale used in promulgated MACT standards for somewhat similar industries; these include the Taconite Iron Ore Processing NESHAP (40 CFR 63, Subpart RRRRR), Iron and Steel Foundries NESHAP (40 CFR 63, Subpart EEEEE), Integrated Iron and Steel Manufacturing Facilities NESHAP (40 CFR 63, Subpart FFFFF), and the Industrial, Commercial, and Institutional Boilers and Process Heaters NESHAP (40 CFR 63, Subpart DDDDD).

Using SO_2 as a surrogate for HF, the MACT floor is proposed to be the use of a GSA dry scrubber. The MACT floor is also proposed to be a maximum outlet concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit. This proposed limit is based on the performance guarantee received from a GSA dry scrubber vendor for a similar project. The performance guarantee is equal to 97% or a minimum outlet concentration of 10 mg/Nm^3 for fluorides.

Step Three: List All Available/Reasonable Applicable Control Technologies

The control technologies that will be considered in the technical and economically feasible analysis are:

(1) Gas suspension absorber (GSA)

(2) Spray dryer absorption (SDA)

(2) High pressure wet scrubber

(3) Low pressure wet scrubber followed with wet electrostatic precipitator (ESP)

(4) Dry sorbent injection (DSI) dry scrubber

(5) Clean fuels

(6) Good design methods and operating practices

The proposed induration furnace is designed to operate on natural gas (as an external fuel) and coke breeze (which is added to the raw materials). Therefore, use of natural gas as a clean fuel as well as good design methods and operating practices will be implemented regardless of the control system selected.

Step Four: Eliminate Control Technologies that are Not Technically Feasible and Not Cost Effective

The test for technical feasibility of any control option is whether it is both available and applicable to reducing HF emissions from the induration furnace. The previously listed information resources were consulted to determine the extent of applicability of each identified control alternative.

No technologies were eliminated from consideration because of technical infeasibility for the furnace windbox exhaust (EU014).

Step Five: Determine Efficiency of Applicable Control Technologies

(1) Gas suspension absorber (GSA): 95%

(2) High pressure wet scrubber: 80%

(3) Low pressure wet scrubber followed with wet electrostatic precipitator (ESP): 80%

(4) Spray dryer absorption (SDA): 60-70%

(5) Dry sorbent injection (DSI) dry scrubber: 40%

Step Six: Identify the Maximum Emission Reduction Control Technology

BACT controls for the furnace windbox exhaust (EU014) have been deemed equivalent to MACT controls. Therefore, MACT is determined to be as follows:

HF emissions from the furnace windbox exhaust (EU014) shall be controlled by the use of a GSA dry scrubber with a maximum outlet concentration of 11.4 ppmv wet corrected to 15% O_2 and a corresponding 12.34 lb/hr limit.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We Protect Hoosiers and Our Environment.

Michael R. Pence
Governor

Thomas W. Easterly
Commissioner

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SENT VIA U.S. MAIL: CONFIRMED DELIVERY AND SIGNATURE REQUESTED

TO: Michael Twite
Magnetation LLC
102 NE 3rd St, Ste 120
Grand Rapids, MN 55744

DATE: April 16, 2013

FROM: Matt Stuckey, Branch Chief
Permits Branch
Office of Air Quality

SUBJECT: Final Decision
Title V
181-32081-00054

Enclosed is the final decision and supporting materials for the air permit application referenced above. Please note that this packet contains the original, signed, permit documents.

The final decision is being sent to you because our records indicate that you are the contact person for this application. However, if you are not the appropriate person within your company to receive this document, please forward it to the correct person.

A copy of the final decision and supporting materials has also been sent via standard mail to:
Larry Lehtinen, Responsible Official
Kathy Moore, Consultant, Keramida Environmental
OAQ Permits Branch Interested Parties List

If you have technical questions regarding the enclosed documents, please contact the Office of Air Quality, Permits Branch at (317) 233-0178, or toll-free at 1-800-451-6027 (ext. 3-0178), and ask to speak to the permit reviewer who prepared the permit. If you think you have received this document in error, please contact Joanne Smiddie-Brush of my staff at 1-800-451-6027 (ext 3-0185), or via e-mail at jbrush@idem.IN.gov.

Final Applicant Cover letter.dot 11/30/07

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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TO: Monticello Union Township Library

From: Matthew Stuckey, Branch Chief
Permits Branch
Office of Air Quality

Subject: **Important Information for Display Regarding a Final Determination**

Applicant Name: Magnetation LLC
Permit Number: 181-32081-00054

You previously received information to make available to the public during the public comment period of a draft permit. Enclosed is a copy of the final decision and supporting materials for the same project. Please place the enclosed information along with the information you previously received. To ensure that your patrons have ample opportunity to review the enclosed permit, **we ask that you retain this document for at least 60 days.**

The applicant is responsible for placing a copy of the application in your library. If the permit application is not on file, or if you have any questions concerning this public review process, please contact Joanne Smiddie-Brush, OAQ Permits Administration Section at 1-800-451-6027, extension 3-0185.

Enclosures
Final Library.dot 11/30/07

Mail Code 61-53

IDEM Staff	DPABST 4/16/2013 Magnetation LLC 181-32081-00054 (Final)			AFFIX STAMP HERE IF USED AS CERTIFICATE OF MAILING
Name and address of Sender	▶	Indiana Department of Environmental Management Office of Air Quality – Permits Branch 100 N. Senate Indianapolis, IN 46204	Type of Mail: **CERTIFICATE OF MAILING ONLY**	

Line	Article Number	Name, Address, Street and Post Office Address	Postage	Handing Charges	Act. Value (If Registered)	Insured Value	Due Send if COD	R.R. Fee	S.D. Fee	S.H. Fee	Rest. Del. Fee Remarks
1		Nike 373 North Diener Road Reynolds IN 47980 (Affected Party)									
2		Tom & Marge Diener 5345 N Springboro Road Brookston IN 47923 *(Affected Party)*									
3		Brian Furrer 33 W 100 N Reynolds IN 47980 *(Affected Party)*									
4		Vernon Furrer 6510 W 100 N Wolcott IN 47995 *(Affected Party)*									
5		Sid & Mary Lou Holderly 509 N. Main Street Reynolds IN 47980 *(Affected Party)*									
6		Mark Howard PO Box 540 Monticello IN 47960 *(Affected Party)*									
7		Laverne Haas 1716 E. Hickory Brook Lane Frankfort IN 46041 *(Affected Party)*									
8		Elaine Howard 3548 E. Howard Ct. Monticello IN 47960 *(Affected Party)*									
9		Betty Kleyla 803 Fairwood Drive Monticello IN 47960 *(Affected Party)*									
10		Michael OFarrell 306 S Washington St, PO Box 278 Reynolds IN 47980 *(Affected Party)*									
11		Tim Hebble US Molders 59 W 100 N Reynolds IN 47980 *(Affected Party)*									
12		Nancy Blum Reynolds II LLC 3766 E. Monon road Monticello IN 47960 *(Affected Party)*									
13		Carl, Ralph Bonnie Zarse 1535 S 100 E Reynolds IN 47980 (Affected Party)									
14		Greg Bossaer White County Ag. Assoc. 12 N 25 E Reynolds IN 47980 *(Affected Party)*									
15		Dennis Coffin 500 N Main St Reynolds IN 47980 *(Affected Party)*									

Total number of pieces Listed by Sender	Total number of Pieces Received at Post Office	Postmaster, Per (Name of Receiving employee)	The full declaration of value is required on all domestic and international registered mail. The maximum indemnity payable for the reconstruction of nonnegotiable documents under Express Mail document reconstructing insurance is $50,000 per piece subject to a limit of $50, 000 per occurrence. The maximum indemnity payable on Express mil merchandise insurance is $500. The maximum indemnity payable is $25,000 for registered mail, sent with optional postal insurance. See ***Domestic Mail Manual*** **R900, S913**, and **S921** for limitations of coverage on inured and COD mail. See ***International Mail Manual*** for limitations o coverage on international mail. Special handling charges apply only to Standard Mail (A) and Standard Mail (B) parcels.

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Mail Code 61-53

IDEM Staff	DPABST 4/16/2013 Magnetation LLC 181-32081-00054 (Final)			AFFIX STAMP HERE IF USED AS CERTIFICATE OF MAILING
Name and address of Sender	▶	Indiana Department of Environmental Management Office of Air Quality – Permits Branch 100 N. Senate Indianapolis, IN 46204	Type of Mail: **CERTIFICATE OF MAILING ONLY**	

Line	Article Number	Name, Address, Street and Post Office Address	Postage	Handing Charges	Act. Value (If Registered)	Insured Value	Due Send if COD	R.R. Fee	S.D. Fee	S.H. Fee	Rest. Del. Fee Remarks
1		Michael Twite Magnetation LLC 102 NE 3rd St, Ste 120 Grand Rapids MN 55744 (Source CAATS) (CONFIRM DELIVERY)									
2		Larry Lehtinen CEO Magnetation LLC 102 NE 3rd St, Ste 120 Grand Rapids MN 55744 *(RO CAATS)*									
3		Mr. Harry D. DuVall P.O. Box 147 Idaville IN 47950 *(Affected Party)*									
4		White County Commissioners P.O. Box 260 Monticello IN 47960-0260 *(Local Official)*									
5		Monticello Union Township Public Library 321 Broadway St Monticello IN 47690 *(Library)*									
6		Ms. Magie Read P.O. Box 248 Battle Ground IN 47920 *(Affected Party)*									
7		Mr. Robert Kelley 2555 S 30th Street Lafayette IN 44909 *(Affected Party)*									
8		Mrs. Kathy Moore KERAMIDA Environmental, Inc. 401 North College Indianapolis IN 46202 *(Consultant)*									
9		Reynolds Town Council P.O. Box 214 Reynolds IN 47980 *(Local Official)*									
10		White County Health Department 315 N Illinois St Monticello IN 47960 *(Health Department)*									
11		Ron & Sharon Allen 259 N 25 E Reynolds IN 47980 *(Affected Party)*									
12		Brad Stockment Co-Alliance LLP 646 S. Meridian Road Reynolds IN 47980 *(Affected Party)*									
13		Kevin Steele Co-Alliance LLP 5250 E US Hwy 36 Avon IN 46123 (Affected Party)									
14		Arnold & Loretta Dahlenburg 1856 W 100 S Reynolds IN 47980 *(Affected Party)*									
15		Diane Davis 513 N Clark Street Reynolds IN 47980 *(Affected Party)*									

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INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.

Michael R. Pence
Governor

Thomas W. Easterly
Commissioner

100 North Senate Avenue
Indianapolis, Indiana 46204
(317) 232-8603
Toll Free (800) 451-6027
www.idem.IN.gov

TO: Interested Parties / Applicant

DATE: April 16, 2013

RE: Magnetation LLC / 181-32081-00054

FROM: Matthew Stuckey, Branch Chief
Permits Branch
Office of Air Quality

In order to conserve paper and reduce postage costs, IDEM's Office of Air Quality is now sending many permit decisions on CDs in Adobe PDF format. The enclosed CD contains information regarding the company named above.

This permit is also available on the IDEM website at:
http://www.in.gov/ai/appfiles/idem-caats/

If you would like to request a paper copy of the permit document, please contact IDEM's central file room at:

Indiana Government Center North, Room 1201
100 North Senate Avenue, MC 50-07
Indianapolis, IN 46204
Phone: 1-800-451-6027 (ext. 4-0965)
Fax (317) 232-8659

Please Note: *If you feel you have received this information in error, or would like to be removed from the Air Permits mailing list, please contact Patricia Pear with the Air Permits Administration Section at 1-800-451-6027, ext. 3-6875 or via e-mail at PPEAR@IDEM.IN.GOV.*

Enclosures
CD Memo.dot 11/14/08

Mail Code 61-53

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1		Thomas Trustee Honey Creek Township 1310 South 100 East Reynolds IN 47980 (Affected Party)									
2		Dean Mullens Director White County Emergency Management Agency 315 North Ilinois Street Monticello IN 47690 *(Affected Party)*									
3		John Haskins PO Box 174 Reynolds IN 47980 *(Affected Party)*									
4		Randy Mitchell PO Box 1031 Monticello IN 47960 *(Affected Party)*									
5		Whitney Riggs 4661 E 225 N Monticello IN 47960 *(Affected Party)*									
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14											
15											

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