ANALYSIS AND PRELIMINARY DETERMINATION
FOR THE PROPOSED ADDITION OF NINE POTENTIAL MNE SITES AND
THE MODIFICATION OF A DRYER, AND MODIFICATION OF THE FACILITY
TO SUPPORT POTENTIAL INCREASE OF MINING AND PROCESSING CAPACITIES

AND

ANALYSIS AND PRELIMINARY DETERMINATION FOR THE OPERATION PERMIT
FOR AN INDUSTRIAL SAND PRODUCTION FACILITY WITH MINES AND A PROCESSING PLANT

FOR
CHIEFTAIN SAND AND PROPPANT BARRON, LLC,
TO BE LOCATED AT
US HIGHWAY 53 AND COUNTY HIGHWAY SS,
DOVRE TWNSHP, BARRON COUNTY, WISCONSIN

Construction Permit No.: 13-POY-205
Operation Permit No.: 603107010-F01
Facility ID No. 603107010

This review was performed by the Wisconsin Department of Natural Resources, Bureau of Air Management in accordance with Chapter 285, Wis. Stats., and Chapters NR 400 to NR 499, Wis. Adm. Code.

Reviewed by: Paul O. Yeung Date: 12/8/2014

Peer review conducted by: /s/ Joe Brehm Date: 11/20/2014

Preliminary Determination Approved by:	**Signature**	**Date**
Regional Supervisor or Central Office Designee:	/s/ Rick Wulk	12/9/2014
Stationary Source Modeling Team Leader:	/s/ Emily Houtler for JR Sims	12/9/2014
Compliance Engineer (reviewed/approved):	/s/ Joydeb Bhattacharyya for John Dague	12/9/2014

cc: John B. Dague - Northern Region Air Program, Cumberland Area Office
Calhoun Memorial Library, 321 Moore St., PO Box 25, Chetek, WI 54728

INTRODUCTION

Stationary sources that are not specifically exempt from the requirement to obtain a construction permit under s. 285.60(5), Wis. Stats. or ch. NR 406, Wis. Adm. Code may not commence construction, reconstruction, replacement, relocation or modification unless a construction permit for the project has been issued by the Department of Natural Resource's (DNR's) Air Management Program. Owners or operators subject to the construction permit requirements must submit a construction and operation permit applications to the DNR. The applications are reviewed following the provisions set forth in ss. 285.60 to 285.67, Wis. Stats. The criteria for permit issuance vary depending on whether the source is major or minor and whether the source is or proposed to be located in an attainment or nonattainment area.

Subject sources are to be reviewed with respect to the equipment and facility description provided in the applications and for the resulting impact upon the air quality. The review ensures compliance with all applicable rules and statutory requirements. The preliminary determination will show why the source(s) should be approved, conditionally approved, or disapproved. It will encompass emission calculations and an air quality analysis using US EPA models, if applicable. Emissions from volatile organic compound (VOC) sources and small sources whose emissions are known to be insignificant are normally not modeled. As a precautionary note, the emission estimates are based on US EPA emission factors (AP-42) or theoretical data and can vary from actual stack test data.

The sources included in this construction permit are also required to obtain an operation permit under s. 285.60(1)(b), Wis. Stats. This review constitutes the Department's review of applications for both the construction permit and the operation permit for these units.

A final decision on the construction permit and operation permit will not be made until the public has had an opportunity to comment on the Department's analysis, preliminary determination and draft permit. The conditions proposed in the draft permit may be revised in any final permit issued based on comments received or further evaluation by the Department.

GENERAL APPLICATION INFORMATION

Owner/Operator: Chieftain Sand And Proppant Barron, LLC
331 27th Street
New Auburn, WI 54757

Responsible Official: Victor Serri
Chief Operating Officer

Application Contact Person: Tom Henning, Consultant
(920) 207-0721

Application Submitted By: Tom Henning, Consultant
(920) 207-0721

Application submittal date: January 23, 2014

Additional Information Submitted: May 28, 2014 through December 8, 2014

Date of Complete Application: December 8, 2014

PROJECT DESCRIPTION

Chieftain Sand and Proppant was issued construction permit 11-POY-178 on April 25, 2012. That permit authorized to construct

Process P01, Stack S01 – Fluid Bed Dryer with a 150 ton per hour (tph) drying capacity and a burner capacity no greater than 40 million BTU per hour (MMBTU/hr). Emissions are controlled with a baghouse (C01). The dryer is fueled with natural gas.

Process P02, Stack S02 – A Screening Tower baghouse (C02) will be used to control emissions from sand handling, processing, and storage operations inside the dry plant building.

Process P03, Stack S03 – Three Storage Silos for finished sand are each equipped with filters (C03) to control emissions generated from air displacement.

Process P04, Stack S04 – Loadout Station used to load either rail cars or trucks. Transfer point is equipped with filters (C04) to control emissions from the loading process.

Process P05 – Multiple natural gas space heaters and air make-up units, total combustion capacity of up to 5 MMBTU/hr. These units will be vented through the dry plant general building exhausts.

Fugitive Source F01 – On-site Truck Traffic to the Sand Receiving Station in Dry Plant on Unpaved Roads
Fugitive Source F02 – Washed Sand Stockpile
Fugitive Source F03 – Waste Material Storage Pile
Fugitive Source F04 – Transload Operations
Fugitive Source F05 – Crushing
Fugitive Source F06 – Screening
Fugitive Source F07 – Up to 12 Conveyors / Loading Transfers
Fugitive Source F08 – Sand Storage Pile
Fugitive Source F09 – Truck Traffic at the Mine and Wet Plant on Unpaved Roads
Fugitive Source F10 – Blasting at the Mine
Fugitive Source F11 – Drilling at the Mine

One mine, Anderson mine (40 acre) at 2586 3rd Ave, Chetek was covered under 11-POY-178.

On November 14, 2013, Chieftain Sand was issued construction permit 13-POY-108 to make the following changes to permit 11-POY-178 in order to:

1. Install a new rotary industrial sand dryer with a baghouse (P11, S11, C11). The dryer would have drying capacity of 100 tons per hour and up to 40 MMBTU/hour burner capacity (natural gas fired).
2. Install a post-drying screening operation with a baghouse for control (P12, S12, C12).
3. Add three product silos with bin vent filters (P13A, B and C).
4. Install a second rail/truck loadout station with conveyor and dustless loadout spouts (P14) controlled by cartridge collector.
5. Add an additional feed hopper, conveyors/stackers and waste pile to F03, F04, and F06, respectively. Initially wet sand will be trucked to the dry plant site, stockpiled, and fed into hoppers and conveyors to move the sand into the two dryers. In the future, Chieftain intends on

installing a wet sand storage building. This will cover the outdoor piles and move some of the sand transfer points inside the building.
6. New natural gas heating units which will result in the total heat input capacity of these natural gas (and/or propane) heating units up to 20 million BTU per hour.
7. Change the sand drying capacity of the existing dryer from 150 tons per hour to 200 tons per hour. The burner heat input capacity will remain at 40 million BTU per hour.
8. The sand screening tower capacity will increase to 200 tons per hour as well.
9. Add four more potential mines as potential sand sources.
10. Increase unpaved road vehicle mile travelled, and the emissions of F01 and F09 are combined.
11. Remove blasting and drilling from the facility permit. Blasting and drilling has not been done at the site, and will not be done.

The four new mines are: Luckey (160 acre): 362 25 ½ ST CTH AA, Chetek; Poetsch (35 acre): 2485 3rd Ave, Chetek; Schaaf (80 acre): 364 24 ¾ ST, Chetek; Siemers (80 acre): No address, about half a mile South of Luckey off 25 ½ ST, New Auburn.

On January 23, 2014, Chieftain Sand submitted a new construction permit application (the application was partially received on December 26, 2013), with subsequent proposed changes, for the following changes at the facility:

1. Change the rotary sand dryer (P11) capacity to 200 tons per hour, with a capacity heat input of 50 million BTU per hour.
2. Change the second screening tower (P12) operation capacity to 200 tons per hour.
3. Change the fluid bed dryer (P01) CO emission limit to make the facility synthetic minor for Part 70 for CO.
4. Add blasting and drilling (removed in permit 13-POY-108) to the facility.
5. Add a grizzly feeder in the dry plant.
6. Increase the size of the crusher to 800 tons per hour (it was at 300 tons per hour in 13-POY-108).
7. Increase the size of the screen in wet plant to 800 tons per hour (it was at 500 tons per hour in 13-POY-108).
8. Add nine potential mine sites.
9. Add outdoor storage pile acreage.
10. Change the mining production limit to 6,000,000 tons per year.
11. Change the wet plant capacity to 7,008,000 tons per year (capacity of the crusher at the wet plant)
12. Increase truck traffic VMT at the mine sites (unpaved), and wet plant (paved and unpaved) and dry plant (paved).
13. Add front end loader traffic emissions at the mine sites and wet and dry plants.
14. Include water truck traffic emissions at the facility.

The nine potential new mine sites may potentially be located in each of these areas: Sioux Creek S12 Mine - T32N, R11W, S12 (T. of Sioux Creek), Sioux Creek S13 Mine - T32N, R11W, S13 (T. of Sioux Creek), Sioux Creek S24 Mine - T32N, R11W, S24 (T. of Sioux Creek), Dovre S7 Mine - T32N, R10W, S7 (T. of Dovre), Dovre S18 Mine - T32N, R10W, S18 (T. of Dovre), Dovre S19 Mine - T32N, R10W, S19 (T. of Dovre), Dovre S8 Mine - T32N, R10W, S8 (T. of Dovre), Dovre S17 Mine - T32N, R10W, S17 (T. of Dovre), and Dovre Mine - S20 T32N, R10W, S20 (T. of Dovre), all in Barron County.

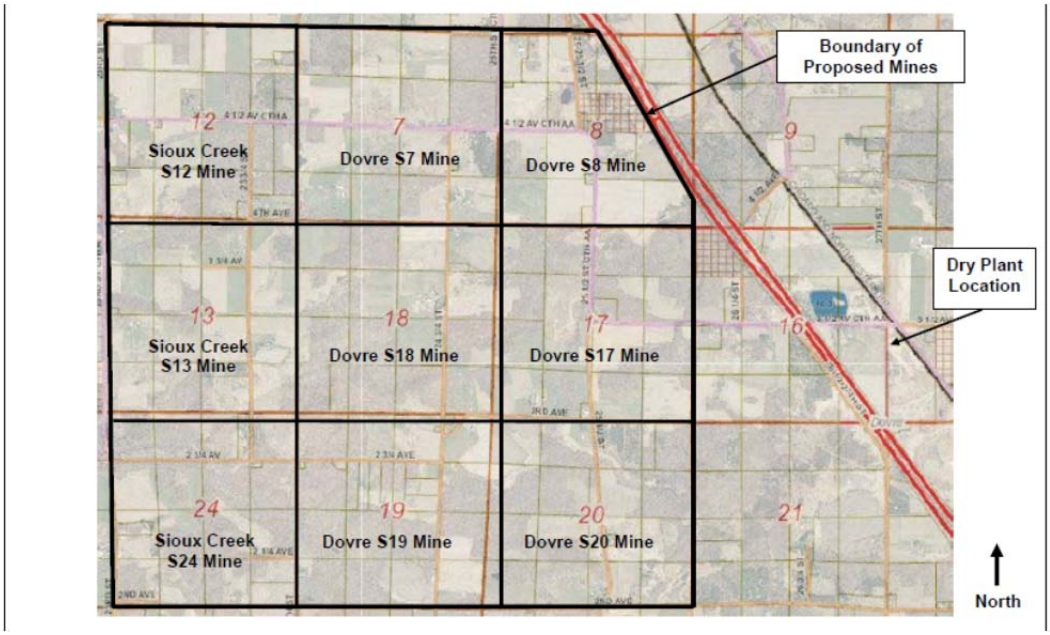
The project is subject to NSPS under Part 60 Subpart UUU and Subpart OOO. There is no applicable specific exemption in s. NR 406.04(1), therefore a construction permit and an operation permit will be required.

Other Actions:

This construction permit will also be processed as an operation permit (603107010-F01) which covers operations at the entire facility.

SOURCE DESCRIPTION

The rotary sand dryer (P11) was permitted under 13-POY-108 with a sand drying capacity of 100 tons per hour, and with a heat input capacity of 40 million BTU per hour. Chieftain Sand has proposed to change the rotary sand dryer (P11) capacity to 200 tons per hour, with a heat input capacity of 50 million BTU per hour. The sand screening tower (P12) was permitted under 13-POY-108 with a sand processing capacity of 100 tons per hour. Chieftain Sand has proposed to change the sand screening tower (P12) capacity to 200 tons per hour. In addition, the company proposed to add 9 potential sand mines. The nine potential new mines are and may potentially be located in each of these areas: Sioux Creek S12 Mine - T32N, R11W, S12 (T. of Sioux Creek), Sioux Creek S13 Mine - T32N, R11W, S13 (T. of Sioux Creek), Sioux Creek S24 Mine - T32N, R11W, S24 (T. of Sioux Creek), Dovre S7 Mine - T32N, R10W, S7 (T. of Dovre), Dovre S18 Mine - T32N, R10W, S18 (T. of Dovre), Dovre S19 Mine - T32N, R10W, S19 (T. of Dovre), Dovre S8 Mine - T32N, R10W, S8 (T. of Dovre), Dovre S17 Mine - T32N, R10W, S17 (T. of Dovre), and Dovre Mine - S20 T32N, R10W, S20 (T. of Dovre), all in Barron County. These potential mines may be located in the locations as outline in the following figure:



The company proposed an increase in mining production limit to 6.0 million tons per year. The limit on mine sand of 6.0 million tons per year will be enforced. Some of the mined sand may not need to be crushed.

The VMT limitation on truck traffic on unpaved roads will also be increased as proposed in the permit application material. The VMT on the front end loader traffic will be limited as well.

The silos and rail load out will not be changed.

Description of New or Modified Units.

Emission Unit Information.

Emission Unit Information.

Boiler/furnace number [or process line, etc.]:	P11
Unit description:	New Rotary Sand Dryer
Control technology status:	Baghouse
Maximum continuous rating (mmBTU/hr):	50 mmBTU/hr; 200 tons/hr
Date of construction or last modification:	2014
Construction Permit Requirements:	13-POY-205

Stack Information.

Stack identification number:	S11
Exhausting unit(s):	P11
This stack has an actual exhaust point:	Y
Discharge height above ground level (ft):	90
Inside dimensions at outlet (ft):	4
Exhaust flow rate (normal) (ACFM):	65,000
Exhaust flow rate (maximum) (ACFM):	65,000
Exhaust gas temperature (normal) (°F):	140
Exhaust gas temperature (maximum) (°F):	140
Exhaust gas discharge direction:	UP
Stack equipped with any obstruction:	NO

Control Device Information.

Control Device identification number:	C11
Exhausting emissions unit(s):	P11
Control device type [baghouse, ESP, etc.]:	Baghouse
Control device description:	Baghouse
Manufacturer and model number:	-
Date of construction:	2013

	Fuel name	Higher heating value	Max. hourly consumption
Primary Fuel	Natural Gas	1020 BTU/cu. ft.	49000 cu. ft./hr

Emission Unit Information.

Boiler/furnace number [or process line, etc.]:	P12
Unit description:	Sand Dry Plant Building
Control technology status:	Fabric Filter Baghouse
Maximum continuous rating (mmBTU/hr):	-
Date of construction or last modification:	2014
Construction Permit Requirements:	13-POY-205

Stack Information .

Stack identification number:	S12
Exhausting unit(s):	P12
This stack has an actual exhaust point:	Y
Discharge height above ground level (ft):	90
Inside dimensions at outlet (ft):	3
Exhaust flow rate (normal) (ACFM):	30000
Exhaust flow rate (maximum) (ACFM):	30000
Exhaust gas temperature (normal) (°F):	75
Exhaust gas temperature (maximum) (°F):	75
Exhaust gas discharge direction:	UP
Stack equipped with any obstruction:	NO

Control Device Information.

Control Device identification number:	C12
Exhausting emissions unit(s):	P12
Control device type [baghouse, ESP, etc.]:	Fabric Filter
Control device description:	Baghouse
Manufacturer and model number:	-
Date of construction:	2013

Stack Parameter Summary.

Stack ID	Circular or Rectangular	Discharge Direction	Exhaust Obstacle	Diameter or Width (if rect.)	Length (if rect.)	Height	Temp.	Normal Flow Rate	Maximum Flow Rate
		U, D, H	Yes/No	ft	ft	ft	°F	ACFM	ACFM
S01	Circular	U	No	4	--	85	170	65000	65000
S02	Circular	U	No	3	--	85	68	27000	27000
S03A	Circular	H	No	1	--	88	Ambient	300	300
S03B	Circular	H	No	1	--	88	Ambient	300	300
S03C	Circular	H	No	1	--	88	Ambient	300	300
S04	Circular	H	No	1.3	--	30	Ambient	1000	1000
S11	Circular	U	No	4	--	90	140	65000	65000
S12	Circular	U	No	3	--	90	75	30000	30000
S13A	Circular	H	No	1	--	88	Ambient	300	300
S13B	Circular	H	No	1	--	88	Ambient	300	300
S13C	Circular	H	No	1	--	88	Ambient	300	300
S14	Circular	H	No	1.3	--	30	Ambient	1000	1000

Insignificant Emissions Units.

- Maintenance of Grounds, Equipment, and Buildings (lawn care, painting, etc.)
- HVAC System Maintenance
- Pollution Control Equipment Maintenance
- Fire Control Equipment
- Janitorial Activities
- Office Activities
- Convenience Water Heating
- Convenience Space Heating (< 5 million BTU/hr Burning Gas, Liquid, or Wood)
- Sanitary Sewer and Plumbing Venting

CROSS MEDIA IMPACTS

The sand mine operation will be subject to NR 135, Wis. Adm. Code for the reclamation of the mine site. Sand not acceptable as product will be used in the reclamation of the mine site.

EMISSION CALCULATIONS.

For the rotary sand dryer (P11), the maximum capacity is 200 tons per hour.

AP-42 Table 11.19.1-1 provides a particulate matter (PM) emission of 2.0 pounds per ton of sand for a sand dryer. It is unknown whether that would be for a fluid bed dryer or a rotary dryer. The emission factor rating is E. It is unknown what the particle size distribution would be.

The maximum theoretical PM emissions from each dryer based on this emission factor would be

2.0 lb/ton * 200 ton/hr = 400 lb/hr

On an annual basis, the maximum theoretical PM emissions from each dryer based on this emission factor would be:

400 #/hr * 8760 hrs/yr / 2000 #/ton = 1752 tons/yr

The dryer will be subject to the PM emission limitation in NR 415.05 and the allowable emission rate in NR 415 will be the more restrictive limit of (a) and (b), and this limit includes both front and back half:

(a) 0.20 #/1000 # exhaust gas; the exhaust flow rate at capacity will be 65000 acf/min at 140F. The exhaust gas mass flow rate at standard conditions will be:

65000 acf/min * (460+68)/(460+140) * 60 min/hr * 0.075 #/cf = 257400 #/hr

At 0.20 #/1000# gas, the allowable PM emission limit will be:

0.20 #/1000 # * 257400 #/hr = 51.48 #/hr

(b) The maximum allowable emission limit calculated by the process weight rate equation is:

$E = 17.31\ P^{0.16}$. The process weight rate (at capacity) is 200 tons/hr in this case. So,

$E = 17.31\ (200)^{0.16}$

E = 40.41 #/hr

As far as NR 415.05 is concerned, the PM limit based on process rate equation is the more restrictive limit when the dryer is operating at capacity.

The dryers are subject to NSPS Subpart UUU. The NSPS PM emission limit for sand dryer is 0.025 gr/dscf. According to the permit application material, the exhaust flow for the dryer will be 65000 acf/min at 140^{o}F. The allowable PM emissions under NSPS from the dryer will be:

0.025 gr/dscf * 65000 cf/min (460+528)/(460+140) * 60 min/hr / 7000 gr/# = 12.26 #/hr

On an annual basis, that is the same as

12.26 #/hr * 8760 hrs/yr / 2000 #/ton = 53.7 tons/yr

The NSPS PM limit will be based on Method 5 front half catch only.

The major majority of the condensable particulates emission tests using Method 202 performed on industrial sand dryers have shown that the condensable particulates emission rates correspond to, or lower than the AP-42 emission factor of 5.7 pounds per million cubic feet of natural gas (0.0057 pound per million BTU) for condensable particulates from natural gas combustion. As a conservative measure, the emission factor can be doubled to calculate the potential emissions of condensable particulates from the each of the dryers:

0.0057 #/mmbtu * 2 * 50 mmbtu/hr = 0.57 #/hr

The total (filterable + condensable) PM potential to emit for each dryer before applying more restrictive limitations and requirements will be:

(12.26 + 0.57) #/hr = 12.83 #/hr

On an annual basis, that is the same as

12.83 #/hr * 8760 hrs/yr / 2000 #/ton = 56.2 tons/yr

The company requested more restrictive PM emission limit for each dryer of 3.5 #/hr. The dryer PM annual potential to emit will be:

3.5 #/hr * 8760 hrs/yr / 2000 #/ton = 4.91 tons/yr

The 3.5 #/hr emission limit corresponds to the baghouse outlet loading of:

3.5 #/hr * 7000 gr/# * 1 hr/60 min / [65000*(460+68)/(460+140)] cf/min = 0.007 gr/dscf

To be synthetic minor for PM_{10} the company requested a PM_{10} emission limit of 3.2 pounds per hour.

3.2 #/hr * 8760 hrs/yr / 2000 #/ton = 14.02 tons/yr

The 3.2 #/hr emission limit corresponds to the baghouse outlet loading of:

3.2 #/hr * 7000 gr/# * 1 hr/60 min / [65000*(460+68)/(460+140)] cf/min = 0.0065 gr/dscf

To meet the ambient standard for $PM_{2.5}$ the company requested a PM_{10} emission limit of 2.5 pounds per hour.

2.5 #/hr * 8760 hrs/yr / 2000 #/ton = 10.95 tons/yr

The 2.5 #/hr emission limit corresponds to the baghouse outlet loading of:

2.5 #/hr * 7000 gr/# * 1 hr/60 min / [65000*(460+68)/(460+140)] cf/min = 0.005 gr/dscf

The emissions due to the combustion of fuel in the dryer are given in Table 1.

The P12 equipment and processes are placed inside the new dry plant building. It is unknown how much of the particulate matter emissions from the processes will be captured and be exhausted to the filter collector. The maximum theoretical emissions can be back-calculated from the emission limit with an assumed filter control efficiency of 99.5%. The applicant has requested for an emission limit for PM of

2.2 #/hr for P12. So, in such a case, the maximum theoretical particulate matter (PM) emissions would be:

2.2 #/hr / (1-0.995) = 440 #/hr

440 #/hr * 8760 hrs/yr / 2000 #/ton = 1927.2 tons/yr

The new dry plant building is subject to the more restrictive of s. NR 415.05(1) and s. NR 415.05(2). The PM limit in s. NR 415.05(1) is 0.20 pound per 1000 exhaust gas. The maximum exhaust flow rate will be 50000 cf/min at 75F. The emission limit at 0.2 pound per 1000 exhaust gas will be:

0.20 lb/1000 lb gas * 30000 ft^3/min * (460+68)/(460+75) * 60 min/hr * 0.075 lb/ft^3 = 26.65 lb/hr

The PM limit in s. NR 415.05(2) is

$E = 17.31\ P^{0.16}$
$E = 17.31\ (200)^{0.16}$
E = 40.41 lb/hr

So the more restrictive PM limit is that from the process weight rate in NR 415.05(2).

By rule, the new dry plant building is required to meet the NSPS in Part 60 Subpart OOO of front half only PM limit of 0.014 gr/dscf. That corresponds to

0.014 grain/dscf * 30000 ft^3/min * (460+68)/(460+75) ÷ 7,000 grain/lb * 60 min/hr = 3.55 lb/hr

3.55 #/hr * 8760 hrs/yr / 2000 #/ton = 15.55 tons/yr

There is no combustion associated with this process, any emission of condensable particulates would be negligible.

The company has requested the PM limit of 2.2 pounds per hour. The dry plant PM annual potential to emit will be:

2.2 #/hr * 8760 hrs/yr / 2000 #/ton = 9.64 tons/yr

The 2.2 #/hr emission limit corresponds to the cartridge collector outlet loading of:

2.2 #/hr * 7000 gr/# * 1 hr/60 min / [30000 ft^3/min * (460+68)/(460+75)] = 0.009 gr/dscf

The company has requested the PM_{10} limit of 2.0 pounds per hour. The dry plant PM_{10} annual potential to emit will be:

2.0 #/hr * 8760 hrs/yr / 2000 #/ton = 8.76 tons/yr

The 2.0 #/hr emission limit corresponds to the cartridge collector outlet loading of:

2.0 #/hr * 7000 gr/# * 1 hr/60 min / [30000 ft^3/min * (460+68)/(460+75)] = 0.0047 gr/dscf

The company has requested the $PM_{2.5}$ limit of 1.7 pounds per hour. The dry plant $PM_{2.5}$ annual potential to emit will be:

1.7 #/hr * 8760 hrs/yr / 2000 #/ton = 7.45 tons/yr

The 1.7 #/hr emission limit corresponds to the cartridge collector outlet loading of:

1.7 #/hr * 7000 gr/# * 1 hr/60 min / [50000 ft^3/min * (460+68)/(460+75)] = 0.004 gr/dscf

Silos P13A, P13B and P13C

P13A, P13B and P13C are identical processes (silos). The emission calculations provided here are for each process.

PM emissions occur when the silos are being filled from a conveyor transferring sand into each silo. As sand enters the silos, the volume of sand displaces an equal volume of air. Any entrained sand and dust particles leaving will be particulate matter emissions. The AP-42 PM emission factor of 0.003 #/ton for conveyor transfer point given in Table 11.19.2-2, can be used to calculate the PM maximum theoretical emissions. The maximum loading capacity is 200 tons per hour (the dryer's capacity). The PM maximum theoretical emissions will be

0.003 lb/ton * 200 ton/hr = 0.6 lb/hr

0.6 #/hr * 8760 hrs/yr / 2000 #/ton = 2.63 tons/yr

The uncontrolled emission factor for PM_{10} is 0.0011 #/ton. The PM_{10} maximum theoretical emissions will be

0.0011 lb/ton * 200 ton/hr = 0.22 lb/hr

0.22 #/hr * 8760 hrs/yr / 2000 #/ton = 0.96 tons/yr

No emission factor for $PM_{2.5}$ is given in the AP-42 table. For the MTE, the PM_{10} and $PM_{2.5}$ emission rates are assumed to be the same.

Particulate matter (PM) emissions are subject to the more restrictive limitation in s. NR 415.05(1)(m) and (2), Wis. Adm. Code. Section NR 415.05(1)(m), Wis. Adm. Code limits the PM emissions to less than 0.20 pound per 1000 pounds of exhaust gas. The exhaust gas rate is 1000 scf/min. At 0.20 pound per 1000 pounds of exhaust gas, the allowable PM emissions would be:

0.20 #/1000 # * 1000 cf/min * 60 min/hr * 0.075 #/cf = 0.9 #/hr

0.9 #/hr * 8760 hrs/yr / 2000 #/ton = 3.94 tons/yr

Section NR 415.05(2), Wis. Adm. Code limits the PM emissions based on the process weight rate equation $17.31P^{0.16}$ #/hr, where P is the process weight rate in tons per hour, and in this case, P = 200 for the entre process line.

$E = 17.31P^{0.16}$ #/hr

$E = 17.31\ (200)^{0.16}$

E = 40.40 #/hr

So the PM limit 0.20 pound per 1000 pounds of exhaust gas is more restrictive. This PM limit is based on Method 5 and Method 202, and includes condensable particulates.

An individually stack-vented silo is not subject to the PM emission limit in the NSPS Subpart OOO.

The company proposed to limit the PM emissions from each of P13A, P13B and P13C to 0.043 pound per hour. At 0.013 #/hr, the annual potential to emit based on this limit will be:

0.013 #/hr * 8760 hrs/yr / 2000 #/ton = 0.057 tons/yr

The applicant also requested the PM_{10} and $PM_{2.5}$ emission limits to be 0.013 #/hr in order to meet ambient air quality standards for PM_{10} and $PM_{2.5}$. In addition, together with the other limitations and permit conditions for PM_{10}, the facility will be a synthetic minor source for Part 70 for PM_{10} emissions.

The 0.013 #/hr emission limit corresponds to the baghouse outlet loading of:

0.013 #/hr * 7000 gr/# * 1 hr/60 min / 300 dscf/min = 0.005 gr/dscf

<u>P14, Railcar loading station</u>

For P14, the railcar loading station, the FIRE PM emission factor of 0.02 #/ton for bulk loading of construction sand, SCC 30502506, can be used to calculate the PM maximum theoretical emissions. The maximum loading capacity is 200 tons per hour (the dryer's capacity). The PM maximum theoretical emissions will be

0.02 lb/ton * 200 ton/hr = 4.0 lb/hr

4.0 #/hr * 8760 hrs/yr / 2000 #/ton = 17.52 tons/yr

The uncontrolled emission factor for PM_{10} is 0.0024 #/ton. The PM_{10} maximum theoretical emissions will be

0.0024 lb/ton * 200 ton/hr = 0.48 lb/hr

0.48 #/hr * 8760 hrs/yr / 2000 #/ton = 2.1 tons/yr

No emission factor for $PM_{2.5}$ is given in FIRE. For the MTE, the PM_{10} and $PM_{2.5}$ emission rates are assumed to be the same.

Particulate matter (PM) emissions are subject to the more restrictive limitation in s. NR 415.05(1)(m) and (2), Wis. Adm. Code. Section NR 415.05(1)(m), Wis. Adm. Code limits the PM emissions to less than 0.20 pound per 1000 pounds of exhaust gas. The exhaust gas rate is 1000 scf/min. At 0.20 pound per 1000 pounds of exhaust gas, the allowable PM emissions would be:

0.2 #/1000 # * 1000 cf/min * 60 min/hr * 0.075 #/cf = 0.9 #/hr

Section NR 415.05(2), Wis. Adm. Code limits the PM emissions based on the process weight rate equation $17.31P^{0.16}$ #/hr, where P is the process weight rate in tons per hour, and in this case, P = 200 for the entre process line.

$E = 17.31P^{0.16}$ #/hr

$E = 17.31\ (200)^{0.16}$

E = 40.40 #/hr

So the PM limit of 0.20 pound per 1000 pounds of exhaust gas is more restrictive. This PM limit is based on Method 5 and Method 202, and includes condensable particulates.

The NSPS PM emission limit for the #1 truck and railcar loadout station is 0.014 gr/dscf. The maximum flow rate is 1000 scfm. Thus the NSPS PM emission limit from the loadout station will be:

0.014 gr/dscf * 000 scf/min * 60 min/hr / 7000 gr/# = 0.12 #/hr

On an annual basis, that is the same as

0.12 #/hr * 8760 hrs/yr / 2000 #/ton = 0.53 tons/yr

The NSPS limit is for filterable particles only and the compliance test method is Method 5.

There is no combustion associated with this process, any emission of condensable particulates would be negligible.

The company proposed to limit the PM emissions from S14 to 0.043 pound per hour. At 0.043 #/hr, the annual potential to emit based on this limit will be:

0.043 #/hr * 8760 hrs/yr / 2000 #/ton = 0.19 tons/yr

The applicant also requested the PM_{10} and $PM_{2.5}$ emission limits to be 0.043 #/hr in order to meet ambient air quality standards for PM_{10} and $PM_{2.5}$. In addition, together with the other limitations and permit conditions for PM_{10}, the facility will be a synthetic minor source for Part 70 for PM_{10} emissions.

The 0.043 #/hr emission limit corresponds to the baghouse outlet loading of:

0.043 #/hr * 7000 gr/# * 1 hr/60 min / 1000 dscf/min = 0.005 gr/dscf

The summary of the stack vented emissions and the non-stack vented emissions from the facility are as given in Tables 2 through 6 below.

Table 1. Emission Calculations for By Products of Combustion for the dryers

Fluid Bed Dryer - Natural Gas (P01)

Pollutant	Dryer Capacity MMBTU/hr	Emission Factor lb/10^6 cf	Emission Factor in lb/MMBTU	Total Potential Emissions lb/hr	Total Potential Emissions ton/yr	Source of Emission Factors
CO	40			6.0	26.28	2/19/14 Stack Test = 4.09 lb/hr
NOx	40		0.17	6.8	29.78	Manufacturer
VOC	40	5.5	0.0054	0.22	0.94	AP-42 Table 1.4-2
CO_2	40	120,000	118	4,706	20,612	AP-42 Table 1.4-2
SO_2	40	0.60	0.00059	0.024	0.10	AP-42 Table 1.4-2

Natural gas contains 1,020 MMBTU/MMCF per footnote in AP-42 Table 1.4-2.

MMBTU/hr is calculated based on 39,000 cf/hr of natural gas x 1020 BTU/cf = 40 MMBTU

Rotary Sand Dryer - Natural Gas (P11)

Pollutant	Dryer Capacity ton/hr	Emis Factor lb/ton		Potential Emissions lb/hr	Potential Emissions ton/yr	Source of Emission Factors
CO	200	0.020		4.0	17.52	Stack test (@100 tph) = 0.06 lb/hr
NOx	200	0.044		8.7	38.11	Manufacturer[2]
Pollutant	Burner Capacity MMBTU/hr	Emis Factor lb/10^6 cf	Emis Factor[1] lb/MMBTU	Potential Emissions lb/hr	Potential Emissions ton/yr	Source of Emission Factors
VOC	50	5.5	0.0054	0.27	1.18	Manufacturer
CO_2	50	120,000	118	5,882	25,765	AP-42 Table 1.4-2
SO_2	50	0.60	0.0006	0.029	0.13	AP-42 Table 1.4-2

[1] Natural gas contains 1,020 MMBTU/MMCF per footnote in AP-42 Table 1.4-2.

[2] A safety factor of 50% has been applied to the NOx emission Factor.

Table 1B. Emission Calculations for By Products of Combustion for the heating units

Heating Units - Natural Gas or Propane

Pollutant	Heater Capacity (Total) MMBTU/hr	Emission Factor lb/10^3 gal	Emission Factor lb/MMBTU	Total Potential Emissions lb/hr	Total Potential Emissions ton/yr	Source of Emission Factors
CO	20	7.5	0.082	1.6	7.2	AP-42 Table 1.5-1
NOx	20	13	0.14	2.84	12.45	AP-42 Table 1.5-1
VOC	20	0.80	0.0087	0.17	0.77	AP-42 Table 1.5-1
CO_2	20	12,500	136.612	2,732	11,967	AP-42 Table 1.5-1
SO_2	20	0.016	0.00017	0.0035	0.015	AP-42 Table 1.5-1

Emissions calculated using propane as the primary fuel. According to AP-42 Table 1.5-1, propane contains 91.5 MMBTU/10^3 gallons

Table 1C. Emission Calculations for By Products of Combustion for blasting

Blasting (F10)

Pollutant	ANFO Use[1] ton/yr	Emission Factor lb/ton	Potential Emissions ton/yr	Source of Emission Factors
CO	1,350	67	45.2	AP-42 Table 13.3-1
NOx	1,350	17	11	AP-42 Table 13.3-1
VOC	1,350	-	-	AP-42 Table 13.3-1
CO_2	1,350	374	253	See Note 2 below.
SO_2	1,350	2.0	1.4	AP-42 Table 13.3-1

[1] ANFO (Ammonium Nitrate + fuel oil)

[2] Emission Factor from 40 CFR 98 Table C-1, complete conversion of fuel oil carbon to CO_2, 6% fuel oil in ANFO, and fuel oil wt. of 7.2 lb/gal = 73.96 kg CO_2/MMBTU x 2.2 lb/kg x 0.138 MMBTU/gal x gal/7.2 lb x 2,000 lb/ton x 0.06 ton Fuel Oil/ton ANFO = 374 lb CO_2/ton ANFO

Table 1D. SUMMARY OF TOTAL POTENTIAL EMISSIONS FROM COMBUSTION UNITS

Pollutant	P01 Existing Dryer ton/yr	Heaters ton/yr	F10 Blasting ton/yr	P11 New Dryer ton/yr	Total ton/yr
CO	26.3	7.2	45.2	17.5	**96.2**
NOx	29.8	12.4	11.5	38.1	**91.8**
VOC	0.94	0.77	-	1.18	**2.9**
CO_2	20,612	11,967	253	25,765	**58,596**
SO_2	0.10	0.015	1.4	0.13	**1.6**

Table 2. POTENTIAL EMISSIONS OF PARTICULATE MATTER for Stacked Sources

Process	Control Device	Hourly Emissions lb PM/hr	Annual Emissions ton PM/yr	Hourly Emissions lb PM10/hr	Annual Emissions ton PM10/yr	Hourly Emissions lb PM2.5/hr	Annual Emissions ton PM2.5/yr
P01 - Fluid Bed Dryer	Baghouse	2.8	12.26	2.8	12.26	1.36	6.0
P02 - Screening Tower	Baghouse	1.8	7.88	1.8	7.88	1.07	4.7
P03 Three Storage Silos	Bin Vent	0.013	0.056	0.013	0.056	0.013	0.056
P04 Truck and Rail Loading	Filter	0.043	0.19	0.043	0.19	0.043	0.19
P11 - Rotary Dryer	Baghouse	3.5	15.3	3.2	14.0	2.5	11.0
P12 - Screening Tower	Baghouse	2.2	9.6	2.0	8.8	1.7	7.4
P13 Second Three Storage Silos	Bin Vent	0.013	0.056	0.013	0.056	0.013	0.056
P14 Truck and Rail Loading	Filter	0.043	0.19	0.043	0.19	0.043	0.19
	Total =	**5.7**	**45.532**	**5.2**	**43.432**	**4.2**	**29.592**

Table 3. Potential PM Emissions Calculations for Fugitive Sources

					PM			PM_{10}			$PM_{2.5}$		
Process	**Process Number**	**# of Units**	**Hourly Capacity tph (each)**	**Annual Capacity tpy**	**Emission Factor lb/ton**	**Hourly Emission lb PM/hr**	**Annual Emission ton PM/yr**	**Emission Factor lb/ton**	**Hourly Emission lb PM_{10}/hr**	**Annual Emission ton PM_{10}/yr**	**Emission Factor lb/ton**	**Hourly Emission lb $PM_{2.5}$/hr**	**Annual Emission ton $PM_{2.5}$/yr**
Crusher (Wet Plant)	F05	1	800	7,000,800	0.0012	0.96	4.2	0.00054	0.43	1.9	0.00010	0.080	0.35
Screen (Wet Plant)	F06	1	800	7,000,800	0.0022	1.8	7.7	0.00074	0.59	2.6	0.000050	0.040	0.18
Up to 15 Conveyors	F07	15	800	7,000,800	0.00014	1.7	7.4	0.000046	0.55	2.4	0.000013	0.16	0.68
Stackers & Hoppers - **Unwashed** Sand	F08A	3	800	7,000,800	0.00071	1.7	7.5	0.00034	0.8	3.6	0.000051	0.12	0.5
Stackers, Hoppers and Transload - **Washed** Sand	F08B	7	800	3,504,000	0.00071	4.0	8.8	0.00034	1.9	4.1	0.000051	0.29	0.6
Grizzly (Dry Plant)	F09	1	600	3,504,000	0.0012	0.72	2.1	0.00054	0.32	0.95	0.00010	0.060	0.26

Notes:

1. Crusher, Screen, Converyors and Grizzly: Emission Factors from AP-42, Table 11.19.2-2 for controlled sources (0.55 - 2.88 % moisture).

2. Stackers, Hoppers and Transload: Emission Factors from AP-42 13.2.4 (1): EF (lb/ton) = k * 0.0032 * $(U/5)^{1.3}$ / $(M/2)^{1.4}$
where,

k PM_{30} =	0.74	Size fraction constant
k PM_{10} =	0.35	Size fraction constant
k $PM_{2.5}$ =	0.053	Size fraction constant
M =	8.0	Moisture content, % (Unwashed Sand)
U =	8.85	Average wind speed, mph

Table 4. Sand Storage Piles - Wind Erosion

PM Emission Factor = 0.38 ton PM/acre/yr (undisturbed area)

Emission Factor Source: *Fifth Edition of AP-42, Table 11.9-4, Chapter 11.9, "Western Surface Coal Mining", 1998*

Note: No scaling factors available for $PM_{2.5}$ & PM_{10}; use ratio of 'k' factors from AP-42, Sect. 13.2.4, Aggregate Handling and Storage Piles, 2006

k, PM =	0.74	Storage Pile Area =	20	acres
k, PM_{10} =	0.35	Control Efficiency =	50%	(from natural moisture)
k, $PM_{2.5}$ =	0.053	Time =	8,760	hours/year

	Storage Piles - Uncontrolled			Storage Piles - Controlled		
	EF_{PM} ton/acre/yr	Hourly lb/hr	Annual ton/yr	**EF_{PM}** ton/acre/yr	Hourly lb/hr	Annual ton/yr
PM_{30}	0.38	1.7	7.6	0.19	0.87	3.8
PM_{10}	0.18	0.82	3.6	0.090	0.41	1.8
$PM_{2.5}$	0.027	0.12	0.54	0.014	0.062	0.27

Note: PM_{30} = PM

Table 5. Overburden Removal and Blasting

MINE OVERBURDEN REMOVAL

From AP-42 Table 11.9-1, Bulldozing

Variables	PM	PM10	PM2.5
k Value (Particle Size Multiplier)	1.0	0.75	0.105
s Value (Silt Content)	4.8	4.8	4.8
M (Moisture content)[1]	10	10	10
Activity Time (hr/year)	3,000	3,000	3,000
E (Emission Rate lb/hr)	1.9	0.2	0.035
E (Emission Rate T/year)	2.8	0.4	0.052

Equation for bulldozing overburden:

$$E = 5.7 * k * (s)^{1.2} / M^{1.3}$$

Where:

E = Size-specific emission factor (lb/hr)

k = Particle size multiplier

s = Surface material silt content (%)

M = Material moisture content (%)

PM EMISSIONS FROM BLASTING

from AP-42 Table 11.9-1, Blasting of Overburden

Variables	PM	PM10	PM2.5
k Value (Particle Size Multiplier)	1.0	0.52	0.03
A (Blast Area) [1]	22,000	22,000	22,000
Number of Blasts per year	80	80	80
Emission Factor, lb/blast	46	24	1.4
Emission Rate, ton/yr	1.8	0.95	0.055

Equation for PM from Blasting:

$$EF = k * 0.000014 * A^{1.5}$$

Where:

EF = Size-specific emission factor (lb/blast)

k = Particle size multiplier

A = area of horizontal blast (ft^2)

[1] Area of blast estimated at 1/2 acre. Total blast area estimated to be:
0.5 acre/blast x 80 blast/yr = 40 acre/yr
Number of blasts is assumed to be half of maximum theoretical.

Table 6A. Vehicle Traffic - Unpaved Roads at the Mines

Emissions calculations are based on AP-42 Section 13.2.2: Unpaved Roads

EF = $k(s/12)^a(W/3)^b * [(365 - P)/365]$ Particulate emission factor, lb/VMT

Where:	Haul Truck	Loader	Overburden Truck	Water Truck	
k (PM 2.5) =	0.15	0.15	0.15	0.15	constant for PM-2.5, lb/VMT
k (PM 10) =	1.5	1.5	1.5	1.5	constant for PM-10, lb/VMT
k (PM 30) =	4.9	4.9	4.9	4.9	constant for PM-30, lb/VMT
a =	0.9	0.9	0.9	0.9	for PM10 and PM2.5
a =	0.7	0.7	0.7	0.7	for PM 30
b =	0.45	0.45	0.45	0.45	
s =	4.8	4.8	4.8	4.8	surface material silt content, % (from AP-42 Table 13.2.2.1)
W =	27.5	36	40	30	Mean weight of vehicles, tons
P =	115	115	115	115	(AP-42 Figure 13.2.1.2)

Uncontrolled Emission Factors, lb/VMT

Pollutant	Haul Truck	Loader	Overburden Truck	Water Truck
PM2.5	0.12	0.138	0.14	0.13
PM10	1.2	1.38	1.4	1.3
PM30	4.8	5.4	5.7	5.0

Mine Production Capacity = 6,000,000 tons/year

Overburden Removal = 2,628,000 tons/year

Vehicle Miles Traveled Per Year

	Sand Truck	Loader	Overburden Truck	Water Truck
Tons/trip	40	7.0	40	
Trips/year	150,000	1,232,571	65,700	250
Distance/trip (mi)	0.75	0.01	0.30	0.75
VMT/year	112,500	12,326	19,909	188

Uncontrolled Emissions:

	PM 2.5		PM 10		PM 30	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Sand Truck	1.6	6.9	16	69	62	269
Loader	0.19	0.85	1.9	8.5	7.6	33
Overburden Truck	0.33	1.4	3.3	14	13	56
Water Truck	0.003	0.012	0.03	0.12	0.11	0.47
Total:	**2.1**	**9.2**	**20.9**	**91.7**	**82.1**	**360**

Controlled Emissions: Control Eff. = 75% Other Vehicles 50% Water Truck

	PM 2.5		PM 10		PM 30	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Sand Truck	0.39	1.72	3.9	17.2	15.4	67
Loader	0.048	0.212	0.48	2.12	1.90	8.3
Overburden Truck	0.082	0.36	0.82	3.6	3.2	14.1
Water Truck	0.0014	0.0060	0.014	0.060	0.053	0.23
Total:	**0.52**	**2.29**	**5.2**	**22.9**	**20.6**	**90.0**

Table 6B. Unpaved Roads - Wash Plant

UNPAVED ROADS: Emissions calculations are based on AP-42 Section 13.2.2

EF = $k(s/12)^a(W/3)^b * [(365 - P)/365]$ in lb/VMT

Where:	Loader	Water Truck	Haul Truck	
k (PM 2.5) =	0.15	0.15	0.15	constant for PM-2.5, lb/VMT
k (PM 10) =	1.5	1.5	1.5	constant for PM-10, lb/VMT
k (PM 30) =	4.9	4.9	4.9	constant for PM-30, lb/VMT
a =	0.9	0.9	0.9	for PM10 and PM2.5
a =	0.7	0.7	0.7	for PM 30
b =	0.45	0.45	0.45	
s =	4.8	4.8	4.8	surface material silt content, % (from AP-42 Table 13.2.2.1)
W =	36	30	27.5	Mean weight of vehicles, tons
P =	115	115	115	(AP-42 Figure 13.2.1.2)

Uncontrolled Emission Factors, lb/VMT

Pollutant	Loader	Water Truck	Haul Truck
PM2.5	0.138	0.127	0.122
PM10	1.38	1.27	1.22
PM30	5.4	5.0	4.8

Vehicle Miles Traveled Per Year Production = 7,008,000 tons/year

	Loader	Water Truck	Haul Truck	
Tons/trip	7.0		25.0	
Trips/year	1,001,143	250	280,320	(Water Truck = 365 - P)
Distance/trip (mi)	0.01	0.10	0.10	
VMT/year	10,011	25	28,032	

Uncontrolled Emissions:

	PM 2.5	PM 10	PM 30

	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Water Truck	0.0004	0.002	0.004	0.016	0.014	0.062
Haul Truck	0.39	1.71	3.91	17.1	15.3	67.1
Loader	0.16	0.69	1.57	6.9	6.2	27.1
Total:	**0.55**	**2.40**	**5.48**	**24.0**	**21.5**	**94.3**

Controlled Emissions: Control Eff. = 75% Loader, Haul Truck
50% Water Truck

	PM 2.5		PM 10		PM 30	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Water Truck	0.00018	0.00079	0.0018	0.0079	0.0071	0.031
Haul Truck	0.10	0.428	0.98	4.3	3.8	16.8
Loader	0.039	0.17	0.39	1.7	1.5	6.8
Total:	**0.14**	**0.60**	**1.4**	**6.0**	**5.4**	**23.6**

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Table 6B. Paved Roads - Wash Plant

PAVED ROADS: Emissions calculations are based on AP-42 Section 13.2.1

EF = $k\ (sL)^{0.91}(W)^{1.02}$ Particulate emission factor, lb/VMT

Where:

k (PM 2.5) =	0.00054	0.00054	constant for PM 2.5, lb/VMT
k (PM 10) =	0.0022	0.0022	constant for PM 10, lb/VMT
k (PM 30) =	0.011	0.011	constant for PM 30, lb/VMT
SL =	8.2	8.2	silt loading (AP-42 Table 13.2.1-3)(g/m^2)

The average silt loading value for industrial roads at quarries is used. Silt loading at fac sand facilities will be low because frac sand grains are not easily crushed to generate silt.

	Haul Truck	**Water Truck**	
W =	27.5	30	Mean weight of vehicles, tons

Uncontrolled Emission Factors, lb/VMT

Pollutant	Haul Truck	Water Truck
PM2.5	0.11	0.12
PM10	0.44	0.48
PM30	2.2	2.4

Vehicle Miles Traveled Per Year

Production = 7,008,000 tons/year

	Haul Truck	Water Truck
Tons/trip	25.0	
Trips/year	280,320	250
Distance/trip (mi)	0.60	0.60
VMT/year	168,192	150

(Water Truck = 365 - P)

Uncontrolled Emissions:

	PM 2.5	PM 10	PM 30

	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Water Truck	0.0020	0.009	0.008	0.036	0.041	0.18
Haul Truck	2.1	9.1	8.4	36.9	42.1	184.4
Total:	**2.1**	**9.1**	**8.4**	**36.9**	**42.2**	**184.6**

Controlled Emissions: Control Efficiency = 90% Haul Truck

50% Water Truck

	PM 2.5		PM 10		PM 30	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Water Truck	0.00101	0.0044	0.0041	0.018	0.021	0.090
Haul Truck	0.21	0.91	0.84	3.7	4.2	18.4
Total:	**0.21**	**0.91**	**0.85**	**3.7**	**4.2**	**18.5**

Total Annual Uncontrolled Emissions due to paved and unpaved roads in wet plant:

PM (=PM30): 94.3 + 184.6 tons/yr = 278.9 tons/yr
PM10: 24.0 + 36.9 tons/yr = 60.9 tons/yr
PM10: 2.4 + 9.1 tons/yr = 12.5 tons/yr

Total Annual Controlled Emissions due to paved and unpaved roads in wet plant:

PM (=PM30): 23.6 + 18.5 tons/yr = 42.1 tons/yr
PM10: 6.0. + 3.7 tons/yr = 9.7 tons/yr
PM10: 0.6 + 0.91 tons/yr = 1.51 tons/yr

Table 6C. Unpaved Roads - Dry Plant

UNPAVED ROADS: Emissions calculations are based on AP-42 Section 13.2.2

$EF = k(s/12)^a(W/3)^b * [(365 - P)/365]$ in lb/VMT

Where:	Loader	Water Truck	
k (PM 2.5) =	0.15	0.15	constant for PM-2.5, lb/VMT
k (PM 10) =	1.5	1.5	constant for PM-10, lb/VMT
k (PM 30) =	4.9	4.9	constant for PM-30, lb/VMT
a =	0.9	0.9	for PM10 and PM2.5
a =	0.7	0.7	for PM 30
b =	0.45	0.45	
s =	4.8	4.8	surface material silt content, % (from AP-42 Table 13.2.2.1)
W =	36	30	Mean weight of vehicles, tons
P =	115	115	(AP-42 Figure 13.2.1.2)

Uncontrolled Emission Factors, lb/VMT

Pollutant	Loader	Water Truck
PM2.5	0.138	0.127
PM10	1.38	1.27
PM30	5.4	5.0

Vehicle Miles Traveled Per Year

Production = 3,504,000 tons/year

	Loader	Water Truck
Tons/trip	7.0	
Trips/year	500,571	250
Distance/trip (mi)	0.01	0.10
VMT/year	5,006	25

Uncontrolled Emissions:

	PM 2.5		PM 10		PM 30	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Water Truck	0.0004	0.002	0.004	0.016	0.014	0.062
Loader	0.08	0.34	0.79	3.4	3.1	13.5
Total:	**0.08**	**0.35**	**0.79**	**3.5**	**3.1**	**13.6**

Controlled Emissions: Control Efficiency = 75% Loader
50% Water Truck

	PM 2.5		PM 10		PM 30	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Water Truck	0.00018	0.00079	0.0018	0.0079	0.0071	0.031
Loader	0.020	0.086	0.20	0.86	0.77	3.4
Total:	**0.020**	**0.087**	**0.20**	**0.87**	**0.78**	**3.4**

Table 6C. Paved Roads - Dry Plant

PAVED ROADS: Emissions calculations are based on AP-42 Section 13.2.1

EF = $k\ (sL)^{0.91}(W)^{1.02}$ Particulate emission factor, lb/VMT

Where:

k (PM 2.5) =	0.00054	0.00054	constant for PM 2.5, lb/VMT
k (PM 10) =	0.0022	0.0022	constant for PM 10, lb/VMT
k (PM 30) =	0.011	0.011	constant for PM 30, lb/VMT
SL =	8.2	8.2	silt loading (AP-42 Table 13.2.1-3)(g/m^2)

The average silt loading value for industrial roads at quarries is used. Silt loading at fac sand facilities will be low because frac sand grains are not easily crushed to generate silt.

	Haul Truck	**Water Truck**	
W =	27.5	30	Mean weight of vehicles, tons

Uncontrolled Emission Factors, lb/VMT

Pollutant	Haul Truck	Water Truck
PM2.5	0.11	0.12
PM10	0.44	0.48
PM30	2.2	2.40

Vehicle Miles Traveled Per Year

Production = 3,504,000 tons/year

	Haul Truck	Water Truck
Tons/trip	25	
Trips/year	140,160	250
Distance/trip (mi)	0.50	0.50
VMT/year	70,080	125

Uncontrolled Emissions:

	PM 2.5	PM 10	PM 30

	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Water Truck	0.0017	0.007	0.007	0.030	0.034	0.15
Haul Truck	0.86	3.8	3.5	15.4	17.5	76.9
Total:	**0.86**	**3.8**	**3.5**	**15.4**	**17.6**	**77.0**

Control Efficiency = 90% Haul Truck
50% Water Truck

Controlled Emissions:

	PM 2.5		PM 10		PM 30	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Water Truck	0.0008	0.004	0.003	0.015	0.017	0.07
Haul Truck	0.086	0.38	0.35	1.5	1.8	7.7
Total:	**0.087**	**0.38**	**0.35**	**1.6**	**1.8**	**7.8**

Total Annual Uncontrolled Emissions due to paved and unpaved roads in dry plant:

PM (=PM30): 13.6 + 77.0 tons/yr = 90.6 tons/yr
PM10: 3.5 + 15.4 tons/yr = 18.9 tons/yr
PM2.5: 0.35 + 3.8 tons/yr = 4.15 tons/yr

Total Annual Controlled Emissions due to paved and unpaved roads in dry plant:

PM (=PM30): 3.4 + 7.8 tons/yr = 11.2 tons/yr
PM10: 0.87 + 1.6 tons/yr = 2.47 tons/yr
PM2.5: 0.087 + 0.38 tons/yr = 0.47 tons/yr

Table 7. Potential Plant Emissions with Existing Facility, Plant #2, and Mines

Chieftain Sand Emissions Summary

Unit ID	Device Type	Device Description	PTE Emission Rates, ton/year						
			PM	PM_{10}	$PM_{2.5}$	CO	NO_x	SO_2	VOC
P01	Process	#1 Fluid Bed Dryer	12.2	12.2	6.0	26.3	29.8	0.10	0.94
P02	Process	#1 Screening Tower Baghouse	7.9	7.9	4.7	--	--	--	--
P03	Process	Three Storage Silos	0.056	0.056	0.056	--	--	--	--
P04	Process	Rail/Truck Loadout Station	0.19	0.19	0.19	--	--	--	--
P05	Process	Space Heaters	0.67	0.67	0.67	7.2	12.4	0.015	0.77
P11	Process	#2 Industrial Sand Dryer	15.3	14.0	11.0	17.5	38.1	0.13	1.2
P12	Process	#2 Screening Tower Baghouse	9.6	8.8	7.4	--	--	--	--
P13	Process	Three Storage Silos	0.056	0.056	0.056	--	--	--	--
P14	Process	Rail/Truck Loadout Station	0.19	0.19	0.19	--	--	--	--
F01A	Fugitive	Vehicle Traffic at Mine - Controlled	90.0	22.9	2.3	--	--	--	--
F01B	Fugitive	Vehicle Traffic at Wash Plant - Controlled	42.1	9.7	1.5	--	--	--	--
F01C	Fugitive	Vehicle Traffic at Dry Plant - Controlled	11.1	2.4	0.47	--	--	--	--
F02	Fugitive	Stockpiles - Wind Erosion	3.8	1.8	0.27	--	--	--	--
F05	Fugitive	Crusher (Wet Plant)	4.2	1.9	0.35	--	--	--	--
F06	Fugitive	Screen (Wet Plant)	7.7	2.6	0.18	--	--	--	--
F07	Fugitive	Up to 15 Conveyors	7.4	2.4	0.68	--	--	--	--
F08	Fugitive	Stackers, Hoppers and Transloads	16.3	7.7	1.2	--	--	--	--
F09	Fugitive	Grizzly at the Dry Plant	2.1	0.95	0.26				
F10	Fugitive	Blasting	1.8	0.95	0.055	45.2	11.5	1.4	--
F11	Fugitive	Removal of Overburden	2.8	0.37	0.052	--	--	--	--
		Facility Totals =	232.8	97.4	37.4	96.2	91.8	1.6	2.9
		Title V Major Source Thresholds =	--	100	--	100	100	100	100

WISCONSIN HAZARDOUS AIR POLLUTANT (NR 445) REVIEW

The fuel used for combustion in the dryers is virgin fossil fuels. The hazardous air pollutants emitted due to the combustion of these virgin fossil fuels are exempt from the emission limitations and standards in NR 445.

The emissions of FHAP can be calculated based on the emission factors in AP-42, Table 1.4-3. The sum of emission factors for individual HAP is 1.882 pounds per million cubic feet. The one FHAP with the highest emission factor is hexane, and the emission factor is 1.8 pounds per million cubic feet.

The maximum heat input for both dryers combined will be (40 + 50) million BTU/hr = 90 million BTU/hr. The facility will also have 20 million BTU per hour heat input of space heating. So total heat input at the facility will be 110 million BTU/hr. At 1020 million BTU per million cubic feet of natural gas burned, the maximum natural gas burned will be 0.11 million cubic feet/hr. Thus, the emissions of any single HAP will be no more than

1.8 #/million cubic feet * 0.11 million cubic feet/hr = 0.198 pound per hour

The annual maximum theoretical emission (MTE) of any single FHAP will be

0.198 #/hr * 8760 hr/yr / 2000 #/ton = 0.87 ton/yr

The emissions of all FHAP combined from the facility will be no more than

1.882 #/million cubic feet * 0.11 million cubic feet/hr = 0.21 pound per hour

The annual maximum theoretical emission (MTE) of all FHAP combined will be

0.21 #/hr * 8760 hr/yr / 2000 #/ton = 0.98 ton/yr

As such, the MTE and the potential to emit (PTE) for any single FHAP will be less than 10 tons per year. The total MTE and PTE of all FHAP combined will be less than 25 tons per year. The facility is a true minor source of FHAP.

The mined and processed sand is silica, and it is not a hazardous air pollutant regulated under the federal Clean Air Act. It is not regulated under the state hazardous air pollutant regulation under NR 445.

COMPLIANCE AND TECHNOLOGY REVIEW

Particulate matter will be emitted from the sand dryer, and the screening, conveying and elevator operations inside the dry plant building. These emissions will be controlled using fabric filter baghouses.

The new dryer will be a rotary dryer and will have a capacity of 200 tons per hour. It will use natural gas as fuel, at a heat input capacity of 50 mmBtu per hour. Particulate matter (PM) emissions will be controlled by a baghouse. The particulate matter emissions from the sand dryer (P11, S11) will be subject to New Source Performance Standard (NSPS) in 40 CFR Part 60, Subpart UUU (s. NR 440.73, Wis.

Adm. Code) for Calciners and Dryers in non-metallic mineral industries. The NSPS PM emission limit is 0.025 gr/dscf, and the limit is only for filterable particulates with a compliance stack test method of Method 5. The company proposed a PM emission limit of 3.5 pounds per hour from the dryer stack. The company also requested a PM_{10} limit of 3.2 #/hr, and a $PM_{2.5}$ emission limit on the dryer as 2.5 pounds per hour.

The new dryer is a rotary dryer. As such the rotary dryer is not required under NSPS to have opacity compliance monitoring. The company has proposed to have a certified opacity reader to measure and record the opacity of the new dryer stack exhaust on a daily basis using Method 9. This would have complied with the NSPS compliance monitoring requirement if the new dryer would have been a fluid bed dryer.

The company has requested a particulate matter emission limit for the new dryer that is higher than the outlet baghouse loading obtained during a test for the existing dryer. This will provide a margin of error such that the emission limit can be complied with during the compliance test.

The new dry plant building will result in PM emissions and will be controlled by a baghouse. The particulate matter emissions from the dry plant (P12, S12) will be subject to New Source Performance Standard (NSPS) in 40 CFR Part 60, Subpart OOO (s. NR 440.688, Wis. Adm. Code) for non-metallic mineral processing. The NSPS PM emission limit is 0.014 gr/dscf, and the limit is only for filterable particulates with a compliance stack test method of Method 5. The company proposed a PM emission limit of 2.2 pounds per hour from the P12 dry plant building stack. The company also requested a PM_{10} limit of 2.0 #/hr, and a $PM_{2.5}$ emission limit on the dryer as 1.7 pound per hour. NSPS in Part 60 Subpart OOO requires quarterly Method 22 reading of the stack emission. The company will comply with that requirement.

AIR QUALITY REVIEW

The maximum impact from the dispersion modeling analysis includes the modeled impact of the sources plus a background concentration. The background concentration represents the contribution to overall air quality to those sources not explicitly modeled, including but not limited to fugitive emissions, nearby small sources and distant large sources, and other natural contributions. The background concentration is a conservative estimate of the impact of sources not explicitly modeled. In the real-world the background concentration can be less than the value listed in the dispersion modeling analysis.

The modeled impact of the facility is a spatially and temporally coherent sum of the impact of each individually modeled source. It does not represent the overall maximum impact from each individual source added together. Therefore the modeled impact of the facility varies around the facility due to the different contributions from each source. Further, the modeled impact of the facility varies around the facility for each and every hour of the year due to the changing meteorological conditions.

Fugitive dust sources do not have defined stack parameters and the generation of emission varies for each hour due to meteorological conditions, making it very unrepresentative to analyze the impact using a standard dispersion model. Assuming that a small amount of fugitive dust emissions vent into a large volume would produce a negligible modeling impact and is no more accurate than assuming a large amount of emission in a small volume. In the real-world fugitive dust emissions are higher during windy conditions – the exact opposite of when a stack based source has highest impact.

Considering these factors (background concentration, spatial variation of concentration, temporal variation of concentration, uncertain emission characterization, opposing conditions leading to impact), the Department addresses fugitive dust (PM10) in permits by requiring the facility to reduce and control emissions. Performing explicit modeling for fugitive dust emissions is unrepresentative of the real-world impact.

J.R. Sims has performed the ambient air quality review for this project. The following are his analysis, finding and conclusion.

A. INTRODUCTION

This dispersion analysis for a Title V, Research and Testing Exemption compares model results to National Ambient Air Quality Standards (NAAQS) for criteria pollutants. The facility has a physical location of: UTM, NAD 83, Zone 15, 610228E, 5012335N, Town of Dovre, Barron County, Wisconsin. PSD baselines HAVE NOT been set in Barron County.

B. MODELING ANALYSIS

I) General Conditions

1. Tom Henning, consultant for Chieftain Sand, supplied and Paul Yeung verified the emission parameters used in this analysis. Building dimensions were provided by SEH. Building Profile Input Program for PRIME (BPIP-Prime) was used in this analysis to correctly account for the concepts and procedures expressed in the Good Engineering Practice technical support document as well as other related references. Measurements were compared with scaled aerial photographs for accuracy and appropriateness.

2. Five years (2006-2010) of preprocessed meteorological data was used in this analysis. The surface data was collected in Marshfield and the upper air meteorological data originated in Green Bay.

3. The American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) steady-state plume model (AERMOD v 14134) was used in this analysis. The model used rural dispersion coefficients with regulatory and non-regulatory default options. These options allow for missing and calm wind correction, buoyancy induced dispersion, building downwash, recirculation cavity effects and internal computing of Ozone limiting values.

4. All sources vent vertically and without obstruction except as noted elsewhere within this document.

II) Specific Conditions

5. The receptors used in this analysis consisted of a grid conforming to the physical layout of the building and grounds about the facility (8023 receptors) with 25-meter resolution near the facility and extending some 1,250 meters from a point identified as (0,0) of the Cartesian axis on which this facility was placed via supplied plot plans. Points within known fences or on top of buildings were not considered. Terrain is a factor in the area, so receptor elevations were considered via application of the AERMOD terrain processor (AERMAP) with USGS National Elevation Dataset (NED) tiles.

MODEL RESULTS

(All concentrations are reported in $\mu g/m^3$)

C. SIL ANALYSIS

SIL Comparison Analysis Results (All concentrations are reported in $\mu g/m^3$)									
	PM_{10} 24 hour	$PM_{2.5}$ 24 hour	$PM_{2.5}$ Annual	CO 1 hour	CO 8 hour	NO_2 Annual	SO_2 3 hour	SO_2 24 hour	SO_2 Annual
Comparative Results	21	9.3	1.9	95	52	3	0	0	0
Sig. Impact Level	5	1.2	0.3	2000	500	1	25	5	1

D. SIL CONCLUSION

As shown in Section C above, the results of the modeling analysis demonstrate that the Significant Impact Level (SIL) will be satisfied for CO and SO_2. SIL will be exceeded for PM_{10}, $PM_{2.5}$ and NO_2.

E. NAAQS ANALYSIS

NAAQS Analysis	NO_2 Annual	PM_{10} 24 hour	$PM_{2.5}$ 24 hour	$PM_{2.5}$ Annual
Facility Impact	2.5	16.1	9.3	2.0
Background	8.0	29.4	25.6	8.7
Total	10.5	45.5	34.9	10.7
NAAQS	100	150	35	15
% NAAQS	11	30	99.7	71

$NO_X \rightarrow NO_2$ conversion via Tier I

F. NAAQS CONCLUSION

The results of the modeling analysis demonstrate that ALL applicable air quality standards will be satisfied assuming the emissions rates, stack parameters and all other restrictions listed in this document.

G. RECOMMENDATION

The result of the modeling analysis recommends allowing the permit application to move forward through the approval process assuming the emissions rates, stack parameters and all other restrictions listed in this document.

Stack Parameters

ID	Release Type	Description	LOCATION	EMISSION RATES
			UTM NAD83 Zone 15	Pounds per Hour

			X	Y	Z	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
S01	DEFAULT	Dryer	609654.1	5012358	332.38	6.80	9.60	0.32	2.8	1.36
S02	DEFAULT	Screening Tower	609651.2	5012369	332.4			0.32	1.8	1.07
S03A	DEFAULT	SS #1	609688.6	5012333	332.27			0.00	0.013	0.013
S03B	DEFAULT	SS 2	609697.3	5012323	332.32			0.00	0.013	0.013
S03C	DEFAULT	SS 3	609705.9	5012313	332.26			0.00	0.013	0.013
S04	DEFAULT	Loadout	609732.8	5012332	332.21			0.00	0.043	0.043
S11	DEFAULT	Dryer 2	609643.1	5012369	332.38	8.7	18.4	0.00	3.2	2.5
S12	DEFAULT	Screen Plant	609644.4	5012362	332.38			0.00	2	1.7
S13A	DEFAULT	SS 4	609686.5	5012313	332.32			0.00	0.013	0.013
S13B	DEFAULT	SS 5	609695.1	5012302	332.26			0.00	0.013	0.013
S13C	DEFAULT	SS 6	609678	5012324	332.27			0.00	0.013	0.013
S14	DEFAULT	Loadout	609733.8	5012333	332.21			0.00	0.043	0.043

ID	PHYSICALS

	Actual Height	Temp	Vel	Flow	Dia
	(ft)	(F)	(fps)	(acfm)	(ft)
S01	85	170.0	63.5	45500	3.9
S02	85	68.0	49.5	28253	3.5
S03A	88	Ambient	obstructed	obstructed	1.0
S03B	88	Ambient	obstructed	obstructed	1.0
S03C	88	Ambient	obstructed	obstructed	1.0
S04	30	50.0	59.0	1000	0.6
S11	90	140.0	86.2	65000	4.0
S12	90	75.0	70.7	30000	3.0
S13A	88	Ambient	obstructed	Obstructed	1.0
S13B	88	Ambient	obstructed	Obstructed	1.0
S13C	88	Ambient	obstructed	Obstructed	1.0
S14	30	50.0	59.0	1000	0.6

EMISSIONS FROM NEW EQUIPMENT OR MODIFICATION

Stack Emissions

EMISSIONS FROM EXISTING EQUIPMENT

Stack Emissions

Stack S01 - Criteria Pollutants Emissions (Stack Height - 85 ft.).

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	400	1752
SO_2	0.024	0.1
NO_x	6.8	29.8
CO	9.6	42.0
VOC	0.22	0.94
CO_2	4706	20612

Stack S01 - Criteria Pollutants Emissions (Stack Height - 85 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM/PM_{10}	2.8	12.26
$PM_{2.5}$	1.36	5.96
SO_2	0.024	0.1
NO_x	6.8	29.8

CO	6.0	26.28
CO_2	4706	20612
VOC	0.22	0.94

Stack S02 - Criteria Pollutants Emissions (Stack Height - 85 feet)

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	360	1577

Stack S02 - Criteria Pollutants Emissions (Stack Height – 85 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM/PM_{10}	1.8	7.88
$PM_{2.5}$	1.07	4.7

Stack S03A - Criteria Pollutants Emissions (Stack Height - 88 ft.)

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	0.6	2.63
$PM_{10}/PM_{2.5}$	0.22	0.96

Stack S03A - Criteria Pollutants Emissions (Stack Height – 88 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	0.013	0.06

Stack S03B - Criteria Pollutants Emissions (Stack Height - 88 ft.)

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	0.6	2.63
$PM_{10}/PM_{2.5}$	0.22	0.96

Stack S03B - Criteria Pollutants Emissions (Stack Height – 88 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	0.013	0.06

Stack S03C - Criteria Pollutants Emissions (Stack Height - 88 ft.)

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	0.6	2.63
$PM_{10}/PM_{2.5}$	0.22	0.96

Stack S03C - Criteria Pollutants Emissions (Stack Height – 88 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	0.013	0.06

Stack S04 - Criteria Pollutants Emissions (Stack Height - 30 ft.)

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	4.0	17.52
$PM_{10}/PM_{2.5}$	0.48	2.1

Stack S04 - Criteria Pollutants Emissions (Stack Height - 30 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	0.043	0.19

Stack S11 - Criteria Pollutants Emissions (Stack Height - 90 ft.).

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	400	1752
SO_2	0.03	0.13
NO_x	8.7	38.11
CO	18.4	80.59
VOC	0.27	1.18
CO_2	5882	25763

Stack S11 - Criteria Pollutants Emissions (Stack Height - 90 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	3.5	15.33
PM_{10}	3.2	14.02
$PM_{2.5}$	2.5	10.95
SO_2	0.029	0.13
NO_x	8.7	38.11
CO	4.0	17.52
CO_2	5882	25763
VOC	0.27	1.18

Stack S12 - Criteria Pollutants Emissions (Stack Height - 90 feet)

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	440	1729

Stack S12 - Criteria Pollutants Emissions (Stack Height - 90 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	2.2	9.64
PM_{10}	2.0	8.76
$PM_{2.5}$	1.7	7.45

Stack S13A - Criteria Pollutants Emissions (Stack Height - 88 ft.)

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	0.6	2.63
$PM_{10}/PM_{2.5}$	0.22	0.96

Stack S13A - Criteria Pollutants Emissions (Stack Height - 88 feet).

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
$PM/PM_{10}/PM_{2.5}$	0.013	0.06

Stack S13B - Criteria Pollutants Emissions (Stack Height - 88 ft.)

Pollutant	Maximum Theoretical Emissions (MTE)	
	Pounds per hour	Tons per year
PM	0.6	2.63
$PM_{10}/PM_{2.5}$	0.22	0.96

Stack S13B - Criteria Pollutants Emissions (Stack Height – 88 feet).

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
$PM/PM_{10}/PM_{2.5}$	0.013	0.06

Stack S13C - Criteria Pollutants Emissions (Stack Height - 88 ft.)

Pollutant	Maximum Theoretical Emissions (MTE)	
	Pounds per hour	Tons per year
PM	0.6	2.63
$PM_{10}/PM_{2.5}$	0.22	0.96

Stack S13C - Criteria Pollutants Emissions (Stack Height – 88 feet).

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
$PM/PM_{10}/PM_{2.5}$	0.013	0.06

Stack S14 - Criteria Pollutants Emissions (Stack Height - 30 ft.)

Pollutant	Maximum Theoretical Emissions (MTE)	
	Pounds per hour	Tons per year
PM	4.0	17.52
$PM_{10}/PM_{2.5}$	0.48	2.1

Stack S14 - Criteria Pollutants Emissions (Stack Height – 30 feet).

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
$PM/PM_{10}/PM_{2.5}$	0.043	0.19

Facility non-stack emissions

F01A - Vehicle Traffic at Mines Criteria Pollutants Emissions

Pollutant	Maximum Theoretical Emissions (MTE)	
	Pounds per hour	Tons per year
PM	157.0	360
PM_{10}	40.0	91.7
$PM_{2.5}$	4.0	9.17

F01A – Vehicle Traffic at Mines Criteria Pollutants Emissions

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
PM	-	90.0
PM_{10}	-	22.9
$PM_{2.5}$	-	2.29

F01B -Vehicle Traffic at Wet Plant Criteria Pollutants Emissions

Pollutant	Maximum Theoretical Emissions (MTE)	
	Pounds per hour	Tons per year
PM	-	278.9

PM_{10}	-	60.9
$PM_{2.5}$	-	12.5

F01B -Vehicle Traffic at Wet Plant Criteria Pollutants Emissions

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
PM	-	42.1
PM_{10}	-	9.7
$PM_{2.5}$	-	1.51

F01C – Vehicle Traffic at Dry Plant Criteria Pollutants Emissions

Pollutant	Maximum Theoretical Emissions (MTE)	
	Pounds per hour	Tons per year
PM	-	90.6
PM_{10}	-	18.9
$PM_{2.5}$	-	4.15

F01C – Vehicle Traffic at Dry Plant Criteria Pollutants Emissions

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
PM	-	11.2
PM_{10}	-	2.47
$PM_{2.5}$	-	0.47

F02 – Storage Piles Criteria Pollutants Emissions

	Maximum Theoretical Emissions (MTE)	
Pollutant	Pounds per hour	Tons per year
PM	-	3.8
PM_{10}	-	1.8
$PM_{2.5}$	-	0.27

F02 – Storage Piles Criteria Pollutants Emissions

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
PM	-	3.8
PM_{10}	-	1.8
$PM_{2.5}$	-	0.27

F05 – Crusher Criteria Pollutants Emissions

	Maximum Theoretical Emissions (MTE)	
Pollutant	Pounds per hour	Tons per year
PM	0.96	4.2
PM_{10}	0.43	1.9
$PM_{2.5}$	0.08	0.35

F05 – Crusher Criteria Pollutants Emissions

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
PM	0.96	4.2
PM_{10}	0.43	1.9
$PM_{2.5}$	0.08	0.35

F06 – Screen at Wet Plant Criteria Pollutants Emissions

	Maximum Theoretical Emissions (MTE)	
Pollutant	Pounds per hour	Tons per year
PM	1.8	7.7

PM_{10}	0.59	2.6
$PM_{2.5}$	0.04	0.18

F06 – Screen at Wet Plant Criteria Pollutants Emissions

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	1.8	7.7
PM_{10}	0.59	2.6
$PM_{2.5}$	0.04	0.18

F07 –Up to 15 Conveyors Criteria Pollutants Emissions

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	1.7	7.4
PM_{10}	0.55	2.4
$PM_{2.5}$	0.21	0.91

F07 –Up to 15 Conveyors Criteria Pollutants Emissions

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	2.2	9.8
PM_{10}	0.74	3.2
$PM_{2.5}$	0.21	0.91

F08 - Stackers, Hoppers and Tranloads Criteria Pollutants Emissions

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	5.7	24.97
PM_{10}	2.7	11.83
$PM_{2.5}$	0.41	1.2

F08 - Stackers, Hoppers and Tranloads Criteria Pollutants Emissions

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	5.7	16.3
PM_{10}	2.7	7.7
$PM_{2.5}$	0.41	1.1

F09 –Grissly Feeder at Dry Plant Criteria Pollutants Emissions

	Maximum Theoretical Emissions (MTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	0.72	2.1
PM_{10}	0.32	0.95
$PM_{2.5}$	0.06	0.26

F09 –Grissly Feeder at Dry Plant Criteria Pollutants Emissions

	Potential to Emit (PTE)	
Pollutant	**Pounds per hour**	**Tons per year**
PM	0.72	2.1
PM_{10}	0.32	0.95
$PM_{2.5}$	0.06	0.26

F10 - Criteria Pollutants Emissions (Blasting)

Pollutant	Maximum Theoretical Emissions (MTE)	
	Pounds per hour	Tons per year
PM	-	3.6
PM_{10}	-	1.9
$PM_{2.5}$	-	0.11
SO_2	-	2.8
NO_x	-	23.0
CO	-	90.4
CO_2	-	506

F10 - Criteria Pollutants Emissions (Blasting)

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
PM	-	1.8
PM_{10}	-	0.95
$PM_{2.5}$	-	0.055
SO_2	-	1.4
NO_x	-	11.5
CO	-	45.2
CO_2	-	253

F11 –Overburden Removal Criteria Pollutants Emissions

Pollutant	Maximum Theoretical Emissions (MTE)	
	Pounds per hour	Tons per year
PM	-	8.2
PM_{10}	-	1.2
$PM_{2.5}$	-	0.15

F11 –Overburden Removal Criteria Pollutants Emissions

Pollutant	Potential to Emit (PTE)	
	Pounds per hour	Tons per year
PM	-	2.8
PM_{10}	-	0.4
$PM_{2.5}$	-	0.052

Total Facility Emissions

Pollutant	Potential Annual Emissions (Ton/yr)	PSD Threshold (Ton/yr)	Title V Threshold (Ton/yr)
Carbon Monoxide	96.2	250	100
Nitrogen Oxides	91.8	250	100
Volatile Organic Compounds	2.9	250	100
Carbon Dioxide	58,596	N/A	N/A
Sulfur Dioxide	1.6	250	100

Particulate Matter	232.8	250	-
PM_{10}	97.4	250	100
$PM_{2.5}$	37.4	250	-
Hazardous Air Pollutants	negligible	-	10 tpy single HAP 25 tpy all HAPs

FACILITY AND PROJECT CLASSIFICATION

1. Project Status.

Based on the emission estimates in this review, the facility maximum theoretical emissions may exceed Title V major source thresholds for PM_{10} and carbon monoxide emissions.

To avoid being a major source for Part 70 for PM_{10}, the company has requested to have the overburden removal operation limited to 3000 hours per year, and in addition, 90% control of the haul road traffic emissions has been proposed.

As for CO emissions, to avoid being a major source for Part 70, the company has proposed lower CO limits for the dryers and a limit on the amount of explosives to be used.

Therefore, the project will make the facility a synthetic minor non-Part 70 source for Title V since PM_{10} and carbon monoxide emissions will be less than the major source threshold of 100 tons per year. The project will be minor for PSD.

2. Facility Status After the Permit is Issued.

Based on the emission estimates in this review, the facility maximum theoretical emissions may exceed Title V major source thresholds for particulate matter (PM_{10}) and carbon monoxide emissions.

To avoid being a major source for Part 70 for PM_{10}, the company has requested to have the overburden removal operation limited to 3000 hours per year, and in addition, 90% control of the haul road traffic emissions has been proposed.

As for CO emissions, to avoid being a major source for Part 70, the company has proposed lower CO limits for the dryers and a limit on the amount of explosives to be used.

Therefore, after the permit is issued, the facility will be a synthetic minor non-Part 70 source for Title V since PM_{10} and carbon monoxide emissions will be less than the major source threshold of 100 tons per year. The facility will be minor for PSD.

This conclusion is based on the assumption that Chieftain will not provide sand from mines associated with this facility to a dry plant or plants that are contiguous or adjacent to this facility such that the facilities would become a single source for purposes of Title V and PSD.

3. EPA Class Code After the Permit is Issued.

☐ **"A"** [Means the source's maximum theoretical emissions ***and*** potential to emit for one or more pollutants are greater than major source thresholds. The source is a major source (will have a FOP)];

☒ **"SM80"** [Means the source's maximum theoretical emissions of one or more pollutants are greater than major source thresholds and potential to emit is at least 80% but less than 100% of major source thresholds. The source is a non-major source (will have a FESOP)];

☐ **"SM"** [Means the source's maximum theoretical emissions of one or more pollutants are greater than major source thresholds but potential to emit for all pollutants is less than 80% of major source thresholds. The source is a non-major source (usually will have a FESOP)];

☐ **"B"** [Means the source's maximum theoretical emissions and potential to emit for all pollutants are less than major source thresholds. The source is a non-major source (will have a SOP)].

4. Summary.

NSR Applicability	After Permit Issuance	
	Major	Minor
PSD		X
Non-Attainment	NA	
Federal HAP		X

Part 70 Applicability	Facility After Permit Issuance		
	Part 70	FESOP (Syn. Minor)	non-part 70
Status		X	

EPA Class Code	EPA Class Code After Permit Issuance			
	A	SM80	SM	B
Status		X		

ENVIRONMENTAL ANALYSIS

An air pollution control construction permit that does not require review under chs. NR 405 or 408, Wis. Adm. Code, is considered a minor action under s. NR 150.20(1m)(m), Wis. Adm. Code and does not require an environmental analysis.

The issuance of an initial operation permit under ss. 285.60, and 285.62 Wis. Stats., is considered an equivalent analysis action under s. NR 150.20(2)(a)4., Wis. Adm. Code. For further discussion on environmental impacts, please see the attached Environmental Analysis Questionnaire completed by the applicant. Actions specified under s. NR 150.20(2), Wis. Adm. Code, require a WEPA compliance determination under s. NR 150.35, Wis. Adm. Code, but do not require any additional environmental analysis under ch. NR 150, Wis. Adm. Code. The department has determined that this type of proposal is not expected to have the potential to cause significant adverse environmental or secondary effects.

Notification of the determination required under s. NR 150.35, Wis. Adm. Code, is included in the public notice.

RULE APPLICABILITY

The facility is subject to the NSPS for Non-Metallic Mineral Processing Plants, 40 CFR 60, Subpart OOO, and the dryers are subject to the NSPS for Calciners And Dryers In Mineral Industries, 40 CFR 60, Subpart UUU (s. NR 440.73).

The sand dryers are subject to the NSPS under s. NR 440.73, Wis. Adm. Code. The applicable PM emission limit is 0.057 gram per dry standard cubic meter. The applicable visible emission limit is 10% opacity.

The dry plant baghouse, the loadout baghouse and the storage silo fabric filters are subject to the NSPS in 40 CFR Part 60, Subpart OOO. The applicable emission limit is 0.032 gram per dry standard cubic meter. No visible emission standard is applicable for stack emissions from units, except for the storage silos constructed after April 22, 2008. The storage silo fabric filters are subject to a visible emission limit of 7% opacity.

40 CFR 60, Subpart OOO has been revised and updated on April 28, 2009 with a more restrictive particulate matter stack emission limitations compared to the NSPS in s. NR 440.688, Wis. Adm. Code. Subpart OOO also has a more restrictive visible emission for non-captured particulate matter emissions.

The wet sand processes starting from the crushers are subject to the NSPS in Subpart OOO.

The mining of the sand is at or below the water table. As such, the wet mining operations themselves are not subject NSPS in Subpart OOO as per 40 CFR §60.670(a)(2). However, the fugitive dust emissions from the mining operations are subject to s. NR 415.075, Wis. Adm. Code. Visible emission limit will be 20% opacity. Implementation of a fugitive dust control plan will be necessary

The facility is subject to the ambient air monitoring requirements under s. NR 415.075(4), Wis. Adm. Code for each of the mines. The facility will be required to set up, operate, and report the results obtained with a particulate matter ambient air monitoring system which complies with the requirements of s. NR 415.075(4)(a)1. – 5., Wis. Adm. Code. These requirements are contained in the air pollution control permit. However, the facility may apply for, and the Department may grant, a variance from the monitoring requirements of s. NR 415.075(4), Wis. Adm. Code, if the applicant demonstrates that the

general public will not be exposed to significant levels of particulate matter from the source, and that the source's emissions units and processes are controlled to a level which meets all applicable requirements, per s. NR 415.075(4)(b), Wis. Adm. Code.

The sand processing plant is subject to s. NR 415.076, Wis. Adm. Code for the control of fugitive dust emissions. Precautions are required to be taken to prevent particulate matter from becoming airborne.

NEW SOURCE PERFORMANCE STANDARDS (NSPS) APPLICABILITY

For proposed construction of a source:

1. Is the proposed source in a source category for which there is an existing or proposed NSPS?
   ☒ Yes ☐ No ☐ Not applicable. (If yes, identify the source category.) The new rotary dryer is subject to the NSPS in Part 60 Subpart UUU.

2. Is the proposed source an affected facility?
   ☒ Yes ☐ No ☐ Not applicable. (Explain if necessary to clarify.) Yes

For the proposed modification of an existing source:

1. Is the existing source, which is being modified, in a source category for which there is an existing or proposed NSPS?
   ☒ Yes ☐ No ☐ Not applicable. (If yes, identify the source category.) The dry plant and the processing plant is subject to the NSPS in Part 60 Subpart OOO.

2. Is the existing source, which is being modified, an affected facility (prior to modification)?
   ☒ Yes ☐ No ☐ Not applicable. (Explain if necessary to clarify here and in the following items) Yes.

3. Does the proposed modification constitute a modification **under NSPS** to the existing source?
   ☒ Yes ☐ No ☐ Not applicable. Yes.

4. Will the existing source be an affected facility after modification?
   ☒ Yes ☐ No ☐ Not applicable. Yes.

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS) APPLICABILITY

Part 61 NESHAPS:

1. Will the proposed new or modified source emit a pollutant controlled under an existing or proposed NESHAPS?
   ☐ Yes ☒ No (if yes, identify the pollutant).

2. Is the proposed new or modified source subject to an existing or proposed NESHAPS?
   ☐ Yes ☒ No (if yes, identify NESHAPS).

Part 63 NESHAPS:

1. Will the proposed new or modified source emit a pollutant controlled under an existing Part 63 NESHAPS?
   ☐ Yes ☒ No (if yes, identify the pollutant).

2. Is the proposed new or modified source subject to an existing Part 63 NESHAPS?
   ☐ Yes ☒ No (if yes, identify NESHAPS).

3. Is the proposed project subject to s. 112(g) of the Clean Air Act?
   ☐ Yes ☒ No.

The section 112(g) rules only apply to case-by-case MACT standards that are developed for new construction or reconstruction of sources that (by themselves) constitutes a new major source of federal hazardous air pollutants (for source categories not covered under an existing Part 63 MACT standard).

CRITERIA FOR PERMIT APPROVAL

Section 285.63, Wis. Stats., sets forth the specific language for permit approval criteria. The Department finds that:

1. The source will meet emission limitations.

2. The source will not cause nor exacerbate a violation of an air quality standard or ambient air increment.

3. The source is operating or seeks to operate under an emission reduction option. Not Applicable.

4. The source will not preclude the construction or operation of another source for which an air pollution control permit application has been received.

PRELIMINARY DETERMINATIONS FOR CONSTRUCTION PERMIT NO. 13-POY-205 AND OPERATION PERMIT NO. 603107010-F01

The Wisconsin Department of Natural Resources has reviewed the construction permit application and other materials submitted by Chieftain Sand And Proppant, LLC and hereby makes a preliminary determination that this project, when constructed and operated consistent with the application and subsequent information submitted, will be able to meet the emission limits and conditions included in the attached Draft Permit. Furthermore, the Department hereby makes a preliminary determination that an operation permit may be issued with the following Draft Applicable Limits and Draft Permit Conditions. A final decision regarding emission limits and conditions will be made after the Department has reviewed and evaluated all comments received during the public comment period. The proposed emission limits and other proposed conditions in the Draft Permit are written in the same form that they will appear in the construction permit and the operation permit. These proposed conditions may be changed as a result of public comments or further evaluation by the Department. The United States Environmental Protection Agency will be given the opportunity to comment on the operation permit of any Part-70 source prior to the Department making a final decision on the operation permit.

PERMIT FEE CALCULATION

BASIC FEES.

Construction or replacement of a PSD or NAA minor source or the PSD or NAA minor modification of a Part 70 minor source. [$3,000]	$3,000.00
TOTAL BASIC FEES	$3,000.00

ADDITIONAL FEES.

The application is for a source not reviewed under ch. NR 405 or 408, Wis. Adm. Code, where the applicant requested in writing and received the permit within 50 days of receipt of a complete application [$5,000].	$5,000.00
The application is for a source which requires specific permit conditions limiting the potential to emit to make the source a minor source or to make the modification a minor modification [$3,500].	$3,500.00
The permit application required review and analysis of two or more basic emissions units.	$14,400.00
The construction permit requires emission testing.	$6,000.00
The permit application is for a PSD or NAA minor source or minor modification to a major PSD or NAA source whose projected air quality impact requires a detailed air quality modeling analysis. [$1,000]	$1,000.00
A public hearing on the application is held at the request of the permit applicant or its agent. [$1,500]	$1,500.00
TOTAL ADDITIONAL FEES	$31,400.00
TOTAL FEES (Total Basic Fees + Total Additional Fees)	$34,400.00

CREDITS.

The initial fee submitted with the application. [$7,500]	-$7,500.00
Commence Construction Waiver Fee. [$300]	-$300.00
TOTAL CREDITS	-$7,800.00
TOTAL AMOUNT DUE (Total Fee + Total Credit)	$26,600.00

ENVIRONMENTAL ANALYSIS QUESTIONNAIRE
Wisconsin Department of Natural Resources
Air Management Program

I. Applicant Information:

Applicant: **Chieftain Sand and Proppant Barron, LLC**

Address: **331 – 27th Street, New Auburn, WI**

Contact Information: Tel: **Jeffrey Goldsmith: 715-642-4371** E-mail: **jgoldsmith@chieftainsand.com**

Title of Proposal: **Air Permit For Sand Plant and Mine**

Location: County: **Barron** City/Town/Village: **Dovre**

Township Range Section(s): **Parts of Sections 7, 8, 17, 18, 19, 20 T32N, R10W; Parts of Sections 12, 13, 24 T32N R11W**

☐ Attach any maps, plans and other descriptive material.

II. Brief overview of the proposal:

Chieftain Sand and Proppant, LLC requests an air permit to increase the capacity of an existing dryer from 100 ton per hour to 200 ton per hour, to install a grizzly at the dry plant, and to provide addition mining locations.

III. Purpose and need (include history and background as appropriate):

This project will allow an increase in the facility production to provide proppant for use in oil and gas wells. This will allow for more efficient gas and oil recovery and supports the Unites States goal of energy independency.

IV. Authorities and approvals (list local, state and federal permits or approvals required):

Please list all other approvals required for this project. If additional approvals are required, you should also consider these under sections V. and VI. below.

Barron County – Reclamation Plan for Mine

WDNR General Stormwater Permit- Nonmetallic Mining Operations- WI-0046515-05

V. Environmental analysis:

A. Analysis of affected environment and probable impacts

Have you researched to determine if there are any of the following on the affected property or that may be affected by actions resulting from the project? Briefly describe any existing features or resources that may be affected by the proposal and the probable impacts on those features. Provide any supporting information that demonstrates that you have done this.

☐ 1. Physical environment (land use)

The proposed modification of the existing dryer and the addition of the grizzly will not impact the land use at the dry plant. Land use impacts related to the additional mining locations are evaluated with the stormwater permitting process and reclamation plan process.

☐ 2. Physical environment (water resources and wetlands)

The proposed modification of the existing dryer and the addition of the grizzly will not impact water resources and wetlands. Water resources and wetland issues related to the additional mining locations are evaluated with the stormwater permitting process and the issuance of a mining and reclamation permit from Barron County.

☐ 3. Biological environment - archaeological/historical sites

The proposed modification of the existing dryer and the addition of the grizzly will not impact archaeological/historical sites. Archaeological/historical site issues related to the additional mining locations are evaluated with the stormwater permitting process.

☐ 4. Biological environment - threatened/endangered resources (NHI)

The proposed modification of the existing dryer and the addition of the grizzly will not impact threatened/endangered resources. Threatened/endangered resource issues related to the additional mining locations are evaluated with the stormwater permitting process and the NHI list is evaluated during the preparation of the mine and reclamation plan submitted to Barron County. A copy of the most current NHI list for each township/range that includes a mine is included with the mine plan submitted to the county.

☐ 5. Social and economic – environmental justice and local impacts

No adverse social, economic or environmental justice impacts are anticipated because of the proposed project.

☐ 6. Other special resources (e.g., State Natural Areas)

No adverse impacts on other special resources are anticipated because of the proposed project.

B. Analysis of alternatives

Briefly describe the impacts of no action and of alternatives to the project that would decrease or eliminate adverse environmental impacts

Adverse environmental impacts are not anticipated with the modification of the existing dryer and the addition of the grizzly at the dry plant. Therefore, the impacts of no action versus these activities are the same. Adverse environmental impacts from the proposed mining operations are manageable. A "no action" approach for the proposed mine would mean the demand for sand would be met elsewhere which might have more significant environmental impacts than the expansion of the current mine area.

VI. Other considerations and assessing the need for an Environmental Impact Statement (EIS)

A. Does the Project meet any of the following criteria under s. NR 150.20(4)(b)? All of the following are considerations for whether an Environmental Impact Statement may be required. Check all that potentially apply.

☒ 1. The project involves multiple department actions.

☐ 2. The project may be in conflict with local, state or federal environmental policies [NR 150.20(4)(b)2. Wis. Adm. Code].

☐ 3. The project may set precedent for reducing or limiting environmental protection [NR 150.20(4)(b)3. Wis. Adm. Code].

☐ 4. The project may result in deleterious effects over large geographic areas [NR 150.20(4)(b)4. Wis. Adm. Code].

☐ 5. The project may result in long-term deleterious effects that are prohibitively difficult or expensive to reverse [NR 150.20(4)(b)5. Wis. Adm. Code].

☐ 6. The project may result in deleterious effects on especially important, critical, or sensitive environmental resources [NR 150.20(4)(b)6. Wis. Adm. Code].

☐ 7. The project involves broad public controversy [NR 150.20(4)(b)7. Wis. Adm. Code].

☐ 8. The project may result in substantial risk to human life, health, or safety [NR 150.20(4)(b)8. Wis. Adm. Code].

B. For all boxes checked in A. above, describe the criteria in more detail below.

The project involves department actions related to air permitting and stormwater permitting.