

**BASIC APPLICATION FOR EQUIPMENT / AIR POLLUTION PERMIT
OR CERTIFICATE OF OPERATION**

FORM E001
03/2011

1. Name of Company PUREgraphite, LLC dba Novonix Anode Materials LLC 2. NAICS Code: 335991
(If corporation or LLC, name on file with Tennessee Secretary of State Corporate Records Division)

3. Company Official to Contact: LaToya Littlejohn 4. Phone No. 423-580-2398

5. Mailing Address: 353 Corporate Place Chattanooga TN 37419
Street or P.O. Box City State Zip Code

6. Physical Location
(If different from line 5) Same Chattanooga TN 37419
Street City State Zip Code

7. Application for:
 Installation Permit Initial Certificate of Operation Renewal Certificate of Operation

Previous Installation Permit or Certificate of Operation No.: _____

8. Type of equipment for which application is made:

- | | | |
|--|---|--|
| <input checked="" type="checkbox"/> Process Equipment (Form E010 or Form E010A) | <input type="checkbox"/> Previously Submitted | <input checked="" type="checkbox"/> Attached |
| <input type="checkbox"/> Fuel Burning Equipment (Form E011) | <input type="checkbox"/> Previously Submitted | <input type="checkbox"/> Attached |
| <input type="checkbox"/> Incineration Equipment (Form E012) | <input type="checkbox"/> Previously Submitted | <input type="checkbox"/> Attached |
| <input checked="" type="checkbox"/> Minor Pollution Source (Form E014)
<i>(Less than 1000 lbs/yr and less than 10 lbs/day total uncontrolled contaminant emissions)</i> | <input type="checkbox"/> Previously Submitted | <input checked="" type="checkbox"/> Attached |

The following forms are filed with this application:

In addition to the forms specified above: E102, E106, E108

9. Equipment Name:
Rotary Kiln (Calcliner)

10. If application is for a Certificate of Operation (Initial or Renewal), are there any changes since previous application in the equipment or operation which might:

A. Increase, decrease, or alter process materials, fuel, refuse type, etc.? Yes No

B. Increase, decrease, or alter emissions or emission points? Yes No

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11. Process Weight, lb/hr, (Item 6 on Form E010), Incineration Rate, lb/hr, (Item 3C on Form E012), or Fuel Burning Rate, 1,000 Btu/hr, (Item 7C on Form E011): 22 lbs/hr

This is to certify that I am familiar with operations concerning this equipment and the information provided on this application is true and complete to the best of my knowledge:

Mail completed form to:
CHATTANOOGA-HAMILTON COUNTY
AIR POLLUTION CONTROL BUREAU
6125 Preservation Drive, Suite 140
Chattanooga, TN 37416-3638

LaToya Littlejohn Name
Environmental Compliance Engr. Title
5/11/23 Date

This form must be completely filled out before it will be processed

PROCESS EQUIPMENT APPLICATION

FORM E010
07/2000

1. **Name of Company** (as shown on Line 1, Form E001): PUREgraphite, LLC dba Novonix Anode Materials
2. **Equipment Name** (as shown on Line 10, Form E001): Rotary Kiln (Calcliner)
3. **Installation Date:** _____ 4. **Type of Process:** Calcining
5. **Major Raw Materials Used:** Green Coke/Pitch or Pitch/Binder or Pitch/Graphite
6. **Process Weight:** 22.05 Pounds per hour
This is the total weight of all materials introduced into the process.

7. **Control Equipment**

Emissions Uncontrolled Baghouse (File Form E102)

Wet Collecting Device (File Form E103) Inertial Separators (File Form E105)

Electrostatic Precipitator (File Form E104) Other – Specify: Dry iron oxide scrubber

8. **Control Efficiency**

Enter the control efficiency for each pollutant emitted by this equipment (for appropriate Forms E102, E103, E104, E105, E107, or enter zeros if the emissions are uncontrolled as noted in Item 7.

Pollutant	% Efficiency
Particulates	98
SO _x	N/A
NO _x	N/A
CO	N/A
Hydrocarbons	N/A
Other:	

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9. **Emissions Summary**

Enter the amount of each pollutant listed in pounds per hour.

Pollutant	Uncontrolled Emissions (File Form E106)	Actual Emissions (Stack Test Report)	Estimated Emissions (See Formula A)
Total Suspended Particulate	0.0220		0.0004
PM10	0.98		0.0196
Sulfur Oxides	0.1764		0.03748
Nitrogen Oxides (as NO ₂)	0.0121		0.00176
Other (specify)	See below		See below
VOC	0.0077		0.00220
CO	0.0066		0.00496
CO ₂	0.3307		0.3307

OR

Formula A: Estimated Emissions = $\frac{(100\% - \text{Control Efficiency (\%)})}{100\%} \times \text{Uncontrolled Emissions}$

10. **Environmental Impact**

Those emissions indicated in Item 9 may at times under normal operating conditions cause (check all that apply):

- Odors Eye Irritations Property Damage Health Effects
 Other nuisances outside of plant property No environmental damage

11. **Emission Point Data**

Stack Height (emission point) above ground: _____ Ft. Volume of gas discharged into atmosphere: _____ cfm
Ground Elevation above sea level at stack base: 657 Ft. Gas exit temperature: 1832 °F
Stack Diameter: _____ Ft.

12. **Ave. Operating Time**

Daily: 24 hours Weekly: 5 Days Yearly: 50 Weeks

This is to certify that I am familiar with the operations concerning this equipment and that the information provided on this application is true and complete to the best of my knowledge.

LaToya Littlejohn
Company Official

Environmental Compliance Engr.
Title

5/4/23
Date

CHATTANOOGA-HAMILTON COUNTY
AIR POLLUTION CONTROL BUREAU
6125 Preservation Drive, Suite 140
Chattanooga, TN 37416-3740

MINOR POLLUTION SOURCE APPLICATION

FORM E014
07/2001

1. Name of Company: PUREgraphite, LLC dba Novonix Anode Materials
(As shown on Line 1 of Form E001)
2. Name of Equipment: Rotary Kiln (Calciner)
(As shown on Line 9 of Form E001)
3. Type of Operation: Calcining
4. Major Raw Materials: Green coke/Pitch or Pitch/Binder or Pitch/Graphite

5. Control Equipment Data:

<input type="checkbox"/> Emissions Uncontrolled	<input type="checkbox"/> Inertial Separators (File Form E105)
<input type="checkbox"/> Baghouse (File Form E102)	<input type="checkbox"/> Adsorption System (File Form E108)
<input type="checkbox"/> Wet Collecting Device (File Form E103)	<input type="checkbox"/> Flame or Catalytic Destruction (File Form E109)
<input type="checkbox"/> Electrostatic Precipitator (File Form E104)	<input type="checkbox"/> Masking Agent or Odor Counteragent (File Form E111)
<input checked="" type="checkbox"/> Other (specify): <u>Baffle Box</u>	

6. Control Equipment Efficiency:
Control equipment efficiency for each pollutant emitted by this equipment (from appropriate Form E102, E103, E104, E105, E107 or enter zeros if "A" is checked in Item 5):

Pollutant	% Efficiency
Particulates	Unknown
SO _x	N/A
NO _x	N/A
CO	N/A
Hydrocarbons	N/A
Other: HCN	99.6
H ₂ S	99.8

7. Uncontrolled Emissions into Atmosphere:

Pollutant	Amount Emitted (lbs/hr)
Particulates PM, PM10	1
SO _x	0.1764
NO _x	0.0121
CO	0.0066
Hydrocarbons*	0.0077

The values shown were determined by actual stack test (submit copy of stack test report with full details).
 The values shown were estimated (file Form E106 for each pollutant shown).
 *This should include only true hydrocarbons such as ethane, propane, ethylene, etc. List other organic compounds separately.

8. Those emissions indicated in Item 7 may at times under normal operating conditions cause (check one or more):

<input type="checkbox"/> Odors	<input type="checkbox"/> Eye Irritations
<input type="checkbox"/> Property Damage	<input type="checkbox"/> Other nuisances outside of plant property
<input checked="" type="checkbox"/> Health Effects - Carbon monoxide	<input checked="" type="checkbox"/> No environmental damage

9. Do the emissions from this equipment contain asbestos, mercury, or beryllium?
 Yes No

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10. Emission Point Data:

Stack height (emission point) above ground:	_____	Ft
Ground elevation above sea level at stack base:	<u>657</u>	Ft
Stack Diameter:	_____	Ft
Volume of gas discharged into atmosphere:	_____	Cfm
Gas exit Temperature:	<u>1832</u>	°F

11. Average Equipment Operating Time:

Daily	<u>24</u>	Hours
Weekly	<u>5</u>	Days
Yearly	<u>50</u>	Weeks

This is to certify that I am familiar with the operations concerning this equipment and that the information provided on this application is true and complete to the best of my knowledge. This form must be completely filled out before it will be acceptable.

Mail to:
 CHATTANOOGA-HAMILTON COUNTY
 AIR POLLUTION CONTROL BUREAU
 6125 Preservation Drive
 Chattanooga, TN 37416

Company Official: Rafael Littlejohn
Signature
 Title: Environmental Compliance Engr.
 Date: 5/4/23

DO NOT WRITE BELOW THIS LINE

_____ Engineer Approval This form corresponds to permit number: _____

UTM coordinates of company: EW: _____ NS: _____

Special Notations: _____

AIR POLLUTION CONTROL EQUIPMENT DATA - BAGHOUSE

**FORM E102
01/2001**

1. **Name of Company:** PUREgraphite, LLC dba Novonix Anode Materials
As shown on Line 1 of Form E001

2. **Name of Equipment:** Rotary Kiln (Calcliner) - Baffle Box
As shown on Line 9 of Form E001

3. **Equipment Data:**
 Manufacturer of Baghouse: Field Erected
 Model Number: _____ Cost of Baghouse: _____
 Date of Manufacture: _____ Date of Installation: _____
 Pre-cleaning Equipment No Yes
If yes, what type (File appropriate form for control equipment)
 Volume of gas discharged from baghouse at dry standard conditions: _____ dscfm
 Total cloth area of baghouse: _____ ft²
 Air to cloth ratio: _____ $\frac{\text{Ft}}{\text{Min}}$ *(Divide volume of gas discharged by total cloth area)*

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4. **Pressure Drop Across Baghouse:**
 Stated by manufacturer: _____ Inches of H₂O
 Measured (actual): _____ Inches of H₂O
 Calculated: _____ X _____ = _____ Inches of H₂O
(K Factor) Air to cloth ratio in ft/min
 The recommended pressure drop range in inches of H₂O is 1.5 (minimum) to 8.0 (maximum).
If the measured or calculated pressure drop falls outside the recommended range, contact the Chattanooga-Hamilton County Air Pollution Control Bureau.

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5. **Filter Data:**
 Type of fabric filters used in baghouse: _____
 Operating temperature: _____ °F _____ °F 1832 °F
Manufacturer's Recommended Normal Maximum
If the maximum operating temperature exceeds the recommended operating temperature, contact the Chattanooga-Hamilton County Air Pollution Control Bureau.

6. **Baghouse Components:**
Check all that apply.
 Flow rate instrumentation Inlet gas temperature instrumentation Evaporative Cooler
 Dew point indicator Differential pressure instrumentation Other (Describe) _____
 Heat Exchanger Transmissometer _____

7. **Baghouse Operation:** Continuous Intermittent

8. **Baghouse Description:**
 Baghouse Inlet (dirty gas): Bottom Feed Top Feed
 Exterior Filtration Tangential
 Other (Describe): _____

Does the baghouse have a wear-resistant plate? yes no

Baghouse shape: Rectangular Cubical Cylindrical
 Other (Describe): _____

Baghouse volume: _____ Ft³

Baghouse dimensions: _____ Ft _____ Ft _____ Ft
Length Width height

Baghouse shell material: _____

8. **Bag Cleaning:** (check one)
Fabric Flexing Reverse Air Cleaning

Mechanical Shaking & Rapping Reverse Jet
 Sonic Cleaning Reverse Flow
 Collapse Cleaning Manual Cleaning
 Pulse (pressure) – Jet Cleaning

9. **Filter Configuration:**
 Panels Multiple Tube Bag
 Circular Cross-Section Tube Other (Describe): _____

Filter Fabric: Felted Woven Number of Compartments: _____

Filter Area: _____ Ft² Number of Filters per Compartment: _____

10. **Particle Size Distribution in Microns (μ):**
 Particle Type(s): _____ Moisture in gas stream: _____ %

Size	0-5 μ	5-10 μ	10-20 μ	20-44 μ	Greater than 44 μ
% by weight					

11. **Dust Disposal:**
 Automatic (screw conveyor, etc.) Manual (Describe): Drop out to a collection drum

How often are hoppers emptied? Every _____ hours

Name of commercial disposal company (if applicable): _____

Is disposed material wetted for transport? Yes No

Disposal Site: _____

12. **Control Efficiency:**
 Manufacturer's Stated Efficiency: 98 %
 Required Efficiency: _____ %
 Operational Efficiency (performance testing): _____ %

Size	0-5 μ	5-10 μ	10-20 μ	20-44 μ	Greater than 44 μ
% by weight					

13. **Fan Data:**
 Fan Location: Clean air side (pull through) Dirty air side (push through)
 Fan Design (check one - A, B, or C):

Fan Type:	Blade Type:
A. <input type="checkbox"/> Centrifugal (radial flow)	<input type="checkbox"/> Forward Curve <input type="checkbox"/> Backward Curve <input type="checkbox"/> Straight
B. <input type="checkbox"/> Axial-flow (propeller)	<input type="checkbox"/> Propeller <input type="checkbox"/> Tube Axial <input type="checkbox"/> Vane Axial

Fan Properties:

Diameter: _____ Inches Braking Horsepower: _____ BHP
 Speed: _____ RPM Inlet Area: _____ Ft²
 Volume: _____ Cfm @ STP Outlet Area: _____ Ft²
 Static Pressure: _____ Inches WC Motor Horsepower: _____ HP

Standard Heavy Duty Submitted copy of Manufacturer's Multirating Tables Yes No

Special Construction Materials:

Bronze Alloys Aluminum Stainless Steel Bisonite
 Zinc Chromate Primer Rubber, Phenolics, Vinyls, or Epoxy Covering

C. Compressor Positive Displacement Dynamic Reciprocating

*This is to certify that I am familiar with the operations concerning this equipment and that the information provided on this application is true and complete to the best of my knowledge. **This form must be completely filled out before it will be processed.***

Mail to:
 CHATTANOOGA-HAMILTON
 COUNTY AIR POLLUTION
 CONTROL BUREAU
 6125 Preservation Drive
 Chattanooga, TN 37416

Company Official: *L. L. Littlejohn*
Signature

Title: Environmental Compliance Engr.

Date: 5/4/23

Do not write below this line.

 Engineer Approval Permit Number: _____

Special Notations: _____

ADSORBER SYSTEM APPLICATION

(This form must be accompanied by Form E001, E010, E011, E102, E103 or E104 if not already submitted for this equipment.)

FORM E108
07/2001

1. Name of Company: PUREgraphite, LLC dba Novonix Anode Materials
(As shown on Line 1 of Form E001)
2. Name of Equipment: Rotary Kiln (Calciner), Heated V-Blender (VCJ-200)
(As shown on Line 9 of Form E001)
3. Control Equipment Name: Iron Oxide Dry Scrubber (one primary and one back-up)

4. Control Equipment Data:

A. Equipment Data:
 Name of Manufacturer: Custom
 Model Number: _____ Cost of Equipment: _____
 Date of Manufacture: October 2021 Date of Installation: November 2021

B. Pollutant Data:
 List of contaminants to be removed and the corresponding concentrations.

Pollutant	Concentration (ppm at Standard Conditions)
H2S	311 ppmvd
HCN	2,230 ppmvd

C. Carrier Gas Data:
 a. The carrier gas is: Air Other (specify): _____
 b. Vapor concentration: Above Upper Explosive Limit Within Lower and Upper Explosive Limits*
 Below Lower Explosive Limit Not Flammable
 c. Gas Stream Conditions: Temperature: _____ °F Pressure: _____ Inches Hg
 Moisture Content: _____ %

* If within the lower and upper explosive limits, explosion proof pumps, fans, etc. should be considered.

D. Emissions data determined by: Stack Test (submit report) Calculation (submit copy)

5. Process Data:

A. Volume of gas to be treated: _____ CFM @ STP
 B. Velocity of gas to be treated: _____ FPM @ STP
 C. Duct diameter: _____ Ft
 D. Process Operation: Continuous Intermittent Periodic
 E. Operating Time: Daily: 24 Hours/day
 Weekly: 5 Days/week
 Yearly: 50 Weeks/year

6. Adsorption System Data:

A. The system is: Regenerative Non-regenerative Single Pass
 Multi Pass Thin Bed Thick Bed

B. Adsorbent data:
 Activated Carbon – mesh size: _____
 Hydrous Oxides (Specify): _____ - mesh size: _____
 Metallics (Specify): _____ - mesh size: _____
 Other (Specify): Iron Oxide - mesh size: _____

C. If adsorbent is to be chemically impregnated to act as a catalyst or chemisorbent, give details:

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 COUNTY AIR POLLUTION
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 Page 1 of 2

7. Adsorbent System Variables:

A. Bed Depth:	<u>36</u>	Inches	Bed Area: <u>appx. 2.7</u> Ft ²
B. Packing Density:		Lbs/ft ³	<u>11</u> ft ³ per scrubber
C. Total Charge per System:	<u>300</u>	Lbs	
D. Temperature of Adsorbent:		°F	<i>All adsorption reactions are exothermic – give maximum working temperature.</i>
E. Pressure Drop through Bed:		Inches Water	<u> </u> Inches Hg
F. Capacity of Adsorbent:			<i>In weight capacity/weight adsorbent at working temperature and air contaminant concentration.</i>
G. Estimated Life of Adsorbent to Breakthrough:	<u>450</u>	hours	<i>Submit supporting data from manufacturer.</i>
H. Air Flow Rate through Bed:		CFM	

8. Regenerative Systems:

A. Number of Adsorbers in System: _____

B. Time required for Regeneration Cycle: _____

C. If steam is used to regenerate, indicate the steam ratio to solvent: _____

D. Capacity of Working Charge: _____

E. List all equipment to be used for recovery system: _____

9. Control Efficiency:

Specify Pollutant	Efficiency %
H ₂ S	99.8
HCN	99.6

10. Drawings of all equipment should be submitted with each application.

This is to certify that I am familiar with the operations concerning this equipment and that the information provided on this application is true and correct to the best of my knowledge. This form must be completely filled out before it will be acceptable.

Mail to:
 CHATTANOOGA-HAMILTON COUNTY
 AIR POLLUTION CONTROL BUREAU
 6125 Preservation Drive
 Chattanooga, TN 37416

Company Official: *Barbara Littlejohn*
Signature

Title: Environmental Compliance Eng.

Date: 5/4/2013

DO NOT WRITE BELOW THIS LINE

_____ Engineer Approval This form corresponds to permit number: _____

Special Notations: _____

POLLUTION ESTIMATION FORM

FORM E106
01/2001

- 1. Name of Company: PUREgraphite, LLC dba Novonix Anode Materials
As shown on Line 1 of Form E001
- 2. Equipment Name: Rotary Kiln (Calciner)
As shown on Line 9 of Form E001
- 3. Type of pollutant for which estimate is made: PM, PM 10, NOX, SOX, VOC, CO, CO2, HCN, H2S

4. Pollution Emission Factor (PEF): Please refer to the calculations table attached.
(Give value & units in lbs/ton, lbs/lb, lbs/gal, gr/ft³, etc.)

Source of Emission Factor: Please refer to the calculations table attached.

5. Uncontrolled Pollution Emission Rate:

Please see table \times Please see table = Please see table
(PEF from Item 4) *(Give operating rate for this equipment and the appropriate units in either lbs/hr, tons/hr, gal/hr, or cfm)* *(Give value & units)*

6. Uncontrolled Emission Rate: Please see table Pounds emitted per hour

This is to certify that I am familiar with the operations concerning this equipment and that the information provided on this application is true and correct to the best of my knowledge. This form must be completely filled out before it is processed.

Mail to:
 CHATTANOOGA-HAMILTON COUNTY
 AIR POLLUTION CONTROL BUREAU
 6125 Preservation Drive
 Chattanooga, TN 37416

Company Official: *Rafaya Littlejohn*
 Title: Environmental Compliance Engr.
 Date: 5/4/23

DO NOT WRITE BELOW THIS LINE

_____ Engineer Approval

This form corresponds to permit number: _____

Special Notations: _____

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Emission Factor Results

3 factors found.

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SCC ⓘ	30601401	
Industrial Processes; Petroleum Industry; Petroleum Coke Calcining ; Calciner		
POLLUTANT ⓘ	Nitrogen oxides (NOx)	NEI NOX ⓘ CAS ⓘ
Control(s): ⓘ UNCONTROLLED		
Emission Factor ⓘ	-- 1.10E+00 Lb per Ton	Details
Raw Coke Processed;		
Quality ⓘ -- U Emissions Factors Applicability		
SCC ⓘ	30601401	
Industrial Processes; Petroleum Industry; Petroleum Coke Calcining ; Calciner		
POLLUTANT ⓘ	Sulfur oxides (SOx)	NEI ⓘ CAS ⓘ
Control(s): ⓘ UNCONTROLLED		
Emission Factor ⓘ	-- 1.60E+01 Lb per Ton	Details
Raw Coke Processed;		
Quality ⓘ -- U Emissions Factors Applicability		
SCC ⓘ	30601401	
Industrial Processes; Petroleum Industry; Petroleum Coke Calcining ; Calciner		
POLLUTANT ⓘ	Volatile organic compounds (VOC)	NEI VOC ⓘ CAS ⓘ
Control(s): ⓘ UNCONTROLLED		
Emission Factor ⓘ	-- 7.00E-01 Lb per Ton	Details
Raw Coke Processed;		
Quality ⓘ -- U Emissions Factors Applicability		

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Emission Factor Results

5 factors found.

SCC ⓘ	30500402
Industrial Processes; Mineral Products; Calcium Carbide; Coke Dryer	
POLLUTANT ⓘ	Nitrogen oxides (NOx) NEI NOX ⓘ CAS ⓘ
Control(s): ⓘ UNCONTROLLED	
Emission Factor ⓘ -- 2.00E-01 Lb per Ton	Details
Material Produced;	
Quality ⓘ -- U Emissions Factors Applicability	
<hr/>	
SCC ⓘ	30500402
Industrial Processes; Mineral Products; Calcium Carbide; Coke Dryer	
POLLUTANT ⓘ	PM, filterable NEI PM-FIL ⓘ CAS ⓘ
Control(s): ⓘ UNCONTROLLED	
Emission Factor ⓘ -- 2.00E+00 Lb per Ton	Details
Feed Material Processed;	
Quality ⓘ -- E Emissions Factors Applicability	
<hr/>	
SCC ⓘ	30500402
Industrial Processes; Mineral Products; Calcium Carbide; Coke Dryer	
POLLUTANT ⓘ	PM, filterable NEI PM-FIL ⓘ CAS ⓘ
Control(s): ⓘ FABRIC FILTER / BAGHOUSE	
Emission Factor ⓘ -- 2.60E-01 Lb per Ton	Details
Feed Material Processed;	
Quality ⓘ -- E Emissions Factors Applicability	
<hr/>	
SCC ⓘ	30500402
Industrial Processes; Mineral Products; Calcium Carbide; Coke Dryer	
POLLUTANT ⓘ	PM10, filterable NEI PM10-FIL ⓘ CAS ⓘ
Control(s): ⓘ UNCONTROLLED	
Emission Factor ⓘ -- 1.00E+00 Lb per Ton	Details
Material Produced;	
Quality ⓘ -- C Emissions Factors Applicability	
<hr/>	
SCC ⓘ	30500402
Industrial Processes; Mineral Products; Calcium Carbide; Coke Dryer	
POLLUTANT ⓘ	Sulfur oxides (SOx) NEI ⓘ CAS ⓘ
Control(s): ⓘ UNCONTROLLED	
Emission Factor ⓘ -- 3.00E+00 Lb per Ton	Details
Feed Material Processed;	
Quality ⓘ -- E Emissions Factors Applicability	

(87% controlled)

PM10
(0.5 PM)

Emission Factor Results

1 factors found.

SCC ⓘ	30300302		
Industrial Processes; Primary Metal Production; Metallurgical Coke Manufacturing ; By-product Process: Oven Charging			
POLLUTANT ⓘ	Carbon monoxide	NEI CO ⓘ	CAS 630-08-0 ⓘ
Control(s): ⓘ UNCONTROLLED			
Emission Factor ⓘ -- 6.00E-01 Lb per Ton		Details	
Coal Charged;			
Quality ⓘ -- D Emissions Factors Applicability			

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CALCINER, HEATED V-BLENDER & DRYER EMISSIONS CALCS

MAX (T) 1300

TABLE P - CALCINER CRITERIA POLLUTANTS/GHG UNCONTROLLED								
EMISSIONS UNIT	TENNESSEE EPA ID NUMBER	PROCESS	CAPACITY (tph)	OPERATING HOURS (hr/yr)	SCC CODE	EMISSIONS FACTOR (lbs/ton)	EMISSIONS (lbs/hr)	EMISSIONS (tpy)
Raw Coke Calcine Process	TND987782885	Rotary Kiln (Calciner) - NOX	0.0110	8760	30601401	1.10	0.0121	0.0531
		Rotary Kiln (Calciner) - SOX	0.0110	8760	30601401	16.00	0.1764	0.7725
		Rotary Kiln (Calciner) - VOC	0.0110	8760	30601401	0.70	0.0077	0.0338
		Rotary Kiln (Calciner) - CO	0.0110	8760	30300302	0.60	0.0066	0.0290
		Rotary Kiln (Calciner) - CO ₂ , GHG	0.0110	8760	30501001	30	0.3307	1.4484
CRITERIA UNCONTROLLED							0.5335	2.3368

Kiln

TABLE Q - CALCINER CRITERIA POLLUTANTS/GHG CONTROLLED								
EMISSIONS UNIT	TENNESSEE EPA ID NUMBER	PROCESS	CAPACITY (tph)	OPERATING HOURS (hr/yr)	SCC CODE	EMISSIONS FACTOR (lbs/ton)	EMISSIONS (lbs/hr)	EMISSIONS (tpy)
Raw Coke Calcine Process	TND987782885	Rotary Kiln (Calciner) - NOX	0.0176	8760	30501001	0.16	0.00282	0.0124
		Rotary Kiln (Calciner) - SOX	0.0176	8760	30502910	3.40	0.05997	0.2626
		Rotary Kiln (Calciner) - VOC	0.0176	8760	30300303	0.20	0.00353	0.0154
		Rotary Kiln (Calciner) - CO	0.0176	8760	30501623	0.45	0.00794	0.0348
		Rotary Kiln (Calciner) - CO ₂ , GHG	0.0176	8760	30501001	30.00	0.52911	2.3175
CRITERIA UNCONTROLLED							0.00000	0.0000
CRITERIA UNCONTROLLED							0.6034	2.6427

MAX (T) 1300

TABLE R - CALCINER CRITERIA POLLUTANTS/GHG UNCONTROLLED								
EMISSIONS UNIT	TENNESSEE EPA ID NUMBER	PROCESS	CAPACITY (tph)	OPERATING HOURS (hr/yr)	SCC CODE	EMISSIONS FACTOR (lbs/ton)	EMISSIONS (lbs/hr)	EMISSIONS (tpy)
Raw Coke Calcine Process	TND987782885	Box Kiln (Calciner) - NOX	0.0176	8760	30601401	1.10	0.0194	0.0850
		Box Kiln (Calciner) - SOX	0.0176	8760	30601401	16.00	0.2822	1.2360
		Box Kiln (Calciner) - VOC	0.0176	8760	30601401	0.70	0.0123	0.0541
		Box Kiln (Calciner) - CO	0.0176	8760	30300302	0.60	0.0106	0.0463
		Box Kiln (Calciner) - CO ₂ , GHG	0.0176	8760	30501001	30	0.5291	2.3175
CRITERIA UNCONTROLLED							0.8536	3.7389

Kiln

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TABLE L - PM CALCULATIONS UNCONTROLLED

EMISSIONS UNIT	TENNESSEE EPA ID NUMBER	PROCESS	CAPACITY (tph)	OPERATING HOURS (hr/yr)	SCC CODE	EMISSIONS FACTOR (lbs/ton)	EMISSIONS (lbs/hr)	EMISSIONS (lb/hr) CONTROLLED DERIVED	
Raw Coke Calcine Process		GRC Classifier	0.5512	8760	30502713	0.1690	0.0915	0.4007	
		Rotary Klin (Calciner)	0.0110	8760	3050042	2.0	0.0220	0.0966	
		V-Blender (VHC-50)	0.0220	8760	30302308	19.0	0.4189	1.8347	
		Heated V-Blender (VCI-200)	0.1102	8760	30302308	19.0	2.0944	9.1734	
		Press-Head Mixer (VS-600)	0.0331	8760	30302308	19.0	0.6283	2.7520	
		50 Crusher (Bag Crusher)	1.1020	8760	30502003	0.00540	0.0060	0.0261	
		Dryer (FACTROL)	0.0110	8760	30302308	19.0	0.2094	0.9173	
		Box Calciner (5/19/2023)	0.0176	8760	3050042	2.0	0.0353	0.1545	
		PRIMARY PM UNCONTROLLED						3.4705	15.2008
									0.0694

Control Efficiency

98%

Note(a): 10 kg/hr feed rate for kiln according to Process Engineer Manager (Initial Meeting)
 Note(b): the VCH-50 will process ~10-20 kg/batch. It will likely never run, per Director Anode Technology
 Note(c): The VCI-200 holds approximately 100kg of material and takes 12 hours to run. This will likely run once per week for at least three months, and then likely not be used, per Director Anode Technology
 Note(d): The VS600 is a high shear mixer, it'll only hold about 30kg, the batch time will be one hour but it is not continuous so will only periodically perform some batch work, less than one batch per week, per Director Anode Technology
 Note(e): GRC, maximum 3 8-hour shifts per week. Can process up to 500 kg/hr but will likely run around 20kg/hr for most uses, per Director Anode Technology
 Note(f): Dryer processes 10kg sample/batch. The Dryer uses fluidized air.
 Note (g): The capacity for the Box Calciner is 32.5% greater than the Rotary Calciner. 16kg/hr.

Total Process Pounds/hr 0.11000 Tons/hr 35
 Operating Hours Calculator 70,000
 24 hr
 5 day
 50 week
 Annual Process Hour 6000

Kilograms to Pounds Converter
 Input Kilograms Below: 16 Pounds Output Here: 35.27396
Pounds to Tons Converter
 Input Pounds Below: 35.27396192 Tons Output Here: 0.017637

100

TABLE 0

Pollutant	Preprocessor Emission Factor (lb/hr)	Units	Hours/batch	Pounds emitted per batch Year	Batches/Year	PTE Pounds emitted per year	Total emissions, Product Milling and sifting (pounds per hour)	CONVERSION RATIO FROM G2 FURNACE TESTING - SIZE DEPENDENT	Pollutant	Pounds emitted per batch	Batches/Year	PTE Pounds emitted per year	PTE Tons emitted per year																																										
Crucible Heating and Fu Hydrogen Cyanide Hydrogen Sulfide	7.70E-02	lb/hr	12	9.24E-01	730	674.32	0.0222	Rotary Kiln	0.0222	0.000000	730	14.98933333	0.007451																																										
	1.50E-02	lb/hr	12	1.80E-01	730	131.4	0.0222	Rotary Kiln - Emissions Point 2	0.0222	0.000000	730	2.92	0.00146																																										
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<table border="1"> <tr> <td colspan="10">Total SO₂ (lb/yr)</td> <td>25.98293333</td> <td>730</td> <td>188.8558</td> <td>0.084336</td> </tr> <tr> <td colspan="10">Total HCl (lb/yr)</td> <td>4.072</td> <td>730</td> <td>29.72</td> <td>0.014336</td> </tr> <tr> <td colspan="10">Total Sulfur (lb/yr)</td> <td>34.792</td> <td>730</td> <td>254.5758</td> <td>0.122672</td> </tr> </table>														Total SO ₂ (lb/yr)										25.98293333	730	188.8558	0.084336	Total HCl (lb/yr)										4.072	730	29.72	0.014336	Total Sulfur (lb/yr)										34.792	730	254.5758	0.122672
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14.6 batches/week
2.92 batches/day
0.249333 batches/hr
0.052853 lbs hcn/batch
0.006400 lbs h2s/batch