ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

October 24, 2016

SUBJECT: Braddock Recovery, Inc.
1300 Braddock Avenue
Braddock, PA 15104
Allegheny County

Operating Permit: No. 0265

TO: Sandra L. Etzel
Chief Engineer

FROM: Hafeez Ajenifuja
Air Quality Engineer

FACILITY DESCRIPTION:

Braddock Recovery, Inc. (Braddock Recovery) is located on the US Steel - Edgar Thomson site. This facility receives waste products from US Steel, including furnace flue dust, slag and sludge, mill scale, and coke fines, dries them in a rotary kiln fired with coke oven gas, combines them with lime, cement, sodium silicate, water, bentonite and molasses in a wet mixing process in two pugmills, and forms the moist mix into briquettes. These finished briquettes are piled on-site with a radial stacker and then loaded onto railcars and sent back to US Steel to be used in the furnaces. The raw materials are loaded into the first stage of the process with a front-end loader. The front-end loader loads finished briquettes onto a conveyor and then into the railcars. Materials are moved through the entire process by a series of conveyors. The rotary kiln is controlled by a cyclone and baghouse. The particulate removed with these control devices is sent back to screw conveyor (S008). A vibrating screen is used just after the kiln to remove particles that are too large. Another vibrating screen is used at the end of the process to separate fine particles from the finished briquettes. These fines are then re-directed via conveyor to the mixers. The front-end loader loads finished briquettes onto a conveyor and then into the railcars. There are paved roadways and storage piles on-site. Fugitive particulate emissions from the storage piles are controlled by watering. Fugitive particulate emissions from the unpaved roadways are controlled with watering for dust control. Most operations occur in enclosed spaces.

Braddock Recovery is aggregated with U.S. Steel- Edgar Thompson site so that the two sites are considered as a single source for purposes of PSD and NSR.

Braddock Recovery, Inc. is a minor source for particulate matter (PM), particulate matter of 10 microns or less in diameter (PM_{10}), sulfur oxides (SO_x), volatile organic compounds (VOCs), nitrogen oxides (NO_x), carbon monoxide (CO), and Hazardous Air Pollutants (HAPs), as defined in section 2101.20 of Article XXI. However, the facility is considered a major source based on operating, managing or supporting a major source facility- the United States Steel- Edgar Thomson Plant “Waste Product Recycling and Briquetting Process.

OPERATING PERMIT APPLICATION COMPONENTS:

1. Operating Permit Application No. 0265, received January 14, 2013
2. Supplemental Information, via email dated January 30, 2013

EMISSION SOURCES:

I.D.	FACILITY ID	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM DESIGN RATE	FUEL/RAW MATERIAL	STACK I.D.
P001	S017 & S012c	Two (2) Pugmills	None	50 tons/hr	Sludge, Mill Scale, Coke Breeze, Flue Dust, Lime & Additives	None
P002	S005 & S021	Two (2) Screen	None	50 tons/hr	Furnace Flue Dust, Slag and Sludge, Mill Scale Coke Fines	None
P003	S001 & S019	Two (2) Front End Loader	None	50 tons/hr	Furnace Flue Dust, Slag and Sludge, Mill Scale Coke Fines	None
P004	S002-S012, S012d And S012a, S012b, S013– S022, S028 & S029	Twenty One (21) Material Transfer Points	Baghouse	50 tons/hr	Sludge, Mill Scale, Coke Breeze, Flue Dust	Stack 01
P005	S004	Rotary Kiln Dryer	Baghouse and Cyclone	50 tons/hr	Sludge, Mill Scale, Coke Breeze, Flue Dust	Stack 01
P006	S023-S025	Three (3) Storage Silos	Bin Vent Filter	190 tons/hr, Combined	Sludge, Mill Scale, Coke Breeze, Flue Dust	None
F001	S026	Storage Piles	None	50,000 tons/yr	Sludge, Mill Scale, Coke Breeze, Flue Dust	None
F002		Roads and Vehicles	Watering & Sweeping	0.40 mi-Unpaved; 500 Sq. Ft.Acres Parking Lot	N/A	None

NOTE: Material Transfer Points (P004) S002-S011 & S012d emissions are uncontrolled by the baghouse. But transfer points S012, S012a, S012b, S013-S016, S018-S020, S022, S028 & S029 are controlled by baghouse.

PROCESS DESCRIPTIONS:

(1). Pugmills (S012c, S017):

The two (2) new and old pugmills are used to blend the raw material (e.g, Sludge, Mill Scale, Coke Breeze, Flue Dust, Lime & Additives) with lime, cement, sodium silicate, water, bentonite and molasses in a wet mixing process, and forms the moist mix into briquettes. The pugmills operation is enclosed and the new pugmill (S012c) is equipped with a cover and seals that help contain the dust in this operation. In the new pugmill, water, molasses, and other additives are added to bring the moisture content of the material up to 3 -

9%, effectively eliminating emissions from further handling and processing of the moistened material. This high-moisture material is then conveyed to the old pug mill for further mixing for quality control purposes prior to going into the briquetting machine.

Emissions from the pugmills operation are fugitive, and the operation is carried out in an enclosed building. The PM fugitive emissions are shown in the table below:

TABLE 1: Pugmills Fugitive Emission Limitations

Pollutant	**Hourly Emission** lbs/hr	**Annual Emission (tons/year)** [1]
Particulate Matter	13.84	60.60
PM-10	4.13	20.20

[1]A year is defined as any consecutive 12-month period.

Sample emission calculation:

The fugitive PM emission estimates from the pugmills (S012c, S017) are based on AP-42, Chapter 11.12 - Concrete Batching, equation 11.12-1.

Maximum Throughput Rate (tons/hr) = 50 tons/hr or 438,000 tons/yr

$$\mathbf{Ef = k(0.0032) \times (Ua/Mb) + c}$$

Where:

Ef = Emission Factor (lbs/ton)

k = Particle size multiplier = 5.9 for PM and 1.92 for PM10
a = constant = 0.6 for PM and 0.4 for PM10
b= constant = 1.3 for PM and PM10
c = constant = 0.12 for PM and 0.04 for PM10
U = Mean wind speed (mph) = 0.1
M = Moisture content (%) =9-for New Pugmill
M = Moisture content (%) =1.0-for Old Pugmill

PM Ef = $(5.9*0.0032*((0.1^{0.6})/(9^{1.3}))+0.12)$ =**0.12 lbs/ton**

PM10 Ef = $(5.9*0.0032*((0.1^{0.6})/(9^{1.3}))+0.12)$ = 0.04 lbs/ton

Therefore, Fugitive PM from New Pugmill:

PM = (0.12 lbs/ton)*(50 tons/hr)*(1.15)-Adjustment Factor = **6.90 lbs/hr**

(6.01 lbs/hr)*(8760 hr/yr)*(ton/2000lb) = **30.22 tons/yr**

Note that Old Pugmill produce the same amount of emission.

(2). Screens (S005 and S021)

One of the vibrating screen is used just after the kiln to remove particles that are too large. Another vibrating screen is used at the end of the process to separate fine particles from the finished briquettes.

The screens emissions are fugitive PM. Estimates for particulate emissions from the vibratory screens (S005, S021) are based on Chapter 11.19.2 - Sand and Gravel Processing, Tables 11.19.2-2 and 11.19.2-4. Since the material processed is low-moisture, these estimates are based on uncontrolled emission factors.

The PM fugitive emissions are shown in the table below:

TABLE 2: Screens Fugitive Emission Limitations (Combined)

Pollutant	Emission Factor[2] Lbs/ton	Hourly Emission lbs/hr	Annual Emission (tons/year)[1]
Particulate Matter	0.025	2.88	12.59
PM-10	0.0087	1.0	4.38

[1]A year is defined as any consecutive 12-month period.
[2]Emission factors are from AP 42, Chapter 11.19.2, Table 11.19.2-2 (8/04)

Sample emission calculation:

Maximum Throughput Rate (tons/hr) = 50 tons/hr or 438,000 tons/yr

Emission Factor = PM = 2.5E-02 lbs/ton
PM_{10} = 8.7E-03 lbs/ton

(50 tons/hr)*(0.025 lbs/ton)*(1.15) = **1.44 lbs/hr per Screen**

(1.44 lbs/hr)*(2) = 2.88 lbs/hr

= (2.88 lbs/hr)*(8760hr/yr)*(tons/2000lb) = **12.59 tons/yr**

(3). Two (2) Front End loader Batch Drops (S001 & S019)

One of the front end loader is used to load raw materials into the first stage of the process. The front-end loader loads finished briquettes onto a conveyor and then into the railcars.

Estimates for the fugitive particulate emissions from the batch drops are based on AP-42, Chapter 12.5, Iron and Steel Production, Table 12.5-4. A 15% adjustment factor was added to emissions to account for operational variability of equipment. The following table shows the potential emissions from the batch drops:

TABLE 3: Front End Loader Fugitive Emission Limitations (Combined)

Pollutant	Emission Factor[2] Lbs/ton	Hourly Emission lbs/hr	Annual Emission (tons/year) [1]
Particulate Matter	0.0088	1.01	4.43
PM-10	0.0058	0.67	2.92

[1]A year is defined as any consecutive 12-month period.
[2]Emission factors for front-end loader batch drop are from AP 42, Chapter 12.5, Iron and Steel Production,

Sample emission calculation:

Maximum Throughput Rate (tons/hr) = 50 tons/hr or 438,000 tons/yr
Emission Factor = PM = 0.0088 lbs/ton
PM_{10} = 0.0058 lbs/ton

(50 tons/hr)*(0.0088 lbs/ton)*(1.15) = **0.51 lbs/hr (per loader)**

(0.51 lbs/hr)*(2) = 1.01 lbs/hr

(1.01 lbs/hr)*(8760 hrs/yr)*(tons/2000lbs) = **4.43 tons/yr**

(4). Twenty One (21) Material Transfer Points:

There are different transfer points within the operation. The initial transfer point brings material into the rotary dryer. The following are the breakdown of the facility's transfer points. Table 4 emissions were based on Chapter 11.19.2 - Sand and Gravel Processing, Tables 11.19.2-2 and 11.19.2-4. Uncontrolled emission factor was used to estimate Table 4 fugitive emissions because the material has low moisture content, less than 1.3%, while controlled emission factor was used to estimate Table 5 emissions because the material has a moisture content above 3% and a baghouse with 99% control efficiency.

TABLE 4: Material Transfer Fugitive Emission Limitations

Unit ID	Transfer Point No.	Transfer Point Description	Annual Emission PM (tons/yr)	Annual Emissions PM_{10} (tons/yr)
S002	2	Wet Blend Bin to Conveyor No. 1	0.76	0.28
S003	3	Conveyor No. 1 to Rotary Kiln Dryer	0.76	0.28
S006	4	Rotary Kiln to Conveyor No. 2	0.76	0.28
S007	5	Conveyor No. 2 to Oversize Pile	0.004	0.001
S008	6	Rotary Klin to Conveyor No. 3	0.76	0.28
S009	7	Cyclone Screw Feed to Conveyor No. 3	0.02	0.01
S010	8	Baghouse Screw Feed to Conveyor No. 3	0.01	0.002
S011	9	Conveyor No. 3 to Bucket Elevator	0.76	0.28
S012d	12d	New Pugmill to New Conveyor No. 1	0.76	0.28

TABLE 5: Material Transfer Fugitive Emission Limitations

Unit ID	Transfer Point No.	Transfer Point Description	Annual Emission PM (tons/yr)	Annual Emissions PM_{10} (tons/yr)
S012	10	Bucket Elevator to Conveyor No. 4	0.04	0.01
S012a	12a	New Conveyor to Bucket Elevator	0.04	0.01
S012b	12b	Bucket Elevator to New Pugmill	0.04	0.01
S013	11	Conveyor No. 4 to Product Hopper	0.04	0.01
S014	12	Product Hopper to Conveyor No. 5	0.04	0.01
S015	13	Lime Screw Feed to Conveyor No. 5	0.001	0.0002
S016	14	Conveyor No. 5 to Old Pugmill	0.04	0.01
S0	19	Briquetter to S021 Screen 2	0.04	0.01
S0	20	S021 Screen 2 to S018 Briquetter Stacker	0.04	0.01
S018	15	Briquetter to Storage Pile	0.04	0.01
S020	17	Conveyor No. 6 to Conveyor No. 7	0.04	0.01
S022	18	Conveyor No. 7 to Railcar	0.04	0.01

Sample emission calculation:

Maximum Throughput Rate (tons/hr) = 50 tons/hr or 438,000 tons/yr

Conveyor transfer point (uncontrolled) Emission Factor (moisture content below 1.3%) = PM = 0.003 lbs/ton
= PM_{10} = 0.0011 lbs/ton

Conveyor transfer point (controlled) Emission Factor (moisture content above 3%) = PM = 0.00014 lbs/ton
PM_{10}= 0.000046 lbs/ton

(50 tons/hr)*(0.003 lbs/ton)*(1.15) = **0.17 lbs/hr (For transfer point #2)**

(0.17 lbs/hr)*(8760 hrs/yr)*(tons/2000lbs) = **0.76 tons/yr**

(5). Rotary Kiln Dryer (S004):

The dryer is rated at 24.59 MMBTU/hr and fired with coke oven gas. It is used to dry the furnace flue dust, slag and sludge, mill scale, and coke fines. Emissions from the kiln are limited by Installation Permit 93-I-0039F, issued August 18, 1993. Particulate emissions from the kiln are controlled by a cyclone and baghouse. The following table shows the emission limit from the rotary kiln dryer.

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Limited Emissions from Rotary Kiln Dryer (S004)

POLLUTANT	Hourly Emission Limit (lbs/hr)	Annual Emission Limit (tons/year) [1]
PM	1.3	5.69
PM_{10}	1.3	5.69
SO_x	5.31	23.26
NO_x	4.1	18.0
VOC	0.81	3.55
CO	1.1	4.82

[1]A year is defined as any consecutive 12-month

(6). **Three (3) Storage Silos (S023, S024, S025):**

The facility maintains three storage silos for dry materials (lime, cement and sodium silicate). Materials from the storage silos are added to the process via enclosed screw conveyors.

Estimates of particulate emissions due to the loading of these silos are based on AP-42, Chapter 11.12, Concrete Batching, Table 11.12-2. Particulate emissions are controlled with bin vent filters. A control efficiency of 95% is assumed for the bin vent filters. The following table shows the potential emissions from the storage silos.

Potential Emissions (Fugitive)

EU ID - Description	Process Rate	Emission Factor[2]		Emission Limit			
				PM		PM_{10}	
		PM	PM_{10}	Lbs/hr	tons/yr	Lbs/hr	tons/yr
(S023) Lime Silo	10	0.00099	0.00034	0.01	0.05	0.004	0.02
(S024) Cement Silo	150	0.00099	0.00034	0.17	0.75	0.06	0.26
(S025) Sodium Silicate Silo	30	0.00099	0.00034	0.03	0.15	0.01	0.05

[1]A year is defined as any consecutive 12-month period.
[2]Emission factors are from AP-42, Chapter 11.12, Concrete Batching, Table 11.12-2 (2/98).

Sample emission calculation (S023):

Maximum Throughput Rate- (tons/hr) = 10 tons/hr

Silo Loading (uncontrolled) Emission Factor = PM = 0.00099 lbs/ton
PM_{10}= 0.00034 lbs/ton

(10 tons/hr)*(0.00099 lbs/ton)*(1.15) = **0.0114 lbs/hr**

(0.01 lbs/hr)*(8760 hrs/yr)*(tons/2000lbs) = **0.05tons/yr**

(7). Storage Piles (S026):

The facility has storage piles with a capacity of 438,000 tons per year . The permittee moves materials from storage piles to the conveyors with a front-end loader. Estimates of the fugitive emissions of PM and PM_{10} for the storage piles is based on AP-42, Chapter 13.2.4- Aggregate Handling and Storage Piles. Emissions from the storage piles are shown in the table below:

Potential Emissions (Fugitive)

Pollutant[2]	tons/yr[1]
Particulate Matter	0.18
PM-10	0.063

[1]A year is defined as any consecutive 12-month period.

Sample emission calculation:

Maximum Throughput Rate (tons/hr) = 50 tons/hr or 438,000 tons/yr

$Ef = (0.0032 \times (U/5)^{1.3} \times k/(M/2)^{1.4}$

Where;

Ef = Emission Factor (lbs/ton)
k = Particle size multiplier = 1 for PM and 0.35 for PM10
U = Mean wind speed (mph) = 10
M = Moisture content (%) = 10

Therefore,

PM Emission Factor = $(0.0032*(10/5)^{1.3})*(1/(10/2)^{1.4})$ = **0.0008 lb/ton process**

PM_{10} Emission Factor = $(0.0032*(10/5)^{1.3})*(0.35/(10/2)^{1.4})$ = **0.0003 lbs/ton process**

PM = (0.0008 lb/ton)*(50 ton/hr) = **0.04 lbs/hr**

(0.04 lbs/hr)*(8760 hr/yr)*(tons/2000 lb) = **0.18 tons/yr**

(8). Roads and Vehicles (S027):

The facility has unpaved roads. Fugitive emissions from the unpaved road are generated from truck movement, empty truck arriving on site, travelling on unpaved road to the loading and unloading stations.

Trucks travel an estimated 2000 miles per year. Estimates of fugitive particulate emissions from the roadways are based on AP-42, Chapter 13.2.2 - Unpaved Roads. Emissions from the storage piles are shown in the table below:

Potential Emissions (Fugitive)

Pollutant[2]	Tons/yr[1]
Particulate Matter	3.53
PM-10	1.08

[1]A year is defined as any consecutive 12-month period.

Sample emission calculation:

The vehicle travelled 2,000 miles per year

$E = k\ (s/12)^a\ (W/3)^b \times (365-P)/365$

Where:
K = particle size multiplier = 4.9 dimensionless (TSP or PM-30)
1.5 dimensionless (PM^{10})

s = surface material silt content (%) = 8.5 (AP 42, Table 13.2.2-1)
W = mean vehicle weight = 6 tons
a = empirical constant = 0.7 -PM30 or TSP (AP 42, Table 13.2.2-2)
0.9 -PM30 or TSP (AP 42, Table 13.2.2-2)

b = empirical constant = 0.45 - PM30 or TSP (AP 42, Table 13.2.2-2)

p = number of days per year with 0.01 inches precipitation = 120

Therefore, PM emission factor =

$PM = (4.9) \times 8.5/12)^{0.7} \times (6/3)^{0.45} \times (365-120)/365 =$ **3.53 lbs/mile**

$PM_{10} = (1.5) \times 8.5/12)^{0.9} \times (6/3)^{0.45} \times (365-120)/365 =$ **1.08 lbs/mile**

PM emission = (2000 miles/year)*(3.53 lbs/mile)*(tons/2000 lbs) = **3.53 tons/yr**

PM_{10} emission = (2000 miles/year)*(1.08 lbs/mile)*(tons/2000 lbs) = **3.53 tons/yr**

EMISSIONS SUMMARY (entire facility):

Maximum Potential Emissions for Entire Facility Including Fugitive Particulate Emissions

POLLUTANT	ANNUAL EMISSION LIMIT, Including Fugitive Emissions (tons/year) [1]
PM	96.42
PM_{10}	39.07
SO_x	23.26
NO_x	18.0
VOC	3.55
CO	4.82

[1]A year is defined as any consecutive 12-month period.

METHOD OF DEMONSTRATING COMPLIANCE:

Compliance with the emission standards set in this permit will be demonstrated by:

(a) Operating and maintaining the materials processing equipment, cyclone and the baghouse for particulate control in accordance with the manufacturers' specification and good engineering practices.

(b) Measuring the pressure drop across the baghouse used for particulate control on a weekly basis, and recording these measurements.

(c) Watering the unpaved roadways and storage piles on a weekly basis and keeping records of each water application.

See Operating Permit No. 0265 for the specific conditions for determining compliance with the applicable requirements.

REGULATORY APPLICABILITY:

1. **Article XXI Requirements for Issuance:**

The requirements of Article XXI, Parts B and C for the issuance of this permit have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually.

2. **Testing Requirements:**

Testing is not required, but the Department reserves the right to require testing in the future to assure compliance with the terms and conditions of Operating Permit No. 0265.

3. **New Source Review (NSR) and Prevention of Significant Deterioration (PSD):**

NSR and PSD do not apply. Excluding fugitive PM and PM_{10} emissions, the facility is a minor source of all criteria pollutants. Pursuant to §52.21(b)(1)(iii), fugitive PM and PM_{10} emissions do not count

towards the applicability of PSD because the source is not in one of the 28 source categories. However, the source is aggregated with the Edgar Thompson site so that the two sites are considered as a single source for purposes of PSD and NSR.

4. **New Source Performance Standards**

There are currently no NSPS requirements that are applicable to the facility.

5. **National Emission Standards For Hazardous Air Pollutants**

This source is a minor source of hazardous air pollutants, as defined in 40 CFR 63.2. There are currently no area source rules that apply to the facility.

6. **Risk Management Plan; CAA Section 112(r):**

The source is not required to have a risk management plan at this time because none of the regulated chemicals exceed the thresholds on the regulation.

RECOMMENDATION:

All applicable Federal, State and County regulations have been addressed in the permit. The operating permit application for Braddock Recovery, Inc. should be approved with the emission limitations, terms and conditions in Operating Permit No. 0265.

Emission Limit Summary

Emission Unit		Proposed Emission Rates (tons/yr)					
EU ID	Description	PM	PM10	SOx	NOx	VOC	CO
ROTARY KILN DRYER							
S004	Rotary Kiln (a)	5.69	5.69	23.26	18.00	3.55	4.82
	TOTAL	**5.69**	**5.69**				
PUGMILLS							
S012c	New Pugmill	30.29	10.11				
S017	Old Pugmill	30.29	10.11				
	TOTAL	**60.58**	**20.22**				
SCREENS							
S005	Screen #1	6.30	2.19				
S021	Screen #2	6.30	2.19				
	TOTAL	**12.59**	**4.38**				
FRONT-END LOADER BATCH DROPS							
S001	Transfer Point 1	2.22	1.46				
S019	Transfer Point 16	2.22	1.46				
	TOTAL	**4.43**	**2.92**				
MATERIAL TRANSFER POINTS							
S002	Transfer Point 2	2.22	1.46				
S003	Transfer Point 3	2.22	1.46				
S006	Transfer Point 4	0.00	0.00				
S007	Transfer Point 5	0.000	0.000				
S008	Transfer Point 6	0.00	0.00				
S009	Transfer Point 7	0.756	0.277				
S010	Transfer Point 8	0.756	0.277				
S011	Transfer Point 9	0.76	0.28				
S012	Transfer Point 10	0.01	0.00				
S012a	Transfer Point 12a	0.76	0.28				
S012b	Transfer Point 12b	0.76	0.28				
S012d	Transfer Point 12d	0.00	0.00				
S013	Transfer Point 11	0.00	0.00				
S014	Transfer Point 12	0.00	0.00				
S015	Transfer Point 13	0.04	0.01				
S016	Transfer Point 14	0.04	0.01				
ADD	Transfer Point 19	0.04	0.01				
ADD	Transfer Point 20	0.04	0.01				
S018	Transfer Point 15	0.04	0.01				
S020	Transfer Point 17	0.00	0.00				
S022	Transfer Point 18	0.04	0.01				
	TOTAL	**8.43**	**4.38**				
STORAGE SILOS							
S023	Storage Silo (Lime)	0.05	0.02				
S024	Storage Silo (Cement)	0.75	0.26				
S025	Storage Silo (NA_2SiO_3)	0.15	0.05				
	TOTAL	**0.95**	**0.33**				
STORAGE PILES AND UNPAVED ROADS							
S026	Storage Piles	0.21	0.07				
S027	Unpaved Roads	3.53	1.08				
	TOTAL	**3.74**	**1.15**				
GRAND TOTALS & Current Permit Limit		**96.42**	**39.07**	**23.26**	**18.00**	**3.55**	**4.82**

Emissions Table for New Pugmill

		Company Name:	Braddock Recovery, Inc.					
		Address:	1300 Braddock Avenue, Braddock, PA 15104					
	Major Source Operating Permit:		0265					
		Date:	1300 Braddock Avenue, Brac					
1. Emission Factors:								
According to AP-42, Chapter 11.12 - Concrete Batching, the PM/PM10 emission factors for the New Pugmill								
can be estimated from the following equation:								
Ef =	k(0.0032) x (U^a/M^b) + c	where:						
		Ef = Emission Factor (lbs/ton)						
		k = Particle size multiplier =	5.9 for PM and 1.92 for PM10					
		a = constant =	0.6 for PM and 0.4 for PM10					
		b= constant =	1.3 for PM and PM10					
		c = constant =	0.12 for PM and 0.04 for PM10					
		U = Mean wind speed (mph) =	0.1					
		M = Moisture content (%) =	9.0					
	PM Emission Factor =	0.120	lbs/ton process					
	PM10 Emission Factor =	0.040	lbs/ton process					
2. Uncontrolled Potential to Emit (PTE) from New Pugmill:								
			Potential to Emit (tons/yr)		**Potential to Emit (lb/hr)**			
Maximum Throughput Rate (tons/hr):	50.00		**PM**	**PM10**	**PM**	**PM10**		
			30.3	10.1	6.92	2.31		
Methodology								
PTE (ton/yr) = Maximum Throughput Rate (tons/hr) x Emission Factor (lbs/ton) x 8,760 hr/yr x 1 ton/2,000 lbs x 15% Adjustment Factc								
PTE (lb/hr) = Maximum Throughput Rate (tons/hr) x Emission Factor (lbs/ton) x 15% Adjustment Factor								
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Emissions Table for Old Pugmill

Appendix A: Emission Calculations
Particulate Emissions From Old Pugmill (S017)

Company Name: Braddock Recovery, Inc.
Address: 1300 Braddock Avenue, Braddock, PA 15104
Major Source Operating Permit: 0265

1. Emission Factors:

According to AP-42, Chapter 11.12 - Concrete Batching, the PM/PM10 emission factors for the Old Pugmill can be estimated from the following equation:

Ef = $k(0.0032) \times (U^a/M^b) +$ where:

Ef = Emission Factor (lbs/ton)
k = Particle size multiplier = 5.9 for PM and 1.92 for PM10
a = constant = 0.6 for PM and 0.4 for PM10
b= constant = 1.3 for PM and PM10
c = constant = 0.12 for PM and 0.04 for PM10
U = Mean wind speed (mph) = 0.1
M = Moisture content (%) = 9.0

PM Emission Factor = 0.120 lbs/ton process
PM10 Emission Factor = 0.040 lbs/ton process

The materials entering the old pugmill are already wet.

2. Potential to Emit (PTE) from Old Pugmill:

ughput Rate (tons/hr):	50.00	Potential to Emit (tons/yr)		Potential to Emit (lb/hr)	
		PM	**PM10**	**PM**	**PM10**
		30.29	10.11	6.92	2.31

Methodology

PTE (ton/yr) = Maximum Throughput Rate (tons/hr) x Emission Factor (lbs/ton) x 8,760 hr/yr x 1 ton/2,000 lbs x 15% Adjustment Factor

PTE (lb/hr) = Maximum Throughput Rate (tons/hr) x Emission Factor (lbs/ton) x 15% Adjustment Factor

Emissions Table for Screens

Braddock Recovery, Inc. Title V Permit Application

Emissions from Screens (S005 and S021)

1. Emission Factors:

Type of Operation	SCC	Emission Factors (lb/ton) PM	PM10
Vibratory Screen No. 1 (S005)	3-05-020-03	0.025	0.0087
Vibratory Screen No. 2 (S021)	3-05-020-02	0.025	0.0087
	3-05-020-03		

Emission factors are from AP 42, Chapter 11.19.2, Table 11.19.2-2 (8/04)

2. Potential to Emit:

Emissions Unit ID	Process Rate (tons/hr)	Potential to Emit (tpy) PM	PM10	Potential to Emit (lb/hr) PM	PM10
Vibratory Screen No. 1 (S005)	50	6.30	2.19	1.44	0.50
Vibratory Screen No. 2 (S021)	50	6.30	2.19	1.44	0.50
	TOTAL	**12.59**	**4.38**	**2.88**	**1.00**

Methodology

Potential to Emit (tons/yr) = Process Rate (tons/hr) x Emission Factor (lb/ton) x 365 days/yr x 24 hrs/day x 1 ton/2,000 lbs x 15% Adjustment Factor

Potential to Emit (lb/hr) = Process Rate (tons/hr) x Emission Factor (lbs/ton) x 15% Adjustment Factor

2. Potential to Emit:

Emissions Unit ID	Process Rate (tons/hr)	Potential to Emit (tpy) PM	PM10	Potential to Emit (lb/hr) PM	PM10
Vibratory Screen No. 1 (S005)	50	0.36	0.12	0.12	0.04
Vibratory Screen No. 2 (S021)	50	0.36	0.12	0.12	0.04
	TOTAL	**0.71**	**0.25**	**0.24**	**0.09**

Emissions Table for Drops Transfer & Front End Loader

Braddock Recovery, Inc. Title V Permit Application

Emissions from Batch Drops (2) and Transfer Points (19)

1. Emission Factors:

Type of Operation	SCC	Emission Factors (lb/ton) PM	PM10
Batch Drop		0.0088	0.0058
Conveyor transfer point (uncontrolled)	3-05-020-06	0.0030	0.0011
Conveyor transfer point (controlled)	3-05-020-06	0.00014	0.000046

Emission factors for conveyor transfer are from AP 42, Chapter 11.19.2, Crushed Stone Processing Table 11.19.2-2. (8/04)
Emission factors for front-end loader batch drop are from AP 42, Chapter 12.5, Iron and Steel Production, Table 12.5-4. (1/95)

2. Potential to Emit

EU ID	Source Description	Maximum Throughput (tons/hr)	PM Emission Factor (lb/ton)	PM10 Emission Factor (lb/ton)	Permitted (tpy)		Permitted (lb/hr)		Actual (tpy)		Actual (lb/hr)	
Batch Drops					**PM**	**PM10**	**PM**	**PM10**	**PM**	**PM10**	**PM**	**PM10**
S001	Transfer Point 1 (Front End Loader to Wet Blend Bin)	50	0.0088	0.0058	2.22	1.46	0.506	0.334	1.26	0.83	0.43	0.28
S019	Transfer Point 16 (Front End Loader to Conveyor No. 6)	50	0.0088	0.0058	2.22	1.46	0.506	0.334	1.26	0.83	0.43	0.28
				BATCH DROPS GRAND TOTAL	**4.43**	**2.92**	**1.01**	**0.67**	**2.51**	**1.66**	**0.86**	**0.57**
Material Transfer Points (uncontrolled)					**PM**	**PM10**	**PM**	**PM10**	**PM**	**PM10**	**PM**	**PM10**
S002	Transfer Point 2 (Wet Blend Bin to Conveyor No. 1)	50	0.0030	0.0011	0.76	0.28	0.173	0.063	0.43	0.16	0.15	0.054
S003	Transfer Point 3 (Conveyor No. 1 to Rotary Kiln Dryer)	50	0.0030	0.0011	0.76	0.28	0.173	0.063	0.43	0.16	0.15	0.054
S006	Transfer Point 4 (Rotary Kiln to Conveyor No. 2)	50	0.0030	0.0011	0.76	0.28	0.173	0.063	0.43	0.16	0.15	0.054
S007	Transfer Point 5 (Conveyor No. 2 to Oversize Pile)	0.25	0.0030	0.0011	0.004	0.001	0.001	0.0003	0.00	0.00	0.00	0.000
S008	Transfer Point 6 (Rotary Klin to Conveyor No. 3)	50	0.0030	0.0011	0.76	0.28	0.173	0.063	0.43	0.16	0.15	0.054
S009	Transfer Point 7 (Cyclone Screw Feed to Conveyor No. 3)	1.34	0.0030	0.0011	0.02	0.01	0.005	0.002	0.01	0.00	0.00	0.001
S010	Transfer Point 8 (Baghouse Screw Feed to Conveyor No. 3)	0.332	0.0030	0.0011	0.01	0.002	0.001	0.000	0.00	0.00	0.00	0.000
S011	Transfer Point 9 (Conveyor No. 3 to Bucket Elevator)	50	0.0030	0.0011	0.76	0.28	0.173	0.063	0.43	0.16	0.15	0.054
S012d	Transfer Point 12d (New Pugmill to New Conveyor No. 1)	50	0.0030	0.0011	0.76	0.28	0.173	0.063	0.43	0.16	0.15	0.054
					4.56	1.67	1.04	0.38	2.59			
Material Transfer Points (controlled factors used due to high moisture content or flow through fabric filter												
S012	Transfer Point 10 (Bucket Elevator to Conveyor No. 4)	50	0.00014	0.000046	0.04	0.01	0.0081	0.003	0.02	0.01	0.01	0.002
S012a	Transfer Point 12a (New Conveyor to Bucket Elevator)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
S012b	Transfer Point 12b (Bucket Elevator to New Pugmill)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
S013	Transfer Point 11 (Conveyor No. 4 to Product Hopper)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
S014	Transfer Point 12 (Product Hopper to Conveyor No. 5)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
S015	Transfer Point 13 (Lime Screw Feed to Conveyor No. 5)	1	0.00014	0.000046	0.001	0.0002	0.0002	0.0001	0.00	0.00	0.00	0.000
S016	Transfer Point 14 (Conveyor No. 5 to Old Pugmill)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
ADD	Transfer Point 19 (Briquetter to S021 Screen 2)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
ADD	Transfer Point 20 (S021 Screen 2 to S018 Briquetter Stacker)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
S018	Transfer Point 15 (Briquetter to Storage Pile)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
S020	Transfer Point 17 (Conveyor No. 6 to Conveyor No. 7)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
S022	Transfer Point 18 (Conveyor No. 7 to Railcar)	50	0.00014	0.000046	0.04	0.01	0.008	0.003	0.02	0.01	0.01	0.002
					0.39	**0.13**	**0.09**	**0.03**				
				TRANSFER POINTS GRAND TOTAL								

Controlled emission factors are used for transfer points 14, 15, 17, and 18 because the material passing these points has a moisture content 3% or higher. See footnotes for AP 42, Table 11.19.2-2.
Controlled emission factors are also used for exhaust streams that flow through the Fabric Filter.

Methodology

Permitted (tpy) = Max. Throughput (tons/hr) x Emission Factor (lb/ton) x 24 hrs/day x 365 days/yr x 1 ton/2,000 lbs x 15% Adjustment Factor

Emissions Table for Silos

Braddock Recovery, Inc. Title V Permit Application

Emissions from Storage Silos (S023, S024, S025)

1. Emission Factors:

Type of Operation	SCC	Emission Factors (lb/ton) PM	PM10
Silo Loading	3-05-011-07	0.00099	0.00034

Emission factors are from AP-42, Chapter 11.12, Concrete Batching, Table 11.12-2 (2/98).

2. Potential to Emit:

EU ID	Description	Process Rate (tons/hr)	Permitted (tpy) PM	PM10	Permitted (lb/hr) PM	PM10
S023	Lime Silo	10	0.05	0.02	0.01	0.004
S024	Cement Silo	150	0.75	0.26	0.17	0.06
S025	Sodium Silicate Silo (Na_2SiO_3)	30	0.15	0.05	0.03	0.01
		TOTAL	**0.95**	**0.33**	**0.22**	**0.07**

Methodology

Permitted (tpy) = Process Rate (tons/hr) x Emission Factor (lb/ton) x 24 hrs/day x 365 days/yr x 1 ton/2,000 lbs x 15% Adjustment Factor

Assume: 16 hrs/day operation at capacity (without the 15% adjustment factor)

Emissions Table for Storage Piles

Braddock Recovery, Inc. Title V Permit Application

Emissions from Storage Piles

1. Emission Factors (Stockpile Activity)[a]:

According to AP-42, Chapter 13.2.4 - Aggregate Handling and Storage Piles, the PM/PM10 emission factors for storage piles can be estimated from the following equation:

$$Ef = (0.0032 \times (U/5)^{1.3} \times k/(M/2)^{1.4}$$

Where:

Ef = Emission Factor (lbs/ton)

k = Particle size multiplier = 1 for PM and 0.35 for PM10

U = Mean wind speed (mph) = 10

M = Moisture content (%) = 10.0

PM Emission Factor = 0.0008 lbs/ton process

PM10 Emission Factor = 0.0003 lbs/ton process

2. Uncontrolled Potential to Emit (PTE) from Storage Piles:

Maximum Throughput Rate (tons/hr): 50

Potential to Emit (tons/yr)		Potential to Emit (lb/hr)	
PM	**PM10**	**PM**	**PM10**
0.21	0.07	0.05	0.02

Methodology

Uncontrolled PTE (ton/yr) = Maximum Throughput Rate (tons/hr) x Emission Factor (lbs/ton) x 24 hrs/day x 365 days/yr x 1 ton/2,000 lbs x 15% Adjustment Factor

Uncontrolled PTE (lb/hr) = Maximum Throughput Rate (tons/hr) x Emission Factor (lbs/ton) x 15% Adjustment Factor

3. Controlled Potential to Emit (PTE) from Storage Piles

Maximum Throughput Rate (tons/hr): 50

Control Efficiency (%): 50%

Potential to Emit (tons/yr)		Potential to Emit (lb/hr)	
PM	**PM10**	**PM**	**PM10**
0.10	0.04	0.02	0.01

Note: Particulate emissions are controlled with watering. Control efficiency is based on an engineering estimate.

Methodology

Controlled PTE (tons/yr) = Uncontrolled PTE (tons/yr) x (1 - Control Efficiency (%))

Controlled PTE (lb/hr) = Uncontrolled PTE (lb/hr) x (1 - Control Efficiency (%))

Notes:

a) Wind erosion is assumed to be negligible due to routine stockpile watering and minimal silt content.

b) Stockpile activity maintenance is assumed to be accounted for by the 15% adjustment factor.

Emissions Table for Roadways

Braddock Recovery, Inc. Title V Permit Application

Emissions from Unpaved Roads

1. Determine AP 42 Emission Factors:

According to AP-42, Chapter 13.2.2 - Unpaved Roads, November 2006, the PM/PM10 emission factors for unpaved roads can be estimated from the following equation:

$$E = k\,(s/12)^{a}\,(W/3)^{b} \times (365-P)/365$$

Where:

k = particle size multiplier =	4.9	dimensionless (PM30 or TSP)
	1.5	dimensionless PM10
s = surface material silt content (%) =	8.5	(AP 42, Table 13.2.2-1)
W = mean vehicle weight =	6.00	tons
a = empirical constant =	0.7	PM30 or TSP (AP 42, Table 13.2.2-2)
	0.9	PM10 (AP 42, Table 13.2.2-2)
b = empirical constant =	0.45	AP 42, Table 13.2.2-2)
p = number of days per year with 0.01 inches precipitation =	120	

PM Emission Factor = $(4.9) \times 8.5/12)^{0.7} \times (W/3)^{0.45} \times (365-120)/365$ = **3.53** **lbs/mile**

PM10 Emission Factor = $(1.5) \times 8.5/12)^{0.9} \times (W/3)^{0.45} \times (365-120)/365$ = **1.08** **lbs/mile**

2. Potential to Emit (PTE) PM/PM10

Vehicle Miles Traveled (VMT) (miles/yr)	Potential to Emit (tons/yr)	
2,000	**PM**	**PM10**
	3.53	1.08

Methodology

Potential to Emit PM/PM10 (tons/yr) = VMT (miles/yr) x PM/PM10 Emission Factors (lbs/mile) x 1 ton/2000 lbs