ENGINEERING ANALYSIS

PROJECT DESCRIPTION

November 6, 2020, the Department received an application from JD2, LLC (JD2) for the installation of one rotary slag dryer at their Calvert, AL, Washington County slag yard. The slag yard currently has no permitted emission sources.

PROCESS DESCRIPTION

Currently, JD2 stores processed stainless steel slag generated by the Outokumpu steel mill in Calvert, AL. The new dryer would increase the viability of the slag as a product. The dryer consists of a 100 TPH continuous-feed rotary-drum heated by the products of combustion from a flex-fuel burner. At maximum capacity and worst-case emissions, JD2 would operate the burner using propane at 47.4 MMBtu/hr. Emissions from the dryer would be controlled by an attached 30,000 ACFM baghouse.

EMISSIONS

Emissions from material handling have been calculated on a 100 TPH basis using AP-42 Table 12.5-4 for front-end loaders and Table 11.19.2-2 for conveying. The PTE from the heating element of the dryer estimated based using AP-42 factors for propane combustion, on a 47.4 MMBtu/hr basis. Emissions from the baghouse controlling the dryer were estimated using a conservative 0.04 gr/dscf outlet loading factor and a 12,983 dscf/min (28,964 ACFM) outflow. All calculations in this analysis use 8,760 hours per year as a basis of calculation.

JD2 calculated an 12,983 DSCFM outflow (see application for calculations and assumptions including 220 °F exit temperature, 50% excess combustion air, and 13% water weight of the 100 TPH inlet slag). JD2 used 2,400 hours per year as a basis of calculation; without accepting a limit on 2,400 operating hours per year, this analysis cannot use that basis.

JD2 calculated uncontrolled dryer emissions by assuming that 15% of the non-water feedstock was slag fines and that 100% of that would be emitted; this is excessively conservative and yields an estimate of 26,101 lb/hr uncontrolled particulate matter emissions. EPA's AP-42 factor for the drying of crushed ore, from AP-42 Table 11.24-2, for 19.7 pounds of particulate matter per dry ton of throughput, yields an estimate of 1714 lb/hr uncontrolled particulate matter. Uncontrolled particulate matter emissions are expected to exceed 100 TPY.

	Pollutant	Heater	Dryer	Handling	Total Emissions
Criteria Pollutant Emissions (TPY)	PM	1.547	19.490	1.270	22.307
	PM_{10}	1.547	19.490	0.618	21.654
	$PM_{2.5}$	1.547	19.490	0.250	21.287
	SO_2	0.122	-	-	0.122
	NO_X	30.531	-	-	30.531
	CO	17.097	-	-	17.097
	VOC	1.119	-	-	1.119
	Total HAPs	0.384	-	-	0.384
GHG Emissions (TPY)	CO_2	28130.329	-	-	28,130.329
	N_2O	0.275	-	-	0.275
	CH_4	1.373	-	-	1.373
	Mass Sum	28131.977	-	-	28,131.977
	CO_{2e}	28246.494	-	-	28,246.494

Table 1 – Slag Yard Controlled PTE (TPY)

LIMITS

Uncontrolled particulate matter emissions are expected to exceed 100 TPY, the major source threshold for particulate emissions; therefore, JD2 shall be limited to their 4.45 lb/hr PM estimate. Given that JD2 conservatively used 0.04 gr/ft^3 as a basis for outflow grain loading from their baghouse, JD2 can be reasonably expected to meet their chosen limit if the baghouse is operated properly.

REGULATIONS

STATE REGULATIONS

ADEM Administrative Code Rule 335-3-4-.01, "Visible Emission"

Rule 335-3-4-.01(1)(a) states that no person shall emit to the atmosphere an opacity of greater than twenty percent (20%) over a six (6) minute period. **Rule 335-3-4-.01(1)(b)** states that during one six minute period in any sixty minute period a person may discharge into the atmosphere from any source of emissions, particulate of an opacity not greater than that designated as forty percent (40%) opacity. Therefore, the dryer will be subject to this regulation. If well operated, baghouses have negligible opacity. However, if visible emissions are observed during the daily check, the opacity should be determined using Method 9 of 40 CFR Part 60 Appendix A.

ADEM Administrative Code Rule 335-3-4-.02, "Fugitive Dust and Fugitive Emissions"

Rule 335-3-4-.02(1) states that no person shall emit particulate matter through the handling, transportation, and storage any materials without taking reasonable precautions to prevent said emissions. Reasonable precautions include but are not limited to use of water for dust control and installation of hoods, fans, and fabric filters to capture and control particulates.

ADEM Administrative Code Rule 335-3-4-.03, "Fuel Burning Equipment"

This regulation covers particulate matter (PM) emissions from fuel burning equipment. Because the term "fuel-burning equipment" is limited to units which burn fuel for the purpose of indirect heating, per the definition in **Rule 335-3-1-.02(1)(ee)**, this rule does not apply to the direct-fired heating element of the dryer.

ADEM Administrative Code Rule 335-3-4-.04, "Process Industries - General"

Rule 335-3-4-.04(2), states that no person in a Class 2 County (including Washington County) shall emit particulate matter greater than 22.9 lb/hr if their process weight is 13 TPH of dry slag fines (15% of the 87 TPH of dry slag). However, JD2 has agreed to comply with a 4.45 lb/hr PM limit in order to become a synthetic minor source with respect to Title V regulations.

ADEM Administrative Code, Rule 335-3-14-.04, *"Prevention of Significant Deterioration (PSD) Permitting"*

Per Rule 335-3-14-.04, a source other than the 28 specific listed industries (e.g., slag processing) with greater than 250 TPY particulate matter emissions would be considered a major source under BACT. Were JD2 limited only to the 22.9 lb/hr limit derived from rule 335-3-4-.04(2), their PTE would not exceed this threshold. Therefore, before considering that because JD2 will be limited to 4.45 lb/hr, or 19.49 TPY, to qualify as a SMOP, no PSD review would be necessary for this project.

ADEM Admin. Rule 335-3-14-.06, "Determinations for Major Sources in Accordance with Clean Air Act Section 112(g)"

This regulation applies to major sources of hazardous air pollutants (HAPs) constructed after March 27, 1998 which implement projects with significant sources of HAPs. JD2 is not a major source of HAPs.

ADEM Administrative Code, Rule 335-3-16, "Major Source Operating Permits" and ADEM Administrative Code, Rule 335-3-15, "Synthetic Minor Operating Permits"

The 4.45 lb/hr PM limit JD2 would be restricted to would limit their emissions to less than 100 TPY particulate matter, the major source threshold for the Title V program. Therefore, the facility will be considered a synthetic minor source for criteria pollutants in addition to being a true minor source for HAPs.

JD2 will be required to show compliance with this limit by maintaining the differential pressure across the baghouse between 1.5 and 6 inches of water column, checked daily. JD2 will also be required to check the hopper, fan, cleaning cycle, hoods, and ductwork monthly.

Class I Area

The nearest Class I Area to the plant, the Breton Wilderness Area, is greater than 100 kilometers away; additionally, the plant is not a major source for HAPs.

FEDERAL REGULATIONS

40 CFR 60 Subpart A, "General Provisions"

This subpart will be applicable provided that the facility is subject to one of the applicable subparts found under 40 CFR Part 60 "New Source Performance Standards". The facility is not currently subject to any regulations under 40 CFR Part 60.

40 CFR 63 Subpart A, "General Provisions"

This subpart will be applicable provided that the facility is subject to one of the applicable subparts found under 40 CFR Part 63 "National Emission Standards for Hazardous Air Pollutants". The facility is not currently subject to any regulations under 40 CFR Part 63.

RECOMMENDATIONS

This analysis indicates that the proposed emission sources would meet the requirements of all federal and state rules and regulations. Based on the expected emissions from the slag dryer, I recommend that JD2 LLC be issued Synthetic Minor Operating Permit No. 108-0026-X001 for the dryer and heating element with baghouse.

January 11, 2021
Date

R. Jackson Rogers, Jr.
Industrial Minerals Section
Energy Branch
Air Division
ADEM

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