ENGINEERING ANALYSIS

PROJECT DESCRIPTION

On December 20, 2024, Hikae Aluminum Processing, L.L.C. (Hikae) submitted an air permit application for the purchase and operation of the Grooms Aluminum Processing (Grooms) facility in Ashville, Alabama. Grooms was a secondary aluminum processing facility that operated a 25-ton rotary melting furnace and associated aluminum shredder, crushers and screeners. Grooms operated under Synthetic Minor Operating Permits (SMOPs) 410-0041-X002 & X003, issued on July 13, 2022. On June 26, 2024, Grooms notified the Department they had stopped all production operations at the facility as of May 30, 2024. Following an inspection of the Grooms facility, by the Department, on June 28, 2024, the Department changed the facility status to ceased and voided the existing SMOPs 410-0041-X002 & X003, on July 3, 2024.

Hikae plans to reopen the Grooms facility and restart the existing equipment. Operations will include scrap aluminum storage, shredding, crushing, screening, melting and casting. The 25-ton rotary furnace, which is heated by a 20.00 MMBtu/hr natural gas burner, will melt, with flux, aluminum scrap and recovered aluminum fines from dross after the crushing and shredding process. The estimated 6.25 ton per hour of molten aluminum would then be poured into molds to solidify and cool prior to storage and sale. Hikae reported they have no plans to install any additional equipment.

Depending on processing need, scrap feedstock will be conveyed through an electric Saturn Shear Shredder (M-240) or directly charged to the furnace after the crushing and screening process. The crushing and screening process consists of a Diamond jaw crusher, a Stedman (M-4230) impact crusher and a Hewitt Robins (VT1503) triple-decker screen, which will be used to both, reduce the size on incoming scrap, and recover aluminum from the furnace dross or salt cake. Aluminum scrap and dross/salt cake will enter the jaw crusher for initial size reduction and then be screened to separate out aluminum fines from dross fines. The recovered aluminum fines would be fed back to the rotary furnace, and dross fines would be discarded. Oversized pieces from the screen would be processed again by the impact crusher and sent back to the screen.

Emissions from the shredding operation will be controlled by wet suppression. Emissions from the crushing and sizing operations are routed to and controlled by a 49,000-cfm Baghouse (BH1); and emissions from the furnace are routed to a spark arrestor and then to a 30,000-cfm lime injected Baghouse (BH2).

EMISSIONS

Per ADEM Admin. Code r. 335-3-14-.04, Potential to Emit shall mean the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is enforceable.

The Potential to Emit (PTE) from the proposed units is calculated using the maximum capacity of the emissions unit under its physical and operational design for 8,760 hrs per year unless the owner or operator is willing to accept a federally enforceable limitation to lower its PTE. In order to maintain the facility's Synthetic Minor Operating Permits (SMOP), Hikae requested to limit the aluminum processed by the melting furnace to 37,110 tons per year.

Per Hikae's application, Hikae has proposed 6.00 lb/hr and 4.28 lb/hr SMOP limits on total PM from the furnace and crushing and screening operations, respectively. Wet suppression on the shredder's emission should limit particulate matter sufficiently without the need for an explicit lb/hr limit. Hikae did not specifically request a limit on material processed by the crushers and shredders; however, in order to maintain potential emissions below the major source thresholds criteria pollutants, and single HAP pollutants, Hikae estimated the PTE from aluminum scrap processed by the shredder based on maximum capacity of 54,330 TPY (37,110 tpy aluminum scrap and 17,220 tpy waste material) and material processed by the crushers and screener based on a maximum capacity of 40,166 tons per year (37,110 TPY aluminum scrap and 3,035 tpy recycled dross). The additional material charged to the crushers and screener accounts for the reprocessing of the dross and aluminum fines recycled from the furnace. Hikae based PTE on 5433 hours per year as needed, except for furnace heater emissions which were based on operating at 8760 hours per year. Where needed, calculations are based on 6.83 TPH (37,110 TPY) scrap and 0.56 TPH solid flux charged to the rotary furnace and a 6.5 TPH (33,956 TPY) molten aluminum and 1.14 TPH salt cake output from the furnace.

The maximum rated capacities and potential annual throughputs for the emissions units associated with this project are shown below in Table 1.

Summary of Emission Units and Throughputs					
Emission Unit	Description	Rated Capacity			Maximum Operating Hours
		Natural Gas	Aluminum		
		MMBtu/hr	TPH	TPY	HPY
FSS	Shear Shredder	-	10.0	54,330	5,433
AC	Crushing and Screening	-	7.39	40,166	5,433
RF	Furnace Heater	20.0	-	-	8,760
RF	Furnace Melt/Charge	-	6.83	37,110	5,433
RF	Furnace melt/Production	-	6.50	33,956	5,433

Table 1

Emissions from the shredder are controlled by wet suppression. Hikae estimated the emission reduction due to wet suppression at 50%. The use of wet suppression by Hikae would be required on an as needed bases, based on visible emission observations during operation. Emissions from the crushing and screening process are directed to and controlled by a fabric filter baghouse (BH-1). The Department assumes 90% collection efficiency to BH-1, and based on Hikae's application, specific pollutant minimum control efficiencies of PM at 83.5%, PM_{10} at 80.2%, $PM_{2.5}$ at 67%, and MHAPs at 83.6%. These control efficiencies were used to provide conservative estimates. Actual control efficiencies are expected to be higher. Emissions from the rotary melting furnace are routed to and controlled by a lime injected baghouse (BH-2). The Department assumes 90% collection efficiency to BH-2 and based on Hikae's application, specific pollutant minimum control efficiencies of PM at 89%, PM_{10} at 87%, and $PM_{2.5}$ at 79%. Based on previous testing at the facility, HCl emissions were assumed to be at the requested emission limit of 3.5 lb/hr (9.5 TPY). Since the use of wet suppression of shredder emissions and the use of (BH-1) are not required as part of their design, the PTE does not account for controlled emissions from these sources. For calculation purposes, operating hours were normalized to 5937 hrs/yr based on the proposed 37,110 TPY production limit.

Emission control of group 1 furnaces is required by 40 CFR Part 63 Subpart RRR. The inclusion of BH-2's capture and control efficiency were included in the PTE estimates for the furnace only. The use of this control device is enforceable and is therefore considered part of the operational design of the furnace emission source at the facility.

Dioxin and furan (D/F) PTE is based on the limit stipulated by 40 CFR Part 63 Subpart RRR (2.10 gr-DF/ton-charge). Estimates of uncontrolled HAP emissions of 3.87 lbs of HCL per ton of charge to the furnace are factors derived from similar tests at similar facilities.

The emission factors utilized for calculation of PTE were developed or adapted from the following sources:

- Condensable Particulate Matter (PMcon) included with PM_{10}, and $PM_{2.5}$ emission factors in accordance with USA EPA's October 2012 final NSR rule (77 FR 65107) (40 CFR parts 51 and 52).
- Natural Gas Combustion-emission factors (other than PM) were derived from US EPS AP-42 Chapter 1.4.
- Natural Gas Combustion - PM_T, $PM_{2.5}$, PM_{10} (filterable plus condensable) emission factors were derived from US EPA 2002 National Emission Inventory (NEI) Data and supporting documentation.
- Metal and Organic HAP emissions from furnace melting were derived from "Development of the RTR Supplemental Proposal Risk Modeling Dataset for the Secondary Aluminum Production Source Category, RTI International, 12/7/14".
- Furnace PM emissions were derived from EPA Emission Factor Listing for Criteria Pollutants, EPA 450/4-90-003, and AP-42, Chapter 12.8 "Secondary Aluminum Operations".
- Emissions from furnace material handling and hot dross handling were derived from AP-42, Chapter 12.5.1 "Steel Minimills".
- PM emissions from stored and stockpiled material were derived from AP-42, Chapter 13.2.5 "Industrial Wind Erosion".
- Furnace emissions of NO_x, PM_{con}, and CO were derived from a 90% UPL analysis of isolated sidewell stack test results from reverb type furnaces.
- Furnace HCL emissions were based on conservative emission estimates from a similar facility provided by Hiake "Schnitzer Steel Industries, Inc., "Supplemental Information for NOC 11986-General Metals of Tacoma, Washington, date June 28, 2023".
- Historical and recent emissions testing data and vendor provided emission data.
- GHG emissions were obtained from 40 CFR Part 98, Subpart C, Tables C-1 and C-2.

Table 2: Potential Emissions

Pollutant (TPY)	Heater	Furnace Fug + Controlled	Fugitives[1]	Total Emissions
PM_{Total}	0.65	4.87	45.60	51.12
PM_{filt}	0.16	4.08	45.60	49.84
$PM_{10,filt}$	0.16	3.37	4.92	8.45
$PM_{2.5,filt}$	0.16	3.89	4.82	8.88
PM_{con}	0.49	0.80	-	1.29
SO_2	0.05	0.05	-	0.10
NO_X	8.59	1.49	-	10.07
CO	7.21	13.52	-	20.74
VOC	0.47	42.45	3.83	46.75
Total HAPs	0.16	10.67	1.02	11.85
M-HAPs	-	1.89E-03	0.23	0.23

O-HAPS	-	1.14	0.79	1.93
HCL	-	9.53	-	9.53
D/F	-	5.57E-07	-	5.57E-07
CO_2	10247.10	-	-	10247.10
N_2O	0.02	-	-	0.02
CH_4	0.19	-	-	0.19
Mass Sum	10247.32	-	-	10247.32
CO_{2e}	10257.69	-	-	10257.69

[1] Includes emissions from shred/crush/screen, material handling, pouring and cooling.

LIMITS

In addition to the D/F limit required by 40 CFR Part 63 Subpart RRR (2.10 gr-DF/ton-charge), Hikae has requested SMOP limits of 37,110 TPY for aluminum scrap melting; 54,330 TPY from shredding; 40,116 TPY for crushing and screening; 6.0 lb/hr PM and 3.50 lb/hr HCl from the melting furnace; and 4.28 lb/hr of PM from crushing and screening operations. In addition, process operating hours will be limited to 5,433 hours per year.

REGULATIONS

ADEM Administrative Code Rule 335-3-4-.01(1)(a and b), "Visible Emission"

ADEM 335-3-4-.01(a) states that no person shall emit to the atmosphere particulate of an opacity of greater than twenty percent (20%) over a six (6) minute period. **ADEM 335-3-4-.01(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. All sources, including both baghouses, the meltshop roof vents, and any other openings in the building or sources located outside are subject to this rule.

For Hikae to maintain compliance with these rules, Hikae shall perform daily visible emission checks of each unit when operating. If visible emissions are noted, Hikae shall perform a visible emissions observation in accordance with Method 9 and take appropriate actions necessary to eliminate the observed emissions immediately, followed by an additional observation to confirm that emissions are reduced to normal. Records of emissions observations, Method 9 observations conducted, including results and any repairs or observed problems, should be noted in a form suitable for inspection.

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

According to **ADEM 335-3-4-.04(1)**, Class 1 Counties: No person shall cause or permit the emission of particulate matter in any one hour from any source in a Class 1 County in excess of the amount determined by the following equations:

$$E = 3.59P^{0.62} \quad E = 17.31P^{0.16}$$

$$\left(P < 30\frac{tons}{hr}\right) \quad \left(P > 60\frac{tons}{hr}\right)$$

Where E = emissions in pounds per hour ($\frac{lbs}{hr}$) and P = process weight per hour in tons per hour ($\frac{tons}{hr}$). The shredder, crushers and screen, and furnace at the Hikae facility would be subject to this regulation. These units are expected to comply with the emission limits based on the throughput limits in Table 1 and potential emissions in Table 2 above. Throughput records shall be kept daily in order to show compliance with the process weight rule.

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

Secondary Metal Production facilities are one of the 28 source categories listed in ADEM Admin Code r. 335-3-14-.04(2)(a)1 as having a 100 TPY major source threshold for criteria pollutants. Based on the emissions found in Table 2, the facility would not be expected to exceed the 100 TPY threshold. A facility must address PSD regulations for greenhouse gases only if that facility is major for criteria pollutants. Per ADEM Code r. 335-3-14(2)(a)1(i)&(ii), no PSD review would be necessary for this facility.

ADEM Administrative Code, 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. Since this facility is not a major source of HAPs, a 112(g) case by case MACT review would not be necessary.

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

After considering the TPY limits on the sources at the Hikae facility and the overall PTE considering pollution controls, the facility does not have the potential to emit greater than 100 TPY of any single criteria pollutant. The 3.5 lb/hr limit on HCl emissions from the furnace would restrict the facility to less than 10 TPY of any single HAP, after which the facility would not be expected to emit more than 25 TPY of all HAPs species. Given the above limits, the facility will be considered a synthetic minor source for both criteria pollutants and HAPs.

In order to ensure compliance and to match the testing required by 40 CFR Part 63 Subpart RRR, Hikae shall conduct an initial performance test to demonstrate compliance with the above SMOP limits within 180 days of beginning operation. Subsequent performance tests shall be conducted every 5 years.

Hikae must install and operate a device that measures and records or otherwise determines the weight of feed/charge (or throughput) for each operating cycle or time period used in the performance test; and operate each weight measurement system or other weight determination procedure in accordance with the OM&M plan.

Class I Area

The nearest Class I Area to Hikae, the Sipsey Wilderness Area, is greater than 100 km from the faciality. Emissions from the proposed project are not expected to have a significant impact on this area.

FEDERAL REGULATIONS

40 CFR 60 "New Source Performance Standards"

No subparts within this part and applicable to the Hikae facility.

40 CFR 63 "General Provisions"

This subpart is 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 for Source Categories".

40 CFR 63 Subpart RRR – NESHAP for Secondary Aluminum Production

This regulation is applicable to each secondary aluminum production facility as defined in §63.1503, at both major and area sources. This includes any establishment using clean charge, aluminum scrap, or dross from aluminum production, as the raw material and performing one or more of the following processes: scrap shredding, scrap drying/delacquering/decoating, thermal chip drying, furnace operations (i.e., melting, holding, sweating, refining, fluxing, or alloying), recovery of aluminum from dross, in-line fluxing, or dross cooling.

Shredded scrap aluminum will be melted and refined within the rotary melting furnace, which is a Group-1 furnace as defined in §63.1503. Therefore, the furnace would be subject to the PM, HCL, HF and Dioxins/Furans (D/F) emission standards found in Subpart RRR §63.1505(i) & (j). However, due to the SMOP limits on HCL and the TPY of charge limit to the furnace, the facility will be considered an area source under this subpart. Therefore, the furnace will only be subject to the D/F emission standards and associated operating, monitoring, reporting and recordkeeping requirements [§63.1500(c)(4)]. Shredders are subject to this subpart, but only at major sources of HAPs.

Limits

Melting Furnace: Hikae must comply with the 2.1 x 10^{-4}gr of D/F TEQ per ton of feed/charge emission standards found in Subpart RRR §63.1505(i)(3).

Operating Requirements

Hikae must operate all affected sources and control equipment according to the requirements in §63.1506 and, at all times, must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions [§63.1506(a)(5)].

Labeling

Hikae must provide and maintain easily visible labels posted at the furnace that identifies the applicable emission limits and means of compliance, including: (1) The type of affected source or emission unit (e.g., group 1 furnace). (2) The applicable operational standard(s) and control method(s) (work practice or control device). This includes, but is not limited to, the type of charge to be used for a furnace (e.g., clean scrap only, all scrap, etc.), flux materials and addition practices, and the applicable operating parameter ranges and requirements as incorporated in the OM&M plan [§63.1506(b)].

Capture/collection systems

For each affected source or emission unit equipped with an add-on air pollution control device, Hikae must: (1) Design and install a system for the capture and collection of emissions to meet the engineering standards for minimum exhaust rates or facial inlet velocities as contained in the ACGIH Guidelines (incorporated by reference, see § 63.14); (2) Vent captured emissions through a closed system, except that dilution air may be added to emission streams for the purpose of controlling temperature at the inlet to a fabric filter; and (3) Operate each capture/collection system according to the procedures and requirements in the OM&M plan [§63.1506(c)].

Feed/charge weight

Hikae must: (1) install and operate a device that measures and records or otherwise determine the weight of feed/charge (or throughput) for each operating cycle or time period used in the performance test; and (2) operate each weight measurement system or other weight determination procedure in accordance with the OM&M plan. Hikae may choose to measure and record aluminum production weight from an affected source or emission unit rather than feed/charge weight to an affected source or emission unit, provided that, all calculations to demonstrate compliance with the emission limits for are based on aluminum production weight rather than feed/charge weight [§63.1506(d)].

Rotary Melt Furnace and Lime Injected Baghouse

Hikae must operate this unit according to the requirements in §63.1506(m). Hikae has elected to install a bag leak detection system, which must be operated according to §63.1506(m)(1), including: Initiating corrective action within 1 hour of a bag leak detection alarm according to the corrective action procedures in the OM&M plan and operate each fabric filter system such that the bag leak detection system alarm does not sound more than 5 percent of the operating time during a 6-month block reporting period, which is calculated according to §63.1506(m)(1)(iii).

The 3-hour bock average temperature at the inlet of the baghouse shall be maintained less than 25 °F above the temperature established in the most recent performance test and the lime feed hopper shall be free-flowing at all times with the feeder set at or above the level established in the most recent performance test [§63.1506(m)(3)&(4)].

Hikae must maintain the total reactive chlorine flux injection rate for each operating cycle or time period used in the performance test at or below the average rate established during the performance test [§63.1506(m)(5)].

The operation of capture/collection systems and control devices associated with natural gas-fired, group 1 furnaces that will be idled for at least 24 hours after the furnace cycle has been completed may be temporarily stopped. Operations of these capture/collection systems and control devices must be restarted before feed/charge, flux or alloying materials are added to the furnace [§63.1506(m)(7)]. Corrective actions shall be initiated as needed per §63.1506(p).

Monitoring Requirements

Hikae must monitor all control equipment and processes according to the requirements of §63.1510 including the following: Hikae must prepare and implement an OM&M plan [§63.1510(b)&(s)], maintain and inspect Subpart RRR identification & compliance labels [§63.1510(c)], maintain and inspect the hoods and ductwork including conducting annual flow measurements [§63.1510(d)], maintain and operate scales or other devices to record the total weight of feed/charge to each unit [§63.1510(e)] calculate and record the total reactive flux injection rate (TRFIR) for each operating cycle or time period used in the performance test using the procedure in § 63.1512(o) [§63.1510(j)(2)]. Record, for each 15-minute block period during each operating cycle or time period used in the performance test during which reactive fluxing occurs, the time, weight, and type of flux for each amount of gaseous or liquid flux other than chlorine and solid reactive flux [§63.1510(j)(3)]. For solid flux that is added intermittently, record the amount added for each operating cycle or time period used in the performance test using the procedures in § 63.1512(o) [§63.1510(j)(4)].

For the furnace baghouse, Hikae must maintain and continuously operate the bag leak detection system according to the requirements of §63.1510(f)(1)(i)-(x); maintain and operate a thermocouple at the inlet of the baghouse [§63.1510(h)(1)] that meets the performance and equipment specifications of §63.1510(h)(2)(i)-(iii); and, maintain and operate a continuous lime injection system for the baghouse and verify that the lime is always free flowing according to the requirements of §63.1510(i)(1)-(4).

Performance Testing

Hikae must conduct performance testing as required by §63.1511 including, submitting a site-specific test plan which satisfies the of all the rule requirements, and must obtain approval of the plan, by the Department, pursuant to the procedures set forth in 40 CFR §63.7. Hikae shall conduct the initial performance test on D/F emissions within 180 days of beginning operation [§63.1511(b)] and subsequent performance tests every 5 years thereafter [§63.1511(e)]. In addition, Hikae must use the required test methods (Method 23 in Part 60 Appendix A) as described in §63.1511(c) or alternatives in §63.1511(d). Operational standards including lime injection rate, baghouse inlet temperature, and total reactive chlorine flux injection rates shall be established [§63.1511(g), §63.1512(d), (k), (n-p)].

Notifications, Reports and Record Keeping Requirements

In addition to the recordkeeping required by Subpart A [§63.10(b)], Hikae must maintain records of the operating hours of the furnace, each baghouse leak detection system alarm, plus corrective actions taken [§63.1517(b)(1)(i)], lime injection inspections and feeder settings [§63.15.17(b)(4)], flux additions [§63,1517(b)(5)], charge/feed additions [§63.1517(b)(7)], label inspections [§63.1517(b)(13)], fume hood & ductwork annual inspections [§63.1517(b)(14)], the OM&M plan [§63.1517(b)(16)], and records of deviations and corrective actions taken [§63.1517(b)(18)].

Hikae must submit initial notifications and notifications of compliance status as required by §63.1515(a)&(b) and submit excess emissions/summary reports within 60 days after the end of each 6-month period, as required by §63.1516(b). Malfunctions must be reported per §63.1516(d).

RECOMMENDATIONS

The facility, as proposed, should be able to meet all state and federal regulations, if operated properly. As such, I recommend Hikae be issued Synthetic Minor Operating Permit Nos. 410-0041-X002 & X003 for the emission units at the Hikae facility pending fee payment.

________________________________ Draft

David DiFante Date
Industrial Minerals Section
Energy Branch
Air Division

Data:	Rotary 6.25 Ton Heater Emissions			
H_2S mol%	0.00%	mol%		
Op Hours	8760	Hrs	(normalized)	
Heat Content	1,030	Btu/scf (Ind.)		
Flowrate	**19.417**	MScf/Hr (Ind.)		
Heat Input	20,000,000	Btu/hr		
Use btu/scf(EPA) for PM, NOx, CO, VOC. Factors for EPA STP (also ADEM STP). SO2 factor already for Industry STP (from Al. Oil & Gas Board)				
Ind. STP:	68	˚F	14.696	psia
EPA STP:	68	˚F	14.696	psia
Heat Content	1,030	Btu/scf (EPA)		
Fuel HHV Correction Factor	**1.010**			

AP-42 EF (NG)		
PM_{filt}=	1.9	Lb/MMScf
PM_{con}=	5.7	Lb/MMScf
NO_X=	100	Lb/MMScf
CO=	84	Lb/MMScf
VOC=	5.5	Lb/MMScf
HAP=	1.89	Lb/MMScf
SO_2=	0.60	Lb/MMScf
GWP*		
N_2O=	298	
CO_2=	1	
CH_4=	25	

Based on NG with Btu/Content of 1020

*Revised 11/29/2013

(Table C-1 & C-2) 40 CFR Part 98 Sub C GHG Emission Factors for C_1		
N_20=	0.0001	kg/MMBtu
CO_2=	53.06	kg/MMBtu
CH_4=	0.001	kg/MMBtu
(Table C-1 & C-2) 40 CFR Part 98 Sub C GHG Emission Factors for C_3		
N_20=	0.0006	kg/MMBtu
CO_2=	61.46	kg/MMBtu
CH_4=	0.003	kg/MMBtu

Heater Emission Calculations

PMfilt	1.9 Lb	20.000 MMBtu	Scf (EPA)	8,760 Hr	1 Ton	1.010	=	**0.163 Tons**
	MMScf (EPA)	Hr	1,030 Btu	Year	2,000 Lb			**Year**
PMcon	5.7 Lb	20.000 MMBtu	Scf (EPA)	8,760 Hr	1 Ton	1.010	=	**0.490 Tons**
	MMScf (EPA)	Hr	1,030 Btu	Year	2,000 Lb			**Year**
SO_2	0.60 Lb	20.000 MMBtu	Scf (EPA)	8,760 Hr	1 Ton	1.010	=	**0.052 Tons**
	MMScf (EPA)	Hr	1,030 Btu	Year	2,000 Lb			**Year**
NO_X	100 Lb	20.000 MMBtu	Scf (EPA)	8,760 Hr	1 Ton	1.010	=	**8.588 Tons**
	MMScf (EPA)	Hr	1,030 Btu	Year	2,000 Lb			**Year**
CO	84 Lb	20.000 MMBtu	Scf (EPA)	8,760 Hr	1 Ton	1.010	=	**7.214 Tons**
	MMScf (EPA)	Hr	1,030 Btu	Year	2,000 Lb			**Year**
VOC	5.5 Lb	20.000 MMBtu	Scf (EPA)	8,760 Hr	1 Ton	1.010	=	**0.472 Tons**
	MMScf (EPA)	Hr	1,030 Btu	Year	2,000 Lb			**Year**
HAP	1.89 Lb	20.000 MMBtu	Scf (EPA)	8,760 Hr	1 Ton	1.010	=	**0.162 Tons**
	MMScf (EPA)	Hr	1,030 Btu	Year	2,000 Lb			**Year**
CO_2	20 MMBtu	53.06 kg	0.001 Metric Ton	8,760 Hr	1.1023 Tons		=	**10,247 Tons**
	Hr	MMBtu	kg	Year	1 Metric Ton			**Year**
N_2O	20 MMBtu	0.0001 kg	0.001 Metric Ton	8,760 Hr	1.1023 Tons		=	**0.01931 Tons**
	Hr	MMBtu	kg	Year	1 Metric Ton			**Year**
CH_4	20	0.001 kg	0.001 Metric Ton	8,760 Hr	1.1023 Tons		=	**0.19312 Tons**
	Hr	MMBtu	kg	Year	1 Metric Ton			**Year**
Mass Sum	10,247.10 Tons	+	0.0193 Tons	+	0.1931 Tons		=	**10,247 Tons**
	Year		Year		Year			**Year**
	CO_2		**N_2O**		**CH_4**			
CO_2e	10,247.10 TPY X 1		0.0193 TPY X 298		0.1931 TPY X 25		=	**10,258 Tons**
	10,247.10	+	5.76	+	4.83			**Year**
	CO_2		**N_2O**		**CH_4**			

[1] AP-42 emission factors taken from Chapter 1.4. Based on natural gas with 1020 btu/scf, and corrected in calculations. From Chapter 1.5, propane emission factors are equivalent on a heat basis to methane factors, except the NO_X factor is 1.5x higher.

Furnace Emissions and Fugitives from Melting, Material handling, storage, dross handling, and pouring and cooling.

Fugitives (material handling)[4]			
4851	tpy dross & salt cake (Hiake Assumption)		
0.0088	lb pmt/ton low silt	0.021344	TPY pmt
0.0043	lb pm10/ton low silt	0.01043	TPY pm10
0.0016	lb pm2.5/ton low silt	0.003881	TPY pm2.5
Fugitives (hot dross handling)[4]			
4851	tpy dross & salt cake		
0.22	lb pmt/ton	0.53361	TPY pmt
0.2	lb pm10/ton	0.4851	TPY pm10
0.2	lb pm2.5/ton	0.4851	TPY pm2.5

Fugitives (storage)[5]			
113539	TPY metal scrap		
0.25	%moisture		
1.3	mph wind		
0.74	pm30 factor		
0.007554	lb/ton	0.4288	tpy PM
0.0032*PM30*((mph/5)^1.3)/((moist/2)^1.4)			
Fugitives (Pouring/Cooling)[7]			
37,110	Tons Scrap Charged		
0.02	lb SO_2/ton charged	0.04851	TPY SO_2
0.01	lb NO_x/ton charged	0.024255	TPY NO_x
0.14	lb VOC/ton charged	0.33957	TPY VOC

6.25 TPH Rotary Furnace Emissions (from scrap)					
4.236301	TPH production normalized to prod limit			5937.6	hr/yr
6.25	TPH production	37,110	TPY Charged	8760	hr/yr
2000	lb/ton	7000	gr/lb	35315	TPY Produced
~~0.20~~	~~lb VOC/ton aluminum (WebFire)~~[2]			~~3.71~~	~~TPY VOC~~
0.062	lb VHAP/ton aluminum (2014 RTI, max delaq)[1]			1.14	TPY VHAP
2.10E-04	grains DF/ton aluminum (RRR limit)			5.57E-07	TPY D/F
1.4	lb PM/ton product[8]			25.98	TPY PM_{filt}
0.6	ratio PM10:PM (filt) (AP42)[3]			15.59	TPY $PM_{10,filt}$
0.5	ratio PM2.5:PM (filt) (AP42)[3]			12.99	TPY $PM_{2.5,filt}$
0.052%	MHAP% to PMfilt (2014 RTI, max furnace)[1]			0.014	TPY mHAP
0.078817	lb NOX/ton aluminum (90% UPL)[6]			1.46	TPY NOX
0.042906	lb PMcon/ton aluminum (90% UPL)[6]			0.80	TPY Pmcon
0.728726	lb CO/ton aluminum (90% UPL)[6]			13.52	TPY CO
2.5	lb VOC/ton (Hikae assumption)			42.45	TPY VOC
3.87	lb HCl/ton Similar Facility			65.70	TPY HCl
0.01	lb HF/ton (Hiake assumption)			0.17	TPY HF

CONTROL FACTORS	pm	pm10	pm2.5	HCL
Assume Capture to BH	90.0%	90%	90%	90%
Assume PCD Efficiency Hiake	89.0%	87%	79%	95%
Assume Building Settling Fa	80.0%	80.0%	80.0%	0.0%

Fug = uncaptured emissions from furnace
Fug + Build= fugitive after building control

TPY	Controlled	Fugitive	Fug+Build	Total Emisisons
PM_{filt}	2.57	2.60	0.52	3.09
$PM_{10,filt}$	1.82	3.12	0.62	2.45
$PM_{2.5,filt}$	2.45	2.60	0.52	2.97
mHAP	1.35E-03	2.72E-03	5.45E-04	1.89E-03
HCl	2.96	6.57	6.57	9.53

[1] *Development of the RTR Supplemental Proposal Risk Modeling Dataset for the Secondary Aluminum Production Source Category*, RTI International, 12/7/14 (https://www.regulations.gov/document/EPA-HQ-OAR-2010-0544-0239) (naphthalene outlier datapoint excluded)

[2] 0.2 lb-VOC/ton-aluminum, WebFIRE, Clearinghouse for Inventories & Emission Factors, SCC 30400103 (https://cfpub.epa.gov/webfire/)

[3] AP-42, Chapter 12.8 "Secondary Aluminum Operations" (https://www3.epa.gov/ttnchie1/ap42/ch12/final/c12s08.pdf)

[4] AP-42, Chapter 12.5.1 "Steel Minimills" (https://www.epa.gov/sites/default/files/2020-11/documents/c12s0501.pdf)

[5] AP-42, Chapter 13.2.5 "Industrial Wind Erosion" (https://www.epa.gov/sites/default/files/2020-10/documents/13.2.5_industrial_wind_erosion.pdf)

[6] 90% UPL analysis of isolated sidewell stack test results from similar sidewell/reverb type furnaces

[7] EPA 450/4/90-0003

unused, cited for comparison:

[8] 6.0 lb/hr (limit) / 37,110 TPY (charge limit) @ 8760 hrs per year = 1.4 lb-pm/ton charge [Hikae used 1.9 l-pm/ton charge]

	(1) JAW CRUSHER	(1) IMPACT CRUSHER	(1) SCREEN			
Material, Process, Control Type, Particle Size	LOW MOISTURE MINERAL, PRIMARY CRUSHING, UNCONTROLLED	LOW MOISTURE MINERAL, SECONDARY CRUSHING, UNCONTROLLED	STONE, SCREENING, UNCONTROLLED	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR
PMT Emission Factor	0.5	1.2	0.025	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR
PM10 Emission Factor	0.05	0.0087	0.00435	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR
PM2.5 Emission Factor	0.05	0.0087	0.00435	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR
Assumptions	N/A	N/A	PM2.5 = PM10÷2	N/A	N/A	N/A
Number of Emission Points	1	1	1	0	1	0
Capture Efficiency	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Control Efficiency	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Control Efficiency PM10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Control Efficiency PM2.5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Controlled & captured PT	0	0	0	0	0	0
Controlled & captured PM10	0	0	0	0	0	0
Controlled & captured PM2.5	0	0	0	0	0	0
Fugitive PT	0.500000	1.200000	0.025000	0.000000	0.000000	0.000000
Fugitive PM10	0.050000	0.008700	0.008700	0.000000	0.000000	0.000000
Fugitive PM2.5	0.050000	0.008700	0.004350	0.000000	0.000000	0.000000

BASIS OF EMISSION FACTORS:	AP42 11.24-2	AP42 11.24-2	AP-42 11.19.2	NONE	NONE	NONE

C A L C U L A T I O N S (Fugitive Emissions from Crushing and Screening)

hr/yr operation	5937	hours (Normalized to Limit)	Process in Building?	TRUE
Process Flowrate	7.38	ton/hr	Building Settling Factor	0%
MHAP fraction of PM	0.50%			

		COMBINED PM FACTORS		TOTAL PM EMISSIONS	
STACK	PT	0.00E+00	lb-PM/ton	0.00	ton-PT/yr
	PM10	0.00E+00	lb-PM/ton	0.00	ton-PM10/yr
	PM2.5	0.00E+00	lb-PM/ton	0.00	ton-PM2.5/yr
	MHAP	0.00E+00	lb-MHAP/ton	0.000	ton-MHAP/yr
FUGITIVE	PT	1.73E+00	lb-PM/ton	37.79	ton-PT/yr
	PM10	6.74E-02	lb-PM/ton	1.48	ton-PM10/yr
	PM2.5	6.31E-02	lb-PM/ton	1.38	ton-PM2.5/yr
	MHAP	8.63E-03	lb-MHAP/ton	0.189	ton-MHAP/yr

(1) Aluminum Shredder

Material, Process, Control Type, Particle Size	CUSTOM, CUSTOM, UNCONTROLLED	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR
PMT Emission Factor	0.263	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR
PM10 Emission Factor	0.116	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR
PM2.5 Emission Factor	0.116	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR	NO TABULATED FACTOR
Assumptions	CUSTOM INPUT	N/A	N/A	N/A	N/A	N/A
Number of Emission Points	1	0	0	0	0	0
Capture Efficiency	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Control Efficiency	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Control Efficiency PM10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Control Efficiency PM2.5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Controlled & captured PT	0	0	0	0	0	0
Controlled & captured PM10	0	0	0	0	0	0
Controlled & captured PM2.5	0	0	0	0	0	0
Fugitive PT	0.263000	0.000000	0.000000	0.000000	0.000000	0.000000
Fugitive PM10	0.116000	0.000000	0.000000	0.000000	0.000000	0.000000
Fugitive PM2.5	0.116000	0.000000	0.000000	0.000000	0.000000	0.000000

BASIS OF EMISSION FACTORS:	CUSTOM FACTORS	NONE	NONE	NONE	NONE	NONE

CALCULATIONS

hr/yr operation	5937	hours (normalized to Limit)	Process in Building?	FALSE
Process Flowrate	10	ton/hr	Building Settling Factor	0%
MHAP fraction of PM	0.50%			

		COMBINED PM FACTORS		TOTAL PM EMISSIONS	
STACK	PT	0.00E+00	lb-PM/ton	0.00	ton-PT/yr
	PM10	0.00E+00	lb-PM/ton	0.00	ton-PM10/yr
	PM2.5	0.00E+00	lb-PM/ton	0.00	ton-PM2.5/yr
	MHAP	0.00E+00	lb-MHAP/ton	0.000	ton-MHAP/yr
FUGITIVE	PT	2.63E-01	lb-PM/ton	7.81	ton-PT/yr
	PM10	1.16E-01	lb-PM/ton	3.44	ton-PM10/yr
	PM2.5	1.16E-01	lb-PM/ton	3.44	ton-PM2.5/yr
	MHAP	1.32E-03	lb-MHAP/ton	0.039	ton-MHAP/yr