

Heraeus Precious Metals North America LLC
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November 8, 2016

Mark Reynolds
Division of Air Pollution Control
Tennessee Department of Environment & Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Subject: Heraeus Metal Processing, Inc.
ESRN 65-0049
Permit No. 561481
Minor Modification Request – Add new Metal Melting and Processing Sources and
Modify Source 01

Dear Mr. Reynolds:

With this letter, Heraeus Metal Processing, Inc. (Heraeus) submits a minor modification request to install a new metal melting and processing source for precious metal bearing material. A new building will be constructed to house the new equipment. In addition, the existing Auxiliary Furnaces #1, #2, and #3 will be removed from Source 65-0049-01 and will be included with the new equipment installation. The new metal melting and processing line will be a new source at the facility with similar operations to Source 01. The Rhodium Oil Furnace will burn natural gas or No. 2 fuel oil as fuel. The Voss Converter Furnace will burn natural gas or a propylene/oxygen mixture as fuel. Emissions from this source will be controlled by an afterburner and a single baghouse. A construction application was submitted on March 14, 2016 for the new metal melting and processing source; however, it was determined that a minor modification was more appropriate, and Heraeus rescinded the construction application via email on May 15, 2016. The appropriate forms and calculations are attached.

While the baghouse for the new equipment is considered a control device, it is integral to the process because it collects valuable material that is returned into the process. This baghouse serves as a material collector. In 2015, the ball mill baghouses (Source 04) collected material to be reprocessed worth approximately 4.5 times the value of one baghouse. Based on this understanding, Heraeus believes the baghouse for the new metal melting and processing equipment presented below are inherent process equipment as defined in 40 CFR 64, and are not subject to CAM plan requirements.

Description of Change – Install new Metal Melting Source

This source is similar to Source 01 and includes six (6) Inductotherm Electric Melting Furnaces, Eight (8) Cooling Chambers, and two (2) 0.25 MMBtu/hr natural gas-fired tray furnaces. The tray furnaces are controlled by one 400,000 Btu/hr afterburner. The Source also includes seven (7) ball mills, screener, jaw crusher, polishing operations, two (2) Kulzer ball mills, Kulzer sifter, and Kulzer transfer

operations; Auxiliary Furnaces 1, 2, and 3, RH Oil Furnace 1b, and Voss Converter 2b – all controlled by one 43,000 cfm baghouse. The main difference between this new source and Source 01 is the new source will not use a scrubber to control HAP emissions. The material processed in the new source will contain VOC's therefore, the new source will be able to control VOC's with the afterburner and particulate matter and metal HAPs with the baghouse.

Emissions Estimates – Install new Metal Melting Source

There will be an increase in emissions from the installation of the new source; however, the facility wide HAP emissions will remain below the permitted thresholds of 9.9 tpy for an individual HAP and 24.9 tpy for all HAPs combined. Particulate emissions are based on a baghouse exhaust grain loading of 0.02 gr/dscf. In accordance with TAPCR 1200-03-07-.01(5), Heraeus agrees to limit particulate emissions from this source to 4.96 lb/hr and agrees to a 10% opacity limit. Furthermore, Heraeus agrees to limit SO2 emissions to 3.29 lb/hr in accordance with TAPCR 1200-03-14-.01(3).

Suggested Permit Language – Install new Metal Melting Source

65-0049-XX: Source Identification: Six (6) Inductotherm Electric Melting Furnaces, Eight (8) Cooling Chambers, two (2) 0.25 MMBtu/hr natural gas-fired tray furnaces controlled by one 400,000 Btu/hr afterburner, seven (7) ball mills, screener, jaw crusher, polishing operations, two (2) Kulzer ball mills, Kulzer sifter, and Kulzer transfer operations; Auxiliary Furnace #1 (Rhodium Oil) with a burner rating of 0.15 MMBtu/hr, Auxiliary Furnace #1b (Rhodium Oil) with a burner rating of 0.15 MMBtu/hr, Auxiliary Furnace #2 (Voss Converter) with a burner rating of 1.0 MMBtu/hr, Auxiliary Furnace #2b (Voss Converter) with a burner rating of 1.0 MMBtu/hr, Auxiliary Furnace #3 (PTA Coke) with a burner rating of 0.35 MMBtu/hr controlled by one 43,000 cfm baghouse.

E XX-1 (MM6). Heat Input Capacity Restriction

The total stated heat input capacity for the tray furnaces, Auxiliary Furnaces 1, 1b, 2, 2b, and 3, and the afterburner is 3.55 million British thermal units per hour (MMBtu/hr). The Technical Secretary may require the permittee to prove compliance with this rate.

TAPCR 1200-03-07-.07(2)

E XX-2 (MM6). Fuel Use Restriction

Only Natural gas shall be used as fuel for the tray furnaces and afterburner. Auxiliary #1 (Rhodium Oil) and #1b shall only use Natural gas and Diesel. Auxiliary #2 (Voss Converter) and #2b shall only use Natural gas and a Propylene/Oxygen fuel mixture. Auxiliary #3 shall only use Natural gas, Coke, and Charcoal.

TAPCR 1200-03-07-.07(2)

Compliance Method: Compliance with this condition shall be assured by annual certification. Certifications shall be submitted in accordance with condition E2.

E XX-3 (MM6). Raw Material Input Limit

The total raw material input to this source shall not exceed 5,111 tons during any period of twelve (12) consecutive months.

TAPCR 1200-03-07-.07(2), TAPCR 1200-03-10-.04(2)

Compliance Method: A log of the raw material input to this source, in a form that readily shows compliance with this condition, must be maintained at the source location and kept available for inspection for the Technical Secretary or his representative.

E XX-4 (MM6). Particulate Matter Emission Limit

Particulate matter emitted from the metal melting furnaces, cooling chambers, tray furnaces, the seven (7) ball mills, screener, jaw crusher, polishing operations, two (2) Kulzer ball mills, Kulzer sifter, and Kulzer transfer operations, Auxiliary Furnaces 1, 1b, 2, 2b, and 3 – all shall not exceed 4.96 pounds per hour (lb/hr) based on a daily average.

TAPCR 1200-03-07-.01(5); Agreement letter dated August 31, 2016.

Compliance Method: The permittee shall assure compliance with the PM emission limitations by operating, maintaining, and inspecting the air pollution control devices (APCD) as follows:

- (a) The permittee shall comply with **Conditions E3-3 and E3-4** of this permit.
- (b) Compliance with this requirement shall be assured through the use of baghouse to control particulate emissions. Within 30 days of the start-up of this facility, the permittee shall begin taking daily pressure drop readings for the baghouses at this facility and daily pressure drop readings shall be recorded from that date forward. The first thirty (30) days of pressure drop (inches of water column) readings for the control system shall be compiled. The designated person(s) shall note any relevant control system conditions/problems/concerns when recording the values. This data shall be submitted to the Division, along with a proposed minimum pressure drop for the baghouses, no later than 15 days following the 30 days of readings. The minimum pressure drop values for compliance assurance will be incorporated into the permit.
- (c) After incorporation of the minimum pressure drop values into the permit, compliance with the specified particulate emission limits shall be assured by maintaining the required minimum pressure drop values for the baghouses. The pressure drop values for the baghouses shall be recorded once daily when the source is in operation. Days when that source is not operating shall be noted. For lower pressure drop reading(s) resulting from replacement of bags, the permittee shall record the deviation(s) as such in their daily records. Due allowance will be made for lower pressure drop reading(s) which follow replacement of bags provided the permittee establishes to the satisfaction of the Technical Secretary that these lower readings resulted from the replacement of bags. All data, including all required calculations, must be entered in the log no later than 7 days from the end of the day for which the data is required.

E XX-5 (MM6). Volatile Organic Compounds Emission Limit

Volatile organic compounds (VOC) emitted from the metal melting furnaces, cooling chambers, tray furnaces, the seven (7) ball mills, screener, jaw crusher, polishing operations, two (2) Kulzer ball mills, Kulzer sifter, and Kulzer transfer operations, Auxiliary Furnaces 1, 1b, 2, 2b, and 3 – all shall not exceed 32.08 tons during any period of twelve consecutive months.

TAPCR 1200-03-07-.07(2).

Compliance Method: The permittee shall assure compliance with the VOC emission limitation by complying with **condition EXX-1** and by operating, maintaining, and inspecting the air pollution control devices (APCD).

E XX-6 (MM6). Sulfur Dioxide Emission Limit

Sulfur dioxide (SO₂) emitted from this source shall not exceed 3.29 lb/hr.

TAPCR 1200-03-14-.01(3).

Compliance Method: Compliance with conditions EXX-1 and EXX-2 will demonstrate compliance with this condition. Compliance with this condition shall be assured by annual certification. Certifications shall be submitted in accordance with condition E2.

E XX-7 (MM6). Oxides of Nitrogen Emission Limit

Nitrogen oxides (NO_x) emitted from this source shall not exceed 0.58 lb/hr, on a daily average.

TAPCR 1200-03-07-.07(2).

Compliance Method: The potential to emit NO_x from this source is less than five tons per year. In accordance with TAPCD 1200-03-09-.04(5)(c)3. and by annual certification of compliance, the permittee shall be considered to meet the monitoring and related recordkeeping and reporting requirements of TAPCR 1200-03-09-.02(11)(e)1.(iii), and the compliance requirements of TAPCR 1200-03-09-.02(11)(e)3.(i). The permittee shall submit annually a compliance certification for NO_x emissions from this source. Reports and certifications shall be submitted in accordance with condition E2 of this permit.

Suggested Permit Language – Remove Auxiliary Furnaces #1, #2, #3 from Source 01

65-0049-01: Source Identification: Eight Roasting Ovens – each are natural gas fired and rated at 1.5 MMBtu/hr. One chamber furnace that is natural gas fired and rated at 1.5 MMBtu/hr, , Cooling Chambers with 10 natural gas burners each rated at 0.41 MMBtu/hr each. Control equipment consists of two (2) afterburners (8.0 MMBtu/hr each), one quench tank, and one packed tower scrubber.

This source has a CAM plan.

E4-1 (MM2, MM3, MM4, MM5, and MM6). Heat Input Capacity Restriction

The total stated heat input capacity for this source is 33.6 million British thermal units per hour (MMBtu/hr), which includes the 8 ovens, chamber furnace, 2 afterburners, and cooling chambers. The Technical Secretary may require the permittee to prove compliance with this rate.

TAPCR 1200-03-07-.07(2)

E 4-2 (MM2, MM3, MM5, and MM6). Fuel Use Restriction

Only Natural gas shall be used as fuel for the 8 Roasting Ovens, Chamber Furnace, and 2 Afterburners. Cooling chamber burners shall use only Natural gas.

TAPCR 1200-03-07-.07(2)

Compliance Method: Compliance with this condition shall be assured by annual certification. Certifications shall be submitted in accordance with condition E2.

E 4-5 (MM6). Volatile Organic Compounds Emission Limit

Volatile organic compounds (VOC) emitted from this source shall not exceed 10.89 tons during any period of twelve consecutive months.

TAPCR 1200-03-07-.07(2).

Compliance Method: Compliance with this limitation shall be assured with recordkeeping of surrogate monitoring and the use of pollution control equipment (quench tank, packed column, thermal oxidizer, packed tower scrubber, and baghouse). The logs required in conditions E4-4 and E4-8 shall be used to certify compliance with this condition. Certifications shall be submitted in accordance with condition E2.

This source shall operate in accordance with the approved compliance assurance monitoring (CAM) plan. The plan dated April 22, 2010, is incorporated into this permit by reference. The plan maybe revised but must have the Technical Secretary's written approval before it becomes effective and applicable.

E4-6 (MM6). Sulfur Dioxide Emission Limit

Sulfur dioxide (SO_2) emitted from this source shall not exceed 0.02 lb/hr, on a daily average.

TAPCR 1200-03-14-.01(3).

Compliance Method: Compliance with conditions E4-1 and E4-2 will demonstrate compliance with this condition. Compliance with this condition shall be assured by annual certification. Certifications shall be submitted in accordance with condition E2.

E4-7 (MM6). Oxides of Nitrogen Emission Limit

Nitrogen oxides (NO_x) emitted from this source shall not exceed 3.29 lb/hr, on a daily average.

TAPCR 1200-03-07-.07(2).

Compliance Method: Compliance with conditions E4-1 and E4-2 will demonstrate compliance with this condition. Compliance with this condition shall be assured by annual certification. Certifications shall be submitted in accordance with condition E2.

Minor Permit Modification Procedures

The following requirements for minor modifications to a Part 70 permit are found at TN Chapter 1200-03-09-.02(11)(f)5(ii).

(ii) Minor permit modification procedures:

(I) Minor permit modification procedures may be used only for those permit modifications that:

I. Do not violate any applicable requirement;

II. Do not involve significant changes to existing monitoring, reporting or recordkeeping requirements in the permit;

III. Do not require or change a case-by-case determination of an emission limitation or other standard required by the federal Act, or a source-specific determination for temporary sources of ambient impacts as required by the federal Act, or a visibility or increment analysis as required by the federal Act;

IV. Do not seek to establish or change a permit term or condition for which there is no corresponding underlying applicable requirement and that the source has assumed to avoid an applicable requirement to which the source would otherwise be subject. Such terms and conditions include:

A. A federally enforceable emissions cap assumed to avoid classification as a modification under any provision of Title I of the federal Act. Further, federally enforceable emission caps assumed to avoid classification as a modification under chapter 1200-03-11, chapter 1200-30-16, Chapter 1200-03-31, paragraph 1200-03-09-.01(4) or paragraph 1200-03-09-.01(5) are included in the criteria of this section 1200-03-09-.02(11)(f)5(ii)(I)IVA.

B. An alternate emission limit approved pursuant to section 112(i)(5) of the federal Act or rule 1200-03-31-.06;

V. Are not modifications under Title I of the federal Act or the federal regulations promulgated pursuant thereto. Further, the minor permit modification process may be used only for changes that are not modifications under chapter 1200-03-11, Chapter 1200-03-31, chapter 1200-03-16, paragraph 1200-03-09-.01(4) or paragraph 1200-03-09-.01(5); and

VI. Are not otherwise required in paragraph 1200-03-09-.02(11) to be processed as a significant modification.

I hereby certify that installation of Six (6) Inductotherm Electric Melting Furnaces, Eight (8) Cooling Chambers, two (2) 0.25 MMBtu/hr natural gas-fired tray furnaces, seven (7) ball mills, screener, jaw crusher, polishing operations, two (2) Kulzer ball mills, Kulzer sifter, Kulzer transfer operations, and Auxiliary Furnaces 1, 1b, 2, 2b, and 3 meets the criteria for a minor modification and formally request



that the Division use minor modification procedures to account for these minor modifications in the Part 70 permit.

If you have questions or comments, please contact Linda Hunt, Quality, Environmental, Health, and Safety Manager at (423) 346-1059, or my consultant, Shea Cofer at (615) 418-1414.

Sincerely,

A handwritten signature in red ink, appearing to be "N. Ritschel", is positioned above the typed name.

Norbert Ritschel
Vice President and Plant Manager

Attachments: Minor Modification Application and Calculations

Minor Modification Application and Calculations



TITLE V PERMIT APPLICATION INDEX OF AIR POLLUTION PERMIT APPLICATION FORMS

Section 1: Identification and Diagrams		
This application contains the following forms:	APC Form 1, Facility Identification	1
	APC Form 2, Operations and Flow Diagrams	1

Section 2: Emission Source Description Forms		
		Total number of this form
This application contains the following forms (one form for each incinerator, printing operation, fuel burning installation, etc.):	APC Form 3, Stack Identification	1
	APC Form 4, Fuel Burning Non-Process Equipment	6
	APC Form 5, Stationary Gas Turbines or Internal Combustion Engines	
	APC Form 6, Storage Tanks	
	APC Form 7, Incinerators	
	APC Form 8, Printing Operations	
	APC Form 9, Painting and Coating Operations	
	APC Form 10, Miscellaneous Processes	1
	APC Form 33, Stage I and Stage II Vapor Recovery Equipment	
	APC Form 34, Open Burning	

Section 3: Air Pollution Control System Forms		
		Total number of this form
This application contains the following forms (one form for each control system in use at the facility):	APC Form 11, Control Equipment - Miscellaneous	
	APC Form 13, Adsorbers	
	APC Form 14, Catalytic or Thermal Oxidation Equipment	1
	APC Form 15, Cyclones/Settling Chambers	
	APC Form 17, Wet Collection Systems	
	APC Form 18, Baghouse/Fabric Filters	1

(OVER)

Section 4: Compliance Demonstration Forms

		Total number of this form
This application contains the following forms (one form for each incinerator, printing operation, fuel burning installation, etc.):	APC Form 19, Compliance Certification - Monitoring and Reporting - Description of Methods for Determining Compliance	1
	APC Form 20, Continuous Emissions Monitoring	
	APC Form 21, Portable Monitors	
	APC Form 22, Control System Parameters or Operating Parameters of a Process	1
	APC Form 23, Monitoring Maintenance Procedures	
	APC Form 24, Stack Testing	
	APC Form 25, Fuel Sampling and Analysis	
	APC Form 26, Record Keeping	1
	APC Form 27, Other Methods	1
	APC Form 28, Emissions from Process Emissions Sources / Fuel Burning Installations / Incinerators	1
	APC Form 29, Emissions Summary for the Facility or for the Source Contained in This Application	1
	APC Form 30, Current Emissions Requirements and Status	1
	APC Form 31, Compliance Plan and Compliance Certification	1
	APC Form 32, Air Monitoring Network	

Section 5: Statement of Completeness and Certification of Compliance

I have reviewed this application in its entirety and to the best of my knowledge, and based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete. I have provided all the information that is necessary for compliance purposes and this application consists of 49 pages and they are numbered from page 1 to 49. The status of this facility's compliance with all applicable air pollution control requirements, including the enhanced monitoring and compliance certification requirements of the Federal Clean Air Act, is reported in this application along with the methods to be used for compliance demonstration.



(423) 346-1051

Name and Title of Responsible Official

Telephone Number with Area Code

Norbert Ritshel, Vice President

(423) 346-8200

Signature of Responsible Official

Date of Application

11-15-16

(For definition of responsible official, see instructions for APC Form 1)



TITLE V PERMIT APPLICATION EMISSION SUMMARY FOR THE FACILITY OR FOR THE SOURCES CONTAINED IN THIS APPLICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Heraeus Metal Processing, LLC

EMISSIONS SUMMARY TABLE – CRITERIA AND SELECTED POLLUTANTS

2. Complete the following emissions summary for regulated air pollutants at this facility or for the sources contained in this application.

Air Pollutant	Summary of Maximum Allowable Emissions		Summary of Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour- Item 4, APC 28)	Tons per Year	Reserved for State use (Pounds per Hour- Item 4, APC 28)
Particulate Matter (TSP)	44.34		44.34	
Sulfur Dioxide	14.59		14.59	
Volatile Organic Compounds	43.74		43.74	
Carbon Monoxide	20.57		20.57	
Lead	8.90		8.90	
Nitrogen Oxides	24.20		24.20	
Total Reduced Sulfur				
Mercury	1.08E-06		1.08E-06	
Asbestos				
Beryllium				
Vinyl Chlorides				
Fluorides				
Gaseous Fluorides				
Greenhouse Gases in CO ₂ Equivalents	49,783		49,783	

(Continued on next page)

3. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s) at this facility or for the sources contained in this application.

4. Page number: _____ Revision number: _____ Date of revision: _____

Heraeus
Facility Wide
Emissions Summary

Source (ESRN)	PM _{total}		PM _{10f}		PM _{2.5f}		PM _{cond}		NO _x		CO		SO ₂		VOC	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
8 Roasting Ovens, 1 Chamber Furnace, and Cooling Chamber burners (65-0049-01)	1.91	9.31	0.26	1.14	0.06	0.27	0.21	0.82	3.29	14.43	2.86	12.55	0.02	0.09	2.49	10.89
Ball Mills 1, 2, 3, 4, 5, 6 and Blenders (65-0049-04)	1.67	7.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tray Loading	0.83	3.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crucible Furnace (65-0049-06)	0.36	1.58	2.24E-03	9.79E-03	2.24E-03	9.79E-03	6.71E-03	0.03	0.12	0.52	0.10	0.43	7.06E-04	3.09E-03	0.01	0.03
Rotary Oven (65-0049-09)	0.09	0.41	2.79E-03	0.01	2.79E-03	0.01	8.38E-03	0.04	0.07	0.32	0.47	2.06	8.82E-04	3.86E-03	0.11	0.47
Diesel Emergency Engine (65-0049-11)	0.38	0.10	0.19	0.05	0.18	0.05	0.03	0.01	12.21	3.05	3.24	0.81	0.19	0.05	0.34	0.09
New Tray Furnaces, Inductotherm Electric Melting Furnaces, and Cooling Chambers; Aux Furnaces 1, 1b, 2, 2b, 3; New Ball Mills and Metal Processing Equipment	4.96	21.74	4.96	21.74	0.11	0.50	0.03	0.15	0.56	2.44	0.42	1.83	3.29	14.43	7.33	32.08
Plume Suppressor (Insignificant)	0.06	0.26	0.01	0.07	0.01	0.07	0.04	0.20	0.78	3.44	0.66	2.89	0.00	0.02	0.04	0.19
Facility Total	10.27	44.34	5.43	23.02	0.38	0.91	0.33	1.24	17.04	24.20	7.75	20.57	3.51	14.59	10.31	43.74

Source (ESRN)	Arsenic 7440-38-2		Cobalt 7440-48-4		Chromium 7440-47-3		Nickel 8049-31-8		Lead 7439-92-1		Selenium 7782-49-2		Cadmium		Antimony	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
8 Roasting Ovens, 1 Chamber Furnace, and Cooling Chamber burners (65-0049-01)	0.20	0.87	0.17	0.73	0.07	0.29	0.10	0.42	0.75	3.28	0.25	1.09	0.02	0.07	1.66E-03	0.01
Ball Mills 1, 2, 3, 4, 5, 6 and Blenders (65-0049-04)	0.20	0.88	0.17	0.73	0.07	0.29	0.10	0.42	0.75	3.28	0.25	1.09	0.02	0.07	1.67E-03	0.01
Tray Loading	0.10	0.44	0.08	0.37	0.03	0.15	0.05	0.21	0.37	1.64	0.12	0.54	0.01	0.04	8.33E-04	3.65E-03
Crucible Furnace (65-0049-06)	0.04	0.18	0.04	0.15	0.01	0.06	0.02	0.09	0.16	0.69	0.05	0.23	0.00	0.02	3.51E-04	1.54E-03
Rotary Oven (65-0049-09)	--	--	2.46E-05	1.08E-04	1.23E-03	5.39E-03	6.64E-03	2.91E-02	1.23E-06	5.39E-06	--	--	3.28E-07	1.44E-06	--	--
Diesel Emergency Engine (65-0049-11)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
New Tray Furnaces, Inductotherm Electric Melting Furnaces, and Cooling Chambers; Aux Furnaces 1, 1b, 2, 2b, 3; New Ball Mills and Metal Processing Equipment	--	--	--	--	--	--	0.05	0.22	--	--	--	--	0.05	0.22	0.05	0.22
Plume Suppressor (Insignificant)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Facility Total	0.54	2.37	0.45	1.99	0.18	0.80	0.32	1.40	2.03	8.90	0.67	2.95	0.09	0.42	0.05	0.24

Heraeus
Facility Wide
Emissions Summary

Source (ESRN)	CO ₂ eq	
	(lb/hr)	(tpy)
8 Roasting Ovens, 1 Chamber Furnace, and Cooling Chamber burners (65-0049-01)	--	35352.0
Ball Mills 1, 2, 3, 4, 5, 6 and Blenders (65-0049-04)	--	--
Tray Loading	--	--
Crucible Furnace (65-0049-06)	--	615.46
Rotary Oven (65-0049-09)	--	7240.78
Diesel Emergency Engine (65-0049-11)	--	156.11
New Tray Furnaces, Inductotherm Electric Melting Furnaces, and Cooling Chambers; Aux Furnaces 1, 1b, 2, 2b, 3; New Ball Mills and Metal Processing Equipment	--	2315.46
Plume Suppressor (Insignificant)	--	4103.07
Facility Total		49782.88

Source (ESRN)	Mercury N458		Methanol		Tetrachloroethene 127-18-4		Benzene 71-43-2		Toluene		Xylene		Ethylbenzene		HCl		HF		Facility Wide HAPs
	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(tpy)
8 Roasting Ovens, 1 Chamber Furnace, and Cooling Chamber burners (65-0049-01)	--	--	0.40	1.77	--	--	--	--	--	--	--	--	--	--	0.75	3.27	0.002	0.01	11.82
Ball Mills 1, 2, 3, 4, 5, 6 and Blenders (65-0049-04)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.78
Tray Loading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.39
Crucible Furnace (65-0049-06)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.43
Rotary Oven (65-0049-09)	2.46E-07	1.08E-06	--	--	2.56E-01	2.53E-02	0.03	0.11	0.05	0.22	0.02	0.09	3.14E-03	1.37E-02	3.00E-04	1.31E-03	--	--	0.49
Diesel Emergency Engine (65-0049-11)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
New Tray Furnaces, Inductotherm Electric Melting Furnaces, and Cooling Chambers; Aux Furnaces 1, 1b, 2, 2b, 3; New Ball Mills and Metal Processing Equipment	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.65
Plume Suppressor (Insignificant)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Facility Total	2.46E-07	1.08E-06	0.40	1.77	2.56E-01	2.53E-02	0.03	0.11	0.05	0.22	0.02	0.09	3.14E-03	0.01	0.75	3.27	0.002	0.01	24.56



TITLE V PERMIT APPLICATION COMPLIANCE PLAN AND COMPLIANCE CERTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:

Heraeus Metal Processing, Inc.

2. List all the process emission source(s) or fuel burning installation(s) or incinerator(s) that are part of this application.

6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b (RH Oil), 2, 2b (Voss) and 3 - all with 43,000 CFM Baghouse Control Stack S12-1

COMPLIANCE PLAN AND CERTIFICATION

3. Indicate that source(s) which are contained in this application are presently in compliance with all applicable requirements, by checking the following:

- _____ A. Attached is a statement of identification of the source(s) currently in compliance. We will continue to operate and maintain the source(s) to assure compliance with all the applicable requirements for the duration of the permit.
- X** _____ B. APC 30 form(s) includes new requirements that apply or will apply to the source(s) during the term of the permit. We will meet such requirements on a timely basis.

4. Indicate that there are source(s) that are contained in this application which are not presently in full compliance, by checking both of the following:

- NA** _____ A. Attached is a statement of identification of the source(s) not in compliance, non-complying requirement(s), brief description of the problem, and the proposed solution.
- NA** _____ B. We will achieve compliance according to the following schedule:

Action

Deadline

Progress reports will be submitted:

Start date: **NA** _____ and every 180 days thereafter until compliance is achieved.

5. State the compliance status with any applicable compliance assurance monitoring and compliance certification requirements that have been promulgated under section 114(a)(3) of the Clean Air Act as of the date of submittal of this APC 31.

NA

6. Page number:

Revision number:

Date of revision:



TITLE V PERMIT APPLICATION FACILITY IDENTIFICATION

SITE INFORMATION				
1. Organization's legal name Heraeus Metal Processing, LLC			For APC Use Only	APC company point no.
2. Site name (if different from legal name)				APC Log/Permit no.
3. Site address (St./Rd./Hwy.) 1975 Knoxville Highway			NAICS or SIC Code 331492	
City or distance to nearest town Wartburg		Zip code 37887	County name Morgan	
4. Site location (in Lat./Long)	Latitude 36.095278		Longitude 084.548889	
CONTACT INFORMATION (RESPONSIBLE OFFICIAL)				
5. Responsible official contact Norbert Ritschel			Phone number with area code 423-346-8200	
6. Mailing address (St./Rd./Hwy.) 1975 Knoxville Highway			Fax number with area code	
City Wartburg	State TN	Zip code 37887	Email address norbert.ritschel@heraeus.com	
CONTACT INFORMATION (TECHNICAL)				
7. Principal technical contact Linda Hunt			Phone number with area code 423-346-8200	
8. Mailing address (St./Rd./Hwy.) 1975 Knoxville Highway			Fax number with area code	
City Wartburg	State TN	Zip code 37887	Email address linda.hunt@heraeus.com	
CONTACT INFORMATION (BILLING)				
11. Billing contact Linda Hunt			Phone number with area code 423-346-8200	
12. Mailing address (St./Rd./Hwy.) 1975 Knoxville Highway			Fax number with area code	
City Wartburg	State TN	Zip code 37887	Email address linda.hunt@heraeus.com	
TYPE OF PERMIT REQUESTED				
13. Permit requested for: Initial application to operate : <input style="width: 60px; height: 20px;" type="checkbox"/> Permit renewal to operate : <input style="width: 60px; height: 20px;" type="checkbox"/> Administrative permit amendment : <input style="width: 60px; height: 20px;" type="checkbox"/> Minor permit modification : <input checked="" style="width: 60px; height: 20px;" type="checkbox"/> Significant modification : <input style="width: 60px; height: 20px;" type="checkbox"/> Construction permit : <input style="width: 60px; height: 20px;" type="checkbox"/>				

(OVER)

HAZARDOUS AIR POLLUTANTS, DESIGNATIONS, AND OTHER PERMITS ASSOCIATED WITH FACILITY

14. Is this facility subject to the provisions governing prevention of accidental releases of hazardous air contaminants contained in Chapter 1200-03-32 of the Tennessee Air Pollution Control regulations?

☐

Yes

☒

No

If the answer is Yes, are you in compliance with the provisions of Chapter 1200-03-32 of the Tennessee Air Pollution Control regulations?

☐

Yes

☐

No

15. If facility is located in an area designated as "Non-Attainment" or "Additional Control", indicate the pollutant(s) for the designation.

Not Applicable

16. List all valid Air Pollution permits issued to the sources contained in this application [identify all permits with most recent permit numbers and emission source reference numbers listed on the permit(s)].

Permit No.	Emission Source No.
561481	65-0049

17. Page number :

Revision number:

Date of revision:



TITLE V PERMIT APPLICATION OPERATIONS AND FLOW DIAGRAMS

1. Please list, identify, and describe briefly process emission sources, fuel burning installations, and incinerators that are contained in this application. Please attach a flow diagram for this application.

--New Source No. 65-0049

Description: Six Inductotherm Electric Melting Furnaces, Eight Cooling Chambers, and Two Tray Furnaces - each are natural gas fired and rated at 0.25 MMBtu/hr and both are controlled by one 0.4 MMBtu/hr afterburner. Seven Newark Ball Mills, Screener, Jaw Crusher, Polishing, Two Kulzer Ball Mills, Kulzer Sifter, and Kulzer Transfer. Auxiliary Furnace #1 (Rhodium Oil) with a burner rating of 0.15 MMBtu/hr, Auxiliary Furnace #1b (Rhodium Oil) with a burner rating of 0.15 MMBtu/hr, Auxiliary Furnace #2 (Voss Converter) with a burner rating of 1.0 MMBtu/hr, Auxiliary Furnace #2b (Voss Converter) with a burner rating of 1.0 MMBtu/hr, Auxiliary Furnace #3 (PTA Coke) with a burner rating of 0.35 MMBtu/hr This equipment is controlled by one 43,000 CFM Baghouse.

2. List all insignificant activities which are exempted because of size or production rate and cite the applicable regulations.

Insignificant Source	Applicable Regulations
Plume Suppressor	1200-3-9-.04(4)(a)
Low Grade Blender	1200-3-9-.04(2)(a)(3)
Tube Leach & Cutting Operations	1200-3-9-.04(2)(a)(3)
Two electrically heated induction furnaces	1200-3-9-.04(2)(a)(3)
Electric Carbon re-burn furnace	1200-3-9-.04(2)(a)(3)
Propane Storage Tank	1200-3-9-.04(5)(f)(43)
MBK mixing	1200-3-9-.04(2)(a)(3)
Newark Sampling Lab	1200-03-09-.04(5)(f)19

3. Are there any storage piles?

YES _____ NO X

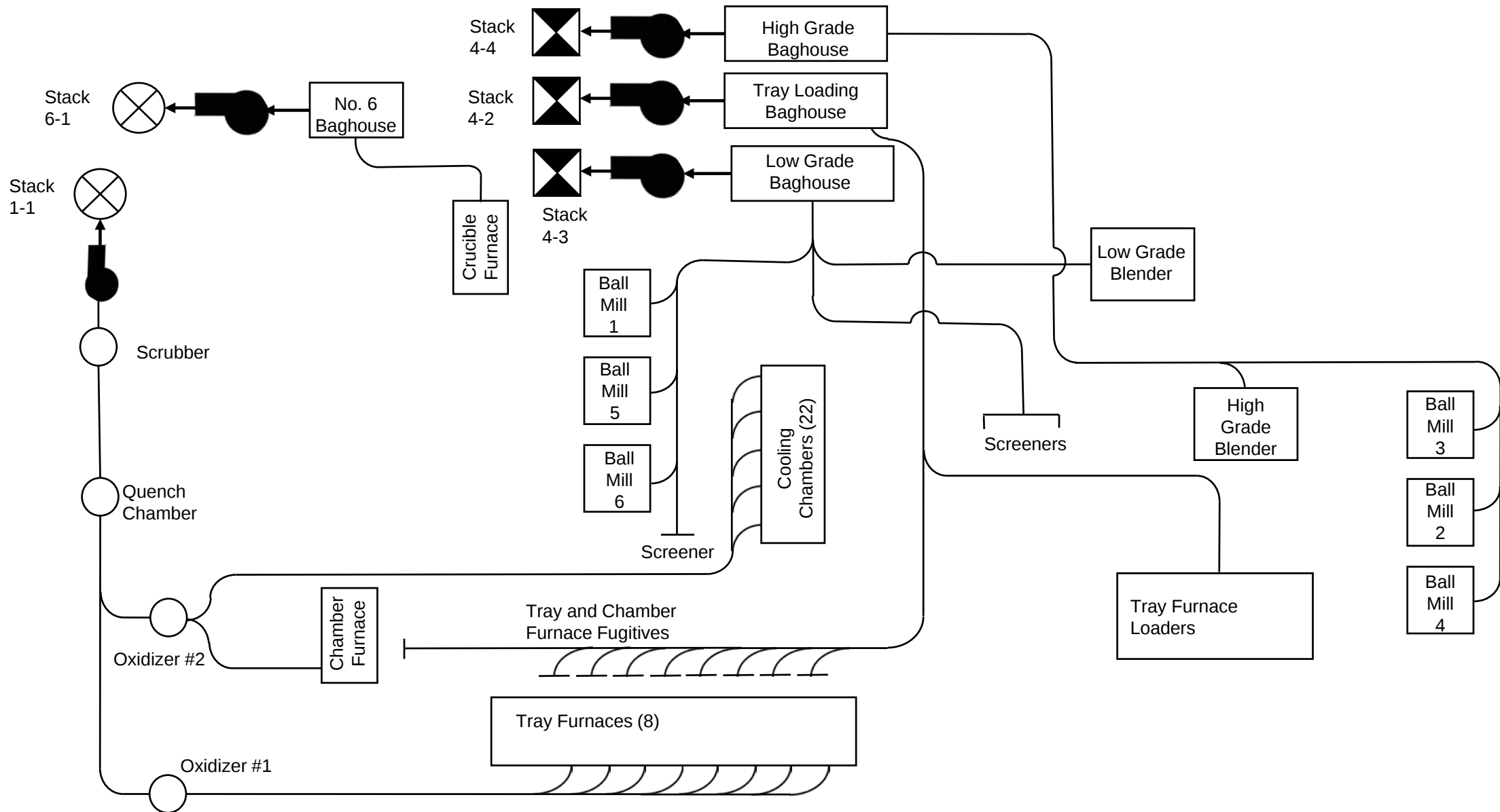
4. List the states that are within 50 miles of your facility.

Kentucky

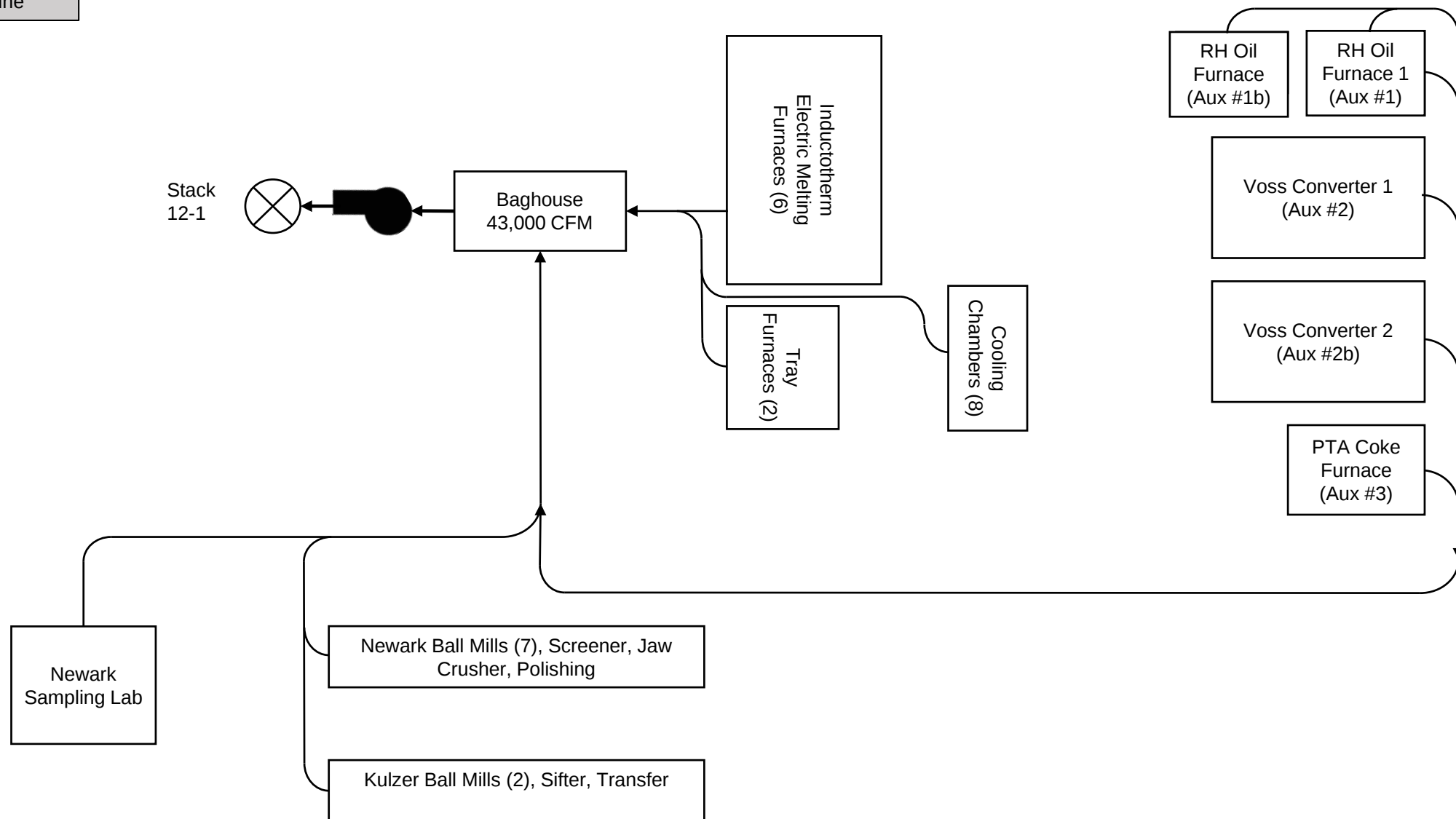
5. Page number:

Revision Number:

Date of Revision:



New Melting and Processing Line





TITLE V PERMIT APPLICATION MISCELLANEOUS PROCESSES

GENERAL IDENTIFICATION AND DESCRIPTION			
1. Facility name: Heraeus Metal Processing, LLC			
2. Process emission source (identify): 6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b (RH Oil), 2, 2b (Voss), and 3 - all with 43,000 CFM Baghouse Control			
3. Stack ID or flow diagram point identification (s): S12-1		4. Year of construction or last modification: 2016	
If the emissions are controlled for compliance, attach an appropriate Air Pollution Control system form.			
5. Normal operating schedule: 24 Hrs./Day 7 Days/Wk. 365 Days/Yr.			
6. Location of this process emission source in UTM coordinates: UTM Vertical : 3997342 UTMHorizontal: 720604			
7. Describe this process (Please attach a flow diagram of this process) and check one of the following: ☒ Batch ☐ Continuous			
PROCESS MATERIAL INPUT AND OUTPUT			
8. List the types and amounts of raw materials input to this process:			
Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Precious Metal Bearing	Melted in furnaces and further processed in	5,111 (Tons/year)	5,111 (Tons/year)
Material	processing equipment	(rolling 12 month avg.)	(rolling 12 month avg.)
9. List the types and amounts of primary products produced by this process:			
Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
10. Process fuel usage:			
Type of fuel	Max heat input (10 ⁶ BTU/Hr.)	Average usage (units)	Maximum usage (units)
Natural Gas	3.55 MMBtu/hr (total)	30.49 MMscf/yr	30.49 MMscf/yr
11. List any solvents, cleaners, etc., associated with this process: N/A			
If the emissions and/or operations of this process are monitored for compliance, please attach the appropriate Compliance Demonstration form.			
12. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, open air sand blasting, material handling operations, etc. (please attach a separate sheet if necessary). N/A			
13. Page number: Revision Number: Date of Revision:			



TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: Heraeus Metal Processing, LLC	
2. Emission source (identify): S12-1	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): 65-0049: 6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and 2 Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b (Voss) and 3 - all with 43,000 CFM Baghouse Control Stack S12-1	
4. Stack height above grade in feet: 45 ft	
5. Velocity (data at exit conditions): 62 _____ (Actual feet per second)	6. Inside dimensions at outlet in feet: 3.83 ft diameter
7. Exhaust flowrate at exit conditions (ACFM): 43,000	8. Flow rate at standard conditions (DSCFM): 28,960
9. Exhaust temperature: 312 _____ Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.9 _____ Percent _____ Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): N/A _____ (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? _____ Yes X _____ No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: _____ Revision Number: _____ Date of Revision: _____	



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: Heraeus Metal Processing, LLC				
2. Stack ID or flow diagram point identification (s): S12-1				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). Two (2) Tray Furnaces				
4. Fuel burning equipment identification number: Tray Furnaces 9-10				
5. Fuel burning equipment description: Each equipped with one primary burner each with a firing rate of 250,000 Btu/hr. One oxidizer is installed for the two furnaces with a firing rate of 400,000 Btu/hr. Total capacity (2 furnaces + 1 oxidizer) = 900,000 Btu/hr				
6. Year of installation or last modification of fuel burning equipment. 2016				
7. Furnace type: Tray Furnace		8. Manufacturer model number (if available):		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: <u>3997342</u> UTM Horizontal: <u>720604</u>				
10. Normal operating schedule: <u>7</u> Hrs./Day <u>24</u> Days/Wk. <u>365</u> Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 0.90 MMBtu/hr		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input.		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas			
Actual yearly consumption	7.73 MMCF/yr			
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: One 43,000 CFM Baghouse for Particulate Matter Control.				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary).				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: Heraeus Metal Processing, LLC				
2. Stack ID or flow diagram point identification (s): S12-1				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). Auxiliary Furnace 1 Rhodium Oil Furnace				
4. Fuel burning equipment identification number: Auxiliary Furnace 1				
5. Fuel burning equipment description: Equipped with a 150,000 Btu/hr natural gas/diesel burner				
6. Year of installation or last modification of fuel burning equipment. 2015				
7. Furnace type: Rhodium Oil Furnace		8. Manufacturer model number (if available):		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: 3997342 UTM Horizontal: 720604				
10. Normal operating schedule: 7 Hrs./Day 24 Days/Wk. 365 Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 0.15 MMBtu/hr		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input.		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	Diesel		
Actual yearly consumption	1.3 MMCF	9.39 (10 ³ gal)		
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: One 43,000 CFM Baghouse for Particulate Matter Control				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary).				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: Heraeus Metal Processing, LLC				
2. Stack ID or flow diagram point identification (s): S12-1				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). Auxiliary Furnace 1b (Rhodium Oil)				
4. Fuel burning equipment identification number: Auxiliary Furnace 1b				
5. Fuel burning equipment description: Equipped with a 150,000 Btu/hr natural gas/diesel burner				
6. Year of installation or last modification of fuel burning equipment. 2016				
7. Furnace type: Rhodium Oil Furnace		8. Manufacturer model number (if available):		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: 3997342 UTM Horizontal: 720604				
10. Normal operating schedule: 7 Hrs./Day 24 Days/Wk. 365 Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 0.15 MMBtu/hr		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input.		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	Diesel		
Actual yearly consumption	1.3 MMCF	9.39 (10 ³ gal)		
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: One 43,000 CFM Baghouse for Particulate Matter Control.				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary).				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: Heraeus Metal Processing, LLC				
2. Stack ID or flow diagram point identification (s): S12-1				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). Auxiliary Furnace 2 (Voss Converter)				
4. Fuel burning equipment identification number: Auxiliary Furnace 2				
5. Fuel burning equipment description: Equipped with a 1.0 MMBtu/hr propylene/oxygen burner				
6. Year of installation or last modification of fuel burning equipment. 2015				
7. Furnace type: Voss Converter		8. Manufacturer model number (if available):		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: 3997342 UTM Horizontal: 720604				
10. Normal operating schedule: 7 Hrs./Day 24 Days/Wk. 365 Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 1.0 MMBtu/hr		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input.		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	Propylene		
Actual yearly consumption	9MMCF	85.9 (10 ³ gal)		
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: One 43,000 CFM Baghouse for Particulate Matter Control.				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary).				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: Heraeus Metal Processing, LLC				
2. Stack ID or flow diagram point identification (s): S12-1				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). Auxiliary Furnace 2b (Voss Converter)				
4. Fuel burning equipment identification number: Auxiliary Furnace 2b				
5. Fuel burning equipment description: Equipped with a 1.0 MMBtu/hr propylene/oxygen burner				
6. Year of installation or last modification of fuel burning equipment. 2016				
7. Furnace type: Voss Converter		8. Manufacturer model number (if available):		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: 3997342 UTM Horizontal: 720604				
10. Normal operating schedule: 7 Hrs./Day 24 Days/Wk. 365 Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 1.0 MMBtu/hr		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input.		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	Propylene		
Actual yearly consumption	9 MMCF	85.9 (10 ³ gal)		
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: One 43,000 CFM Baghouse for Particulate Matter Control.				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary).				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: Heraeus Metal Processing, LLC				
2. Stack ID or flow diagram point identification (s): S12-1				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). Auxiliary Furnace 3 (PTA Coke Furnace)				
4. Fuel burning equipment identification number: Auxiliary Furnace 3				
5. Fuel burning equipment description: Equipped with a 350,000 Btu/hr natural gas burner				
6. Year of installation or last modification of fuel burning equipment. Minor Modification 3 (2014)				
7. Furnace type: PTA Coke Auxiliary Furnace		8. Manufacturer model number (if available):		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: <u>3997342</u> UTM Horizontal: <u>720604</u>				
10. Normal operating schedule: <u>7</u> Hrs./Day <u>24</u> Days/Wk. <u>365</u> Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 0.35 MMBtu/hr		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input.		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	Coke	Charcoal	
Actual yearly consumption	3 MMCF/yr	122.6 Tons/year	122.6 Tons/year	
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: One 43,000 CFM Baghouse for Particulate Matter Control.				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary).				
17. Page number: 6		Revision Number:		Date of Revision:

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: Heraeus Metal Processing, LLC		2. Emission source (identify): 6 Inductoterm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b (Voss), and 3 - all with 43,000 CFM Baghouse Control
3. Stack ID or flow diagram point identification (s): S12-1		
OXIDIZER DESCRIPTION		
4. Describe the oxidation system in use. List the key operating parameters of this device and their normal operating range. The emissions from two (2) 0.25 MMBtu/hr natural gas-fired tray furnaces are controlled by one Natural Gas Fired Afterburner with a maximum heat input of 0.4 MMBtu/hr. The afterburner discharges to a single 43,000 CFM Baghouse. Design Air Flow (combined air flow): 43,000 (ACFM) @312 degrees F Minimum Thermal Oxidizer Temp.: 1,400 degrees F		
5. Manufacturer and model number (if available): TMTS Associates, Inc.	6. Year of installation: 2016	7. Type (check one): Catalytic oxidizer ☐ Thermal oxidizer ☒
8. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant.		
Pollutant	Efficiency (%)	Source of data
VOC	95.0%	Best Engineering Estimate of Process
9. If applicable, discuss how spent catalyst is handled for reuse or disposal. N/A		
10. Equipment specifications:		
Catalytic oxidation	Thermal oxidation	
10A. Minimum operating temperature (°F): N/A	10B. Minimum operating temperature (°F): 1,400	
11A. Type of fuel used: N/A	11B. Type of fuel used: Natural Gas	
12. Type of catalyst used and volume of catalyst used (Ft. ³): N/A	12. Not applicable. N/A	
13A. Maximum fuel use: N/A	13B. Maximum fuel use: 392 (scf/hr) each	
14A. Residence time (sec.): N/A	14B. Residence time (sec.): 8.0 (sec)	
15. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. The afterburner is in series with a 43,000 CFM Baghouse. The overall efficiency: VOC Removal - 95%, PM Removal - 99%		
16. Page number:	Revision Number:	Date of Revision:



TITLE V PERMIT APPLICATION CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION														
1. Facility name: Heraeus Metal Processing, LLC	2. Emission source (identify): 6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and 2 Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b (Voss) and 3													
3. Stack ID or flow diagram point identification (s): S12-1														
BAGHOUSE/FABRIC FILTER DESCRIPTION														
4. Describe the device in use. List the key operating parameters of this device and their normal operating range. Air Flow: 43,000 ACFM, 28,960 DSCFM 1.9 % moisture 312 degrees F Minimum Pressure Drop: (to be determined)														
5. Manufacturer and model number (if available): TMTS Associates, Inc.	6. Year of installation: 2016													
7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions). <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 35%;">Pollutant</th> <th style="width: 25%;">Efficiency (%)</th> <th style="width: 40%;">Source of data</th> </tr> </thead> <tbody> <tr> <td>Particulate</td> <td style="text-align: center;">99%</td> <td>Best Engineering Estimate of Process</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Pollutant	Efficiency (%)	Source of data	Particulate	99%	Best Engineering Estimate of Process						
Pollutant	Efficiency (%)	Source of data												
Particulate	99%	Best Engineering Estimate of Process												
8. Discuss how collected material is handled for reuse or disposal. Dust is captured and recycled back through the process to reclaim any precious metals.														
9. If the bags are coated, specify the material used for coating and frequency of coating N/A														
10. Does the baghouse collect asbestos containing material? Yes ☐ No ☒ If "Yes", provide data as outlined in Item 10, Instructions for this form.														
11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. N/A														
12. Page number:	Revision Number:	Date of Revision:												



TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Heraeus Metal Processing, LLC
2. Process emission source, fuel burning installation, or incinerator (identify): 6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b(Voss), and 3 - all with 43,000 CFM Baghouse
3. Stack ID or flow diagram point identification(s): S12-1 Control.

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

☐ Continuous Emission Monitoring (CEM) - APC 20
 Pollutant(s): _____

☐ Emission Monitoring Using Portable Monitors - APC 21
 Pollutant(s): _____

☒ Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
 Pollutant(s): PM, VOC & HAP

☐ Monitoring Maintenance Procedures - APC 23
 Pollutant(s): _____

☐ Stack Testing - APC 24
 Pollutant(s): _____

☐ Fuel Sampling & Analysis (FSA) - APC 25
 Pollutant(s): _____

☒ Recordkeeping - APC 26
 Pollutant(s): PM, VOC & HAP

☒ Other (please describe) - APC 27
 Pollutant(s): Visible Emissions

5. Compliance certification reports will be submitted to the Division according to the following schedule:
 Start date: One year from receipt of Title V Operating Permit
 And every 365 days thereafter.
6. Compliance monitoring reports will be submitted to the Division according to the following schedule:
 Start date: 180 Days from receipt of Title V Operating Permit
 And every 180 days thereafter.
7. Page number: _____ Revision number: _____ Date of revision: _____



TITLE V PERMIT APPLICATION - COMPLIANCE DEMONSTRATION BY MONITORING CONTROL SYSTEM PARAMETERS OR OPERATING PARAMETERS OF A PROCESS

The monitoring of a control system parameter or a process parameter shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Heraeus Metal Processing, LLC	2. Stack ID or flow diagram point identification(s) S12-1
3. Emission source: 6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b (Voss) and 3 - all with 43,000 CFM Baghouse Control Stack S12-1	

MONITORING DESCRIPTION

4. Pollutant(s) being monitored: PM	
5. Description of the method of monitoring and establishment of correlation between the parameter value and the emission rate of a particular pollutant: Compliance Method: The permittee shall assure compliance with the PM emission limitations by operating, maintaining, and inspecting the air pollution control devices (APCD) as follows: (a) The permittee shall comply with Conditions E3-3 and E3-4 of this permit. (b) Compliance with this requirement shall be assured through the use of baghouse to control particulate emissions. Within 30 days of the start-up of this facility, the permittee shall begin taking daily pressure drop readings for the baghouses at this facility and daily pressure drop readings shall be recorded from that date forward. The first thirty (30) days of pressure drop (inches of water column) readings for the control system shall be compiled. The designated person(s) shall note any relevant control system conditions/problems/concerns when recording the values. This data shall be submitted to the Division, along with a proposed minimum pressure drop for the baghouses, no later than 15 days following the 30 days of readings. The minimum pressure drop values for compliance assurance will be incorporated into the permit. (c) After incorporation of the minimum pressure drop values into the permit, compliance with the specified particulate emission limits shall be assured by maintaining the required minimum pressure drop values for the baghouses. The pressure drop values for the baghouses shall be recorded once daily when the source is in operation. Days when that source is not operating shall be noted. For lower pressure drop reading(s) resulting from replacement of bags, the permittee shall record the deviation(s) as such in their daily records. Due allowance will be made for lower pressure drop reading(s) which follow replacement of bags provided the permittee establishes to the satisfaction of the Technical Secretary that these lower readings resulted from the replacement of bags. All data, including all required calculations, must be entered in the log no later than 7 days from the end of the day for which the data is required.	
6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Log entries shall be made once per day	

7. Page number:	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION

COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Heraeus Metal Processing, LLC	2. Stack ID or flow diagram point identification(s): S12-1
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3. Emission source (identify):
 6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b (Voss) and 3 - all with 43,000 CFM Baghouse Control Stack S12-1

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored:
 PM, VOC, and HAPs

5. Material or parameter being monitored and recorded:
 Material Input

6. Method of monitoring and recording:
 a. The permittee shall maintain a log of the material input rate for each actual calendar month, in a form that readily shows compliance with the total raw material input limit of 5,111 (tons per 12 month rolling average). The log shall be retained for a period of not less than five (5) years.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
 All log entries shall be entered into the log no later than 30 days from the end of the month for which the data is required.

8. Page number:	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION COMPLIANCE DEMONSTRATION BY OTHER METHOD(S)

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: Heraeus Metal Processing, LLC	2. Stack ID or flow diagram point identification(s): S12-1	
3. Emission source (identify): 6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b (Voss) and 3 - all with 43,000 CFM Baghouse Control Stack S12-1		
MONITORING DESCRIPTION		
4. Pollutant(s) or parameter being monitored: Visible Emissions		
5. Description of the method of monitoring: Compliance with this emission limitation shall be certified through utilization of the Division's Opacity Matrix dated June 18, 1996 and amended on September 11, 2013.		
6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Compliance demonstration frequency shall be in accordance with the Opacity Matrix.		
7. Page number:	Revision number:	Date of revision:



TITLE V PERMIT APPLICATION

EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: Heraeus Metal Processing, LLC	2. Stack ID or flow diagram point identification(s): S12-1

3. Process emission source / Fuel burning installation / Incinerator (identify):
 6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b (Voss) and 3 - all with 43,000 CFM Baghouse Control Stack S12-1

EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS
4. Complete the following <u>emissions summary for regulated air pollutants</u> . Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Particulate Matter (TSP)	21.74		21.74	
(Fugitive Emissions)				
Sulfur Dioxide	14.43		14.43	
(Fugitive Emissions)				
Volatile Organic Compounds	32.08		32.08	
(Fugitive Emissions)				
Carbon Monoxide	1.83		1.83	
(Fugitive Emissions)				
Lead	0		0	
(Fugitive Emissions)				
Nitrogen Oxides	2.44		2.44	
(Fugitive Emissions)				
Total Reduced Sulfur				
(Fugitive Emissions)				
Mercury				
(Fugitive Emissions)				

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Asbestos				
(Fugitive Emissions)				
Beryllium				
(Fugitive Emissions)				
Vinyl Chloride				
(Fugitive Emissions)				
Fluorides				
(Fugitive Emissions)				
Gaseous Fluorides				
(Fugitive Emissions)				
Greenhouse Gases in CO ₂ Equivalents	2,316		2,316	

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Nickel	0.22		0.22	
Antimony	0.22		0.22	
Cadmium	0.22		0.22	

6. Page number: Revision number: Date of revision



**TITLE V PERMIT APPLICATION
CURRENT EMISSIONS REQUIREMENTS AND STATUS**

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Heraeus Metal Processing, LLC	2. Emission source number 65-0049
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3. Describe the process emission source / fuel burning installation / incinerator. **6 Inductotherm Electric Melting Furnaces, 8 Cooling Chambers, and Tray Furnaces; 7 Ball Mills, Screener, Jaw Crusher, Polishing, and Kulzer 2 Ball Mills, Sifter, Transfer; Auxiliary Furnaces 1, 1b(RH Oil), 2, 2b (Voss) and 3 - all with 43,000 CFM Baghouse Control Stack S12-1**

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
	PM	1200-03-07-.01(5)	4.96 lb/hr	4.96 lb/hr	IN
	SO2	1200-03-14-.01(3)	0.6 lb/MMscf	14.43 tpy	IN
	NOx	1200-3-7-.07(2)	100 lb/MMscf	2.44 tpy	IN
	CO	1200-3-7-.07(2)	84 lb/MMscf	1.83 tpy	IN
	VOC	1200-3-18-.02(2)	5.5 lb/MMscf	32.08 tpy	IN
	VE	1200-03-05-.01(1)	10% - Method 9	10% - Method 9	IN
Facility Wide	HAPs	1200-3-31-.02(1)	9.9 tpy Individual	24.9 tpy Total	IN
		and Permit 561481 Condition E3-6			

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

11. Page number:	Revision number:	Date of revision:
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Heraeus

2 Tray Furnaces, 6 Inductotherm Electric Melting Furnaces, and 8 Cooling Chambers + Aux Furnaces 1, 1b, 2, 2b, and 3

Newark -- 7 Ball Mills, Screener, Jaw Crusher, Polishing/Kulzer -- 2 Ball Mills, Sifter, Transfer

43,000 CFM Baghouse

Operating Hours 8,760 hr/yr

Flow Rate (ACFM)	Dia (ft)	Exit Velocity (ft/sec)	Exit Temp (F)	Moisture Content %	Flow Rate (DSCFM)	Exhaust PM Conc. (gr/dscf)	PM		Nickel			Antimony			Cadmium			Total HAP
							lb/hr	tpy	%	(lb/hr)	(tpy)	%	(lb/hr)	(tpy)	%	(lb/hr)	(tpy)	(tpy)
43,000	3.83	62	312	1.9%	28960	0.02	4.96	21.7	1%	0.05	0.22	1%	0.05	0.22	1%	0.05	0.22	0.65

1. Metal HAP emissions based on HAP% x PM

2. Exhaust concentration based on engineering judgement and material data

Heraeus

Tray Furnaces

Part of new addition to Heraeus Wartburg Facility. VOC's controlled by one 400,000 BTU/hr Afterburner and Particulate Matter controlled by one 43,000 CFM Baghouse.

Operating Parameters

Fuel Type	Natural Gas	
Furnace Primary Burner	250,000	BTU/hr
Furnace Primary Burner	250,000	BTU/hr
1 Afterburner	400,000	BTU/hr
Combined Max Firing Rate (2 primary burners + 1 Afterburner)	0.90	MMBtu/hr
Operating hours	8,760	hr/yr
Annual Fuel Usage	Natural Gas	
	7.73	MMCF
	882	scf/hr

Emission Calculations

Emission Factors for Natural Gas Combustion^{1,2}

	<u>lb/10⁶ scf</u>	<u>lb/MMBtu-HHV</u>	
Particulate Matter (PM _{Total})	7.6	0.0075	AP-42
Particulate Matter (PM _{Cond})	5.7	0.0056	AP-42
Particulate Matter (PM _{Filter}) ³	1.9	0.0019	AP-42
Nitrogen Oxides (NO _x)	100	0.0980	AP-42
Carbon Monoxide	84	0.0824	AP-42
Sulfur Dioxide (SO ₂)	0.6	0.0006	AP-42
VOC	5.5	0.0054	AP-42
Carbon Dioxide (CO ₂)	119,316	116.98	40 CFR 98 Table C-1
Methane (CH ₄)	2.249	2.205E-03	40 CFR 98 Table C-2
Nitrous Oxide (N ₂ O)	0.22	2.205E-04	40 CFR 98 Table C-2

Natural Gas Emissions

GWP ⁶	
CH4	25
N2O	298

Furnace Primary Burners(2) + Afterburner

	lb/hr	Annual ^{4,5} ton/year
Particulate Matter (PM _{Total})	0.01	0.03
Particulate Matter (PM _{10f})	1.68E-03	0.01
Particulate Matter (PM _{2.5f})	1.68E-03	0.01
Particulate Matter (PM _{Cond})	0.01	0.02
Nitrogen Oxides (NO _x)	0.09	0.39
Carbon Monoxide	0.07	0.32
Sulfur Dioxide (SO ₂)	5.29E-04	2.32E-03
Combustion VOC	0.00	0.02
Carbon Dioxide (CO ₂)	105.28	461.12
Methane (CH ₄)	1.98E-03	0.01
Nitrous Oxide (N ₂ O)	1.98E-04	8.69E-04
CO ₂ Equivalent (CO _{2eq}) ⁸	--	461.60

Example Calculations/Notes:

- (1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Section 1.4, Tables 1.4-1 and 1.4-2, July 1998, Small Boilers < 100 MMBtu/hr
- (2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from lb/10⁶ scf to kg/10⁶ m³, multiply by 16. To convert from lb/10⁶ scf to lb/MMBtu, divide by 1,020.
- (3) Assume PM_{Filt} = PM_{2.5}, PM₁₀
- (4) Maximum Emissions (lb/hr) = Emission Factor (lb/MMscf) * Natural Gas Usage (MMCF)
- (5) Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)
- (6) GWP from 40 CFR 98 Subpart A Table A-1; to convert kg/MMBtu to lb/MMBtu, multiply by 2.205
- (7) CO₂, CH₄, and N₂O Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)
- (8) CO₂ Equivalent (CO_{2eq}) = CO₂(t) + [GWP_{CH4} * CH₄ (t)] + [GWP_{N2O} * N₂O (t)]

Heraeus

Tray Furnaces

Part of new addition to Heraeus Wartburg Facility. VOC's controlled by new 400,000 Btu/h Afterburner

Operating hours 8,760 hr/yr

Tray Furnaces Annual Throughput (TPY)	Organic Material Fraction of Total Material Throughput	Tons/Year of Organic Material through Furnaces	VOC Fraction of the Organic Material	Uncontrolled VOC Emissions (TPY)	Afterburner VOC Destruction Efficiency	Controlled VOC Emissions (TPY)	Controlled VOC Emissions (lb/hr)
5,111	25%	1277.75	50%	638.875	95%	31.94	7.29

Heraeus

Aux Furnace #1

Removed from Source 01 and relocated to new addition to Heraeus Wartburg facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Operating Parameters

Fuel Type	Natural Gas		
Maximum Firing Rate	0.15	MMBtu/hr	
Operating hours	8,760	hr/yr	Diesel heating value = 140,000 Btu/gal 1,047,200 Btu/ft ³
Annual Fuel Usage	Natural Gas		Diesel
	1.3	MMCF	1.25E-03 MMCF
			9.39 10 ³ gal

Emission Calculations

Emission Factors for Natural Gas Combustion^{1,2}

	<u>lb/10⁶ scf</u>	<u>lb/MMBtu-HHV</u>	
Particulate Matter (PM _{Total})	7.6	0.0075	AP-42
Particulate Matter (PM _{Cond})	5.7	0.0056	AP-42
Particulate Matter (PM _{Filter}) ³	1.9	0.0019	AP-42
Nitrogen Oxides (NO _x)	100	0.0980	AP-42
Carbon Monoxide	84	0.0824	AP-42
Sulfur Dioxide (SO ₂)	0.6	0.0006	AP-42
VOC	5.5	0.0054	AP-42
Carbon Dioxide (CO ₂)	119,316	116.98	40 CFR 98 Table C-1
Methane (CH ₄)	2.249	2.205E-03	40 CFR 98 Table C-2
Nitrous Oxide (N ₂ O)	0.22	2.205E-04	40 CFR 98 Table C-2

Natural Gas Emissions

	<u>lb/hr</u>	<u>Annual^{4,5} ton/year</u>
Particulate Matter (PM _{Total})	1.12E-03	4.90E-03
Particulate Matter (PM _{10f})	2.79E-04	1.22E-03
Particulate Matter (PM _{2.5f})	2.79E-04	1.22E-03
Particulate Matter (PM _{Cond})	8.38E-04	3.67E-03
Nitrogen Oxides (NO _x)	0.01	0.06
Carbon Monoxide	0.01	0.05
Sulfur Dioxide (SO ₂)	8.82E-05	3.86E-04
Combustion VOC	8.09E-04	3.54E-03
Carbon Dioxide (CO ₂)	17.55	76.85
Methane (CH ₄)	3.31E-04	1.45E-03
Nitrous Oxide (N ₂ O)	3.31E-05	1.45E-04
CO ₂ Equivalent (CO _{2eq}) ⁸	--	76.93

<u>GWP⁶</u>	
CH4	25
N2O	298

Aux Furnace #1

Removed from Source 01 and relocated to new addition to Heraeus Wartburg facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Emission Factors for Diesel Combustion ¹

	<u>lb/10³ gal</u>	<u>lb/MMBtu-HHV</u>		0.05 %sulfur in fuel
Particulate Matter (PM _{Total})	3.3	2.36E-02	AP-42 Table 1.3-1	
Particulate Matter (PM _{Cond})	1.3	9.29E-03	AP-42 Table 1.3-2	
Particulate Matter (PM _{2.5Filter})	2	1.43E-02	AP-42 Table 1.3-1	
Particulate Matter (PM _{10Filter})	2	1.43E-02	AP-42 Table 1.3-1	
Nitrogen Oxides (NO _x)	20	1.43E-01	AP-42 Table 1.3-1	
Carbon Monoxide	5	3.57E-02	AP-42 Table 1.3-1	
Sulfur Dioxide (SO ₂)	7.1	5.07E-02	AP-42 Table 1.3-1	
VOC	0.252	1.80E-03	AP-42 Table 1.3-3	
Carbon Dioxide (CO ₂)	--	163.05	40 CFR 98 Table C-1	
Methane (CH ₄)	--	6.61E-03	40 CFR 98 Table C-2	
Nitrous Oxide (N ₂ O)	--	1.32E-03	41 CFR 98 Table C-2	

Diesel Fuel Emissions

	lb/hr	Annual ^{2,3} ton/year
Particulate Matter (PM _{Total})	3.54E-03	0.02
Particulate Matter (PM _{10f})	2.14E-03	0.01
Particulate Matter (PM _{2.5f})	2.14E-03	0.01
Particulate Matter (PM _{Cond})	1.39E-03	0.01
Nitrogen Oxides (NO _x)	0.02	0.09
Carbon Monoxide	0.01	0.02
Sulfur Dioxide (SO ₂)	0.01	0.03
Combustion VOC	2.70E-04	1.18E-03
Carbon Dioxide (CO ₂)	24.46	107.13
Methane (CH ₄)	9.92E-04	4.35E-03
Nitrous Oxide (N ₂ O)	1.98E-04	8.69E-04
CO ₂ Equivalent (CO ₂ eq) ⁵	--	107.49

GWP ⁶	
CH ₄	25
N ₂ O	298

Aux Furnace #1

Removed from Source 01 and relocated to new addition to Heraeus Wartburg facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Summary Table (Highest Emission Rate if either fuel is used)

	lb/hr	ton/year
Particulate Matter (PM _{Total})	3.54E-03	1.55E-02
Particulate Matter (PM _{10f})	2.14E-03	9.39E-03
Particulate Matter (PM _{2.5f})	2.14E-03	9.39E-03
Particulate Matter (PM _{Cond})	1.39E-03	6.10E-03
Nitrogen Oxides (NO _x)	0.02	0.09
Carbon Monoxide	0.01	0.05
Sulfur Dioxide (SO ₂)	7.61E-03	3.33E-02
Combustion VOC	8.09E-04	3.54E-03
Carbon Dioxide (CO ₂)	24.46	107.13
Methane (CH ₄)	9.92E-04	4.35E-03
Nitrous Oxide (N ₂ O)	1.98E-04	8.69E-04
CO ₂ Equivalent (CO _{2eq}) ⁸	--	107.49

Example Calculations/Notes:

- (1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Section 1.4, Tables 1.4-1 and 1.4-2, July 1998, Small Boilers < 100 MMBtu/hr and AP-42, Supplement D, Fifth Edition, Section 1.3, May 2010
- (2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from lb/10⁶ scf to kg/10⁶ m³, multiply by 16. To convert from lb/10⁶ scf to lb/MMBtu, divide by 1,020.
- (3) Assume PM_{Filt} = PM_{2.5}, PM₁₀
- (4) Maximum Emissions (lb/hr) = Emission Factor (lb/MMscf) * Natural Gas Usage (MMCF) and
Maximum Emissions (lb/hr) = Emission Factor (lb/10³ gal) * Diesel Fuel Usage (10³ gal)
- (5) Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)
- (6) GWP from 40 CFR 98 Subpart A Table A-1; to convert kg/MMBtu to lb/MMBtu, multiply by 2.205
- (7) CO₂, CH₄, and N₂O Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)
- (8) CO₂ Equivalent (CO_{2eq}) = CO₂(t) + [GWP_{CH4} * CH₄ (t)] + [GWP_{N2O} * N₂O (t)]

Heraeus

Auxiliary Furnace #1b (Rhodium Oil)

Part of new addition to Heraeus Wartburg Facility. Particulate Matter controlled by one 43,000 CFM Baghouse.

Operating Parameters

Fuel Type	Natural Gas		
Maximum Firing Rate	0.15	MMBtu/hr	
Operating hours	8,760	hr/yr	Diesel heating value = 140,000 Btu/gal 1,047,200 Btu/ft ³
Annual Fuel Usage	Natural Gas		Diesel
	1.3	MMCF	1.25E-03 MMCF 9.39 10 ³ gal

Emission Calculations

Emission Factors for Natural Gas Combustion^{1,2}

	lb/10 ⁶ scf	lb/MMBtu-HHV	
Particulate Matter (PM _{Total})	7.6	0.0075	AP-42
Particulate Matter (PM _{Cond})	5.7	0.0056	AP-42
Particulate Matter (PM _{Filter}) ³	1.9	0.0019	AP-42
Nitrogen Oxides (NO _x)	100	0.0980	AP-42
Carbon Monoxide	84	0.0824	AP-42
Sulfur Dioxide (SO ₂)	0.6	0.0006	AP-42
VOC	5.5	0.0054	AP-42
Carbon Dioxide (CO ₂)	119,316	116.98	40 CFR 98 Table C-1
Methane (CH ₄)	2.249	2.205E-03	40 CFR 98 Table C-2
Nitrous Oxide (N ₂ O)	0.22	2.205E-04	40 CFR 98 Table C-2

Natural Gas Emissions

	lb/hr	Annual ^{4,5} ton/year
Particulate Matter (PM _{Total})	1.12E-03	4.90E-03
Particulate Matter (PM _{10f})	2.79E-04	1.22E-03
Particulate Matter (PM _{2.5f})	2.79E-04	1.22E-03
Particulate Matter (PM _{Cond})	8.38E-04	3.67E-03
Nitrogen Oxides (NO _x)	0.01	0.06
Carbon Monoxide	0.01	0.05
Sulfur Dioxide (SO ₂)	8.82E-05	3.86E-04
Combustion VOC	8.09E-04	3.54E-03
Carbon Dioxide (CO ₂)	17.55	76.85
Methane (CH ₄)	3.31E-04	1.45E-03
Nitrous Oxide (N ₂ O)	3.31E-05	1.45E-04
CO ₂ Equivalent (CO ₂ eq) ⁸	--	76.93

GWP ⁶	
CH4	25
N2O	298

Auxiliary Furnace #1b (Rhodium Oil)

Part of new addition to Heraeus Wartburg Facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Emission Factors for Diesel Combustion¹

	lb/10 ³ gal	lb/MMBtu-HHV		0.05 %sulfur in fuel
Particulate Matter (PM _{Total})	3.3	2.36E-02	AP-42 Table 1.3-1	
Particulate Matter (PM _{Cond})	1.3	9.29E-03	AP-42 Table 1.3-2	
Particulate Matter (PM _{2.5Filter})	2	1.43E-02	AP-42 Table 1.3-1	
Particulate Matter (PM _{10Filter})	2	1.43E-02	AP-42 Table 1.3-1	
Nitrogen Oxides (NO _x)	20	1.43E-01	AP-42 Table 1.3-1	
Carbon Monoxide	5	3.57E-02	AP-42 Table 1.3-1	
Sulfur Dioxide (SO ₂)	7.1	5.07E-02	AP-42 Table 1.3-1	
VOC	0.252	1.80E-03	AP-42 Table 1.3-3	
Carbon Dioxide (CO ₂)	--	163.05	40 CFR 98 Table C-1	
Methane (CH ₄)	--	6.61E-03	40 CFR 98 Table C-2	
Nitrous Oxide (N ₂ O)	--	1.32E-03	41 CFR 98 Table C-2	

Diesel Fuel Emissions

	lb/hr	Annual ^{2,3} ton/year
Particulate Matter (PM _{Total})	3.54E-03	0.02
Particulate Matter (PM _{10f})	2.14E-03	0.01
Particulate Matter (PM _{2.5f})	2.14E-03	0.01
Particulate Matter (PM _{Cond})	1.39E-03	0.01
Nitrogen Oxides (NO _x)	0.02	0.09
Carbon Monoxide	0.01	0.02
Sulfur Dioxide (SO ₂)	0.01	0.03
Combustion VOC	2.70E-04	1.18E-03
Carbon Dioxide (CO ₂)	24.46	107.13
Methane (CH ₄)	9.92E-04	4.35E-03
Nitrous Oxide (N ₂ O)	1.98E-04	8.69E-04
CO ₂ Equivalent (CO ₂ eq) ⁵	--	107.49

GWP ⁶	
CH4	25
N2O	298

Auxiliary Furnace #1b (Rhodium Oil)

Part of new addition to Heraeus Wartburg Facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Summary Table (Highest Emission Rate if either fuel is used)

	lb/hr	ton/year
Particulate Matter (PM _{Total})	3.54E-03	1.55E-02
Particulate Matter (PM _{10f})	2.14E-03	9.39E-03
Particulate Matter (PM _{2.5f})	2.14E-03	9.39E-03
Particulate Matter (PM _{Cond})	1.39E-03	6.10E-03
Nitrogen Oxides (NO _x)	0.02	0.09
Carbon Monoxide	0.01	0.05
Sulfur Dioxide (SO ₂)	7.61E-03	3.33E-02
Combustion VOC	8.09E-04	3.54E-03
Carbon Dioxide (CO ₂)	24.46	107.13
Methane (CH ₄)	9.92E-04	4.35E-03
Nitrous Oxide (N ₂ O)	1.98E-04	8.69E-04
CO ₂ Equivalent (CO _{2eq}) ⁸	--	107.49

Example Calculations/Notes:

(1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Section 1.4, Tables 1.4-1 and 1.4-2, July 1998, Small Boilers < 100 MMBtu/hr and AP-42, Supplement D, Fifth Edition, Section 1.3, May 2010

(2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from lb/10⁶ scf to kg/10⁶ m³, multiply by 16. To convert from lb/10⁶ scf to lb/MMBtu, divide by 1,020.

(3) Assume PM_{Filt} = PM_{2.5}, PM₁₀

(4) Maximum Emissions (lb/hr) = Emission Factor (lb/MMscf) * Natural Gas Usage (MMCF) and

Maximum Emissions (lb/hr) = Emission Factor (lb/10³ gal) * Diesel Fuel Usage (10³ gal)

(5) Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

(6) GWP from 40 CFR 98 Subpart A Table A-1; to convert kg/MMBtu to lb/MMBtu, multiply by 2.205

(7) CO₂, CH₄, and N₂O Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

(8) CO₂ Equivalent (CO_{2eq}) = CO₂(t) + [GWP_{CH4} * CH₄ (t)] + [GWP_{N2O} * N₂O (t)]

Heraeus

Aux Furnace #2

Removed from Source 01 and relocated to new addition to Heraeus Wartburg facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Operating Parameters

Fuel Type	Natural Gas	Maximum Firing Rate	1.0	MMBtu/hr
Maximum Firing Rate	1.0	MMBtu/hr	102	MMBtu/10 ³ gal
		Butane Heating value	1.083	gr/100 ft ³
Operating hours	8,760	hr/yr		
Annual Fuel Usage	Natural Gas	Propylene (heating value of Butane used)		
	9	MMCF	85.88	10 ³ gal
			11481.6	cubic feet

Aux Furnace #2

Source 01

Emission Calculations

Emission Factors for Natural Gas Combustion^{1,2}

	lb/10 ⁶ scf	lb/MMBtu-HHV	
Particulate Matter (PM _{Total})	7.6	0.0075	AP-42
Particulate Matter (PM _{Cond})	5.7	0.0056	AP-42
Particulate Matter (PM _{Filter}) ³	1.9	0.0019	AP-42
Nitrogen Oxides (NO _x)	100	0.0980	AP-42
Carbon Monoxide	84	0.0824	AP-42
Sulfur Dioxide (SO ₂)	0.6	0.0006	AP-42
VOC	5.5	0.0054	AP-42
Carbon Dioxide (CO ₂)	119,316	116.98	40 CFR 98 Table C-1
Methane (CH ₄)	2.249	2.205E-03	40 CFR 98 Table C-2
Nitrous Oxide (N ₂ O)	0.22	2.205E-04	40 CFR 98 Table C-2

Natural Gas Emissions

	lb/hr	Annual ^{4,5} ton/year
Particulate Matter (PM _{Total})	7.45E-03	0.03
Particulate Matter (PM _{10f})	1.86E-03	0.01
Particulate Matter (PM _{2.5f})	1.86E-03	0.01
Particulate Matter (PM _{Cond})	5.59E-03	0.02
Nitrogen Oxides (NO _x)	9.80E-02	0.43
Carbon Monoxide	8.24E-02	0.36
Sulfur Dioxide (SO ₂)	5.88E-04	0.00
Combustion VOC	5.39E-03	0.02
Carbon Dioxide (CO ₂)	116.98	512.36
Methane (CH ₄)	2.20E-03	0.01
Nitrous Oxide (N ₂ O)	2.20E-04	9.66E-04
CO ₂ Equivalent (CO ₂ eq) ⁸	--	512.88

GWP ⁶	
CH4	25
N2O	298

Aux Furnace #2

Removed from Source 01 and relocated to new addition to Heraeus Wartburg facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Propylene Fuel Emissions**Emission Factors for Propylene Fuel^{1,2}**

	<u>lb/10³ gal</u>	<u>lb/MMBtu-HHV</u>	
Particulate Matter (PM _{Total})	0.8	0.0078	AP-42
Particulate Matter (PM _{Cond})	0.6	0.0059	AP-42
Particulate Matter (PM _{Filter}) ³	0.2	0.00196	AP-42
Nitrogen Oxides (NO _x)	15	0.1471	AP-42
Carbon Monoxide	8.4	0.0824	AP-42
Sulfur Dioxide (SO ₂)	0.097	0.0010	AP-42
VOC	1.1	0.0108	AP-42
Carbon Dioxide (CO ₂)	14300	140.1961	AP-42
Methane (CH ₄)	0.2	0.0020	AP-42
Nitrous Oxide (N ₂ O)	0.9	0.0088	AP-42

Propylene Emissions

	lb/hr	Annual^{4,5} ton/year
Particulate Matter (PM _{Total})	7.84E-03	0.03
Particulate Matter (PM _{10f})	1.96E-03	0.01
Particulate Matter (PM _{2.5f})	1.96E-03	0.01
Particulate Matter (PM _{Cond})	5.88E-03	0.03
Nitrogen Oxides (NO _x)	1.47E-01	0.64
Carbon Monoxide	8.24E-02	0.36
Sulfur Dioxide (SO ₂)	9.55E-04	4.18E-03
Combustion VOC	1.08E-02	0.05
Carbon Dioxide (CO ₂)	140.20	614.06
Methane (CH ₄)	1.96E-03	0.01
Nitrous Oxide (N ₂ O)	8.82E-03	0.04
CO ₂ Equivalent (CO ₂ eq) ⁸	--	625.79

GWP ⁶	
CH4	25
N2O	298

Summary Table (Highest Emission Rate if either fuel is used)

	lb/hr	ton/year
Particulate Matter (PM _{Total})	7.84E-03	0.03
Particulate Matter (PM _{10f})	1.96E-03	0.01
Particulate Matter (PM _{2.5f})	1.96E-03	0.01
Particulate Matter (PM _{Cond})	5.88E-03	0.03
Nitrogen Oxides (NO _x)	1.47E-01	0.64
Carbon Monoxide	8.24E-02	0.36
Sulfur Dioxide (SO ₂)	9.55E-04	4.18E-03
Combustion VOC	1.08E-02	0.05
Carbon Dioxide (CO ₂)	140.20	614.06
Methane (CH ₄)	2.20E-03	0.01
Nitrous Oxide (N ₂ O)	8.82E-03	0.04
CO ₂ Equivalent (CO _{2eq}) ⁸	--	625.79

Example Calculations/Notes:

(1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Section 1.4, Tables 1.4-1 and 1.4-2, July 1998, Small Boilers < 100 MMBtu/hr, and AP-42, Supplement D, Fifth Edition, Section 1.5, Table 1.5-1, July 2008. Propylene and Butane are both Liquefied Petroleum Gases. Butane emission factors were used since they are more conservative than Propane. 17 ppm sulfur is the required limit for sulfur content in California pipeline gas. This is converted to gr/100 ft³ with the conversion factor: 1 grain/100 ft³ = ~15.7 PPM/V

(2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from lb/106 scf to kg/106 m³, multiply by 16. To convert from lb/106 scf to lb/MMBtu, divide by 1,020. Also, Per AP-42, Table 1.5-1, to convert from lb/10³ gal to lb/MMBtu, divide by heating value of Butane = 102 MMBtu/10³ gal

(3) Assume PM_{Filt} = PM_{2.5}, PM₁₀

(4) Maximum Emissions (lb/hr) = Emission Factor (lb/MMscf) * Natural Gas Usage (MMCF)

(5) Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

(6) GWP from 40 CFR 98 Subpart A Table A-1; to convert kg/MMBtu to lb/MMBtu, multiply by 2.205

(7) CO₂, CH₄, and N₂O Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

(8) CO₂ Equivalent (CO_{2eq}) = CO₂(t) + [GWP_{CH4} * CH₄ (t)] + [GWP_{N2O} * N₂O (t)]

Heraeus

Auxiliary Furnace #2b (Voss Converter)

Part of new addition to Heraeus Wartburg Facility. Particulate Matter controlled by one 43,000 CFM Baghouse.

Operating Parameters

Fuel Type	Natural Gas	Maximum Firing Rate	1.0	MMBtu/hr
Maximum Firing Rate	1.0	MMBtu/hr	Butane Heating value	102
				1.083
Operating hours	8,760	hr/yr		gr/100 ft ³
Annual Fuel Usage	Natural Gas	Propylene (heating value of Butane		
	9	MMCF	85.88	10 ³ gal
			11481.6	cubic feet

Auxiliary Furnace #2b (Voss Converter)

Part of new addition to Heraeus Wartburg Facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Emission Calculations

Emission Factors for Natural Gas Combustion^{1,2}

	lb/10 ⁶ scf	lb/MMBtu-HHV	
Particulate Matter (PM _{Total})	7.6	0.0075	AP-42
Particulate Matter (PM _{Cond})	5.7	0.0056	AP-42
Particulate Matter (PM _{Filter}) ³	1.9	0.0019	AP-42
Nitrogen Oxides (NO _x)	100	0.0980	AP-42
Carbon Monoxide	84	0.0824	AP-42
Sulfur Dioxide (SO ₂)	0.6	0.0006	AP-42
VOC	5.5	0.0054	AP-42
Carbon Dioxide (CO ₂)	119,316	116.98	40 CFR 98 Table C-1
Methane (CH ₄)	2.249	2.205E-03	40 CFR 98 Table C-2
Nitrous Oxide (N ₂ O)	0.22	2.205E-04	40 CFR 98 Table C-2

Natural Gas Emissions

	lb/hr	Annual ^{4,5} ton/year
Particulate Matter (PM _{Total})	7.45E-03	0.03
Particulate Matter (PM _{10f})	1.86E-03	0.01
Particulate Matter (PM _{2.5f})	1.86E-03	0.01
Particulate Matter (PM _{Cond})	5.59E-03	0.02
Nitrogen Oxides (NO _x)	0.10	0.43
Carbon Monoxide	8.24E-02	0.36
Sulfur Dioxide (SO ₂)	5.88E-04	0.00
Combustion VOC	5.39E-03	0.02
Carbon Dioxide (CO ₂)	116.98	512.36
Methane (CH ₄)	2.20E-03	0.01
Nitrous Oxide (N ₂ O)	2.20E-04	9.66E-04
CO ₂ Equivalent (CO ₂ eq) ⁸	--	512.88

GWP ⁶	
CH4	25
N2O	298

Auxiliary Furnace #2b (Voss Converter)

Part of new addition to Heraeus Wartburg Facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Propylene Fuel Emissions**Emission Factors for Propylene Fuel^{1,2}**

	<u>lb/10³ gal</u>	<u>lb/MMBtu-HHV</u>	
Particulate Matter (PM _{Total})	0.8	0.0078	AP-42
Particulate Matter (PM _{Cond})	0.6	0.0059	AP-42
Particulate Matter (PM _{Filter}) ³	0.2	0.00196	AP-42
Nitrogen Oxides (NO _x)	15	0.1471	AP-42
Carbon Monoxide	8.4	0.0824	AP-42
Sulfur Dioxide (SO ₂)	0.097	0.0010	AP-42
VOC	1.1	0.0108	AP-42
Carbon Dioxide (CO ₂)	14300	140.1961	AP-42
Methane (CH ₄)	0.2	0.0020	AP-42
Nitrous Oxide (N ₂ O)	0.9	0.0088	AP-42

Propylene Emissions

	lb/hr	Annual^{4,5} ton/year
Particulate Matter (PM _{Total})	7.84E-03	0.03
Particulate Matter (PM _{10f})	1.96E-03	0.01
Particulate Matter (PM _{2.5f})	1.96E-03	0.01
Particulate Matter (PM _{Cond})	5.88E-03	0.03
Nitrogen Oxides (NO _x)	1.47E-01	0.64
Carbon Monoxide	8.24E-02	0.36
Sulfur Dioxide (SO ₂)	9.55E-04	4.18E-03
Combustion VOC	1.08E-02	0.05
Carbon Dioxide (CO ₂)	140.20	614.06
Methane (CH ₄)	1.96E-03	0.01
Nitrous Oxide (N ₂ O)	8.82E-03	0.04
CO ₂ Equivalent (CO _{2eq}) ⁸	--	625.79

GWP ⁶	
CH4	25
N2O	298

Summary Table (Highest Emission Rate if either fuel is used)

	lb/hr	ton/year
Particulate Matter (PM _{Total})	7.84E-03	0.03
Particulate Matter (PM _{10f})	1.96E-03	0.01
Particulate Matter (PM _{2.5f})	1.96E-03	0.01
Particulate Matter (PM _{Cond})	5.88E-03	0.03
Nitrogen Oxides (NO _x)	1.47E-01	0.64
Carbon Monoxide	8.24E-02	0.36
Sulfur Dioxide (SO ₂)	9.55E-04	4.18E-03
Combustion VOC	1.08E-02	0.05
Carbon Dioxide (CO ₂)	140.20	614.06
Methane (CH ₄)	2.20E-03	0.01
Nitrous Oxide (N ₂ O)	8.82E-03	0.04
CO ₂ Equivalent (CO ₂ eq) ⁸	--	625.79

Example Calculations/Notes:

(1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Section 1.4, Tables 1.4-1 and 1.4-2, July 1998, Small Boilers < 100 MMBtu/hr, and AP-42, Supplement D, Fifth Edition, Section 1.5, Table 1.5-1, July 2008. Propylene and Butane are both Liquefied Petroleum Gases. Butane emission factors were used since they are more conservative than Propane. 17 ppm sulfur is the required limit for sulfur content in California pipeline gas. This is converted to gr/100 ft³ with the conversion factor: 1 grain/100 ft³ = ~15.7 PPM/V

(2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from lb/106 scf to kg/106 m³, multiply by 16. To convert from lb/106 scf to lb/MMBtu, divide by 1,020. Also, Per AP-42, Table 1.5-1, to convert from lb/10³ gal to lb/MMBtu, divide by heating value of Butane = 102 MMBtu/10³ gal

(3) Assume PM_{Filt} = PM_{2.5}, PM₁₀

(4) Maximum Emissions (lb/hr) = Emission Factor (lb/MMscf) * Natural Gas Usage (MMCF)

(5) Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

(6) GWP from 40 CFR 98 Subpart A Table A-1; to convert kg/MMBtu to lb/MMBtu, multiply by 2.205

(7) CO₂, CH₄, and N₂O Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

(8) CO₂ Equivalent (CO₂eq) = CO₂(t) + [GWP_{CH4} * CH₄ (t)] + [GWP_{N2O} * N₂O (t)]

Heraeus

Aux Furnace #3

Removed from Source 01 and relocated to new addition to Heraeus Wartburg facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Operating Parameters

Fuel Type	Natural Gas
Maximum Firing Rate	0.35 MMBtu/hr
Operating hours	8,760 hr/yr
Annual Fuel Usage	Natural Gas
	3 MMCF

Emission Calculations

Emission Factors for Natural Gas Combustion^{1,2}

	<u>lb/10⁶ scf</u>	<u>lb/MMBtu-HHV</u>	
Particulate Matter (PM _{Total})	7.6	0.0075	AP-42
Particulate Matter (PM _{Cond})	5.7	0.0056	AP-42
Particulate Matter (PM _{Filter}) ³	1.9	0.0019	AP-42
Nitrogen Oxides (NO _x)	100	0.0980	AP-42
Carbon Monoxide	84	0.0824	AP-42
Sulfur Dioxide (SO ₂)	0.6	0.0006	AP-42
VOC	5.5	0.0054	AP-42
HCl	--	--	
HF	--	--	
Carbon Dioxide (CO ₂)	119,316	116.98	40 CFR 98 Table C-1
Methane (CH ₄)	2.249	2.205E-03	40 CFR 98 Table C-2
Nitrous Oxide (N ₂ O)	0.22	2.205E-04	40 CFR 98 Table C-2

Natural Gas Emissions

	<u>lb/hr</u>	<u>Annual</u> ^{4,5} <u>ton/year</u>
Particulate Matter (PM _{Total})	2.61E-03	0.01
Particulate Matter (PM _{10f})	6.52E-04	2.86E-03
Particulate Matter (PM _{2.5f})	6.52E-04	2.86E-03
Particulate Matter (PM _{Cond})	1.96E-03	0.01
Nitrogen Oxides (NO _x)	0.03	0.15
Carbon Monoxide	0.03	0.13
Sulfur Dioxide (SO ₂)	2.06E-04	9.02E-04
Combustion VOC	1.89E-03	0.01
HCl	--	--
HF	--	--
Carbon Dioxide (CO ₂)	40.94	179.32
Methane (CH ₄)	7.72E-04	3.38E-03
Nitrous Oxide (N ₂ O)	7.72E-05	3.38E-04
CO ₂ Equivalent (CO ₂ eq) ⁸	--	179.51
Mercury	--	--

GWP ⁶	
CH4	25
N2O	298

Aux Furnace #3

Removed from Source 01 and relocated to new addition to Heraeus Wartburg facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Fuel Type	Coke*				
Maximum Firing Rate	0.35	MMBtu/hr	Sulfur Content	6.0	%
Annual Firing Rate	3,066.0	MMBtu			
Coal Btu Rating	12,500	Btu/lb			
Hourly Coal Usage	0.014	Tons/hr			
Annual Coal Usage	122.64	Tons/yr			

Emission Factors for Coke Combustion^{1,2}

Pollutant	lb/ton Coal	lb/MMBtu	Source
Particulate Matter (PM _{Total})	15	--	Engineering Estimate
Particulate Matter (PM ₁₀)	6.2	--	AP-42 Table 1.1-4
Particulate Matter (PM _{2.5})	--	--	
Particulate Matter (PM _{Cond})	--	0.04	AP-42 Table 1.1-5
Nitrogen Oxides (NO _x)	9.5	--	AP-42 Table 1.1-3
Carbon Monoxide	11	--	AP-42 Table 1.1-3
Sulfur Dioxide (SO ₂)	1.86	--	AP-42 Table 1.1-3
VOC	0.05	--	AP-42 Table 1.1-19
HCl	1.20	--	AP-42 Table 1.1-1
HF	0.15	--	AP-42 Table 1.1-15
Carbon Dioxide (CO ₂)	--	251	40 CFR 98 Table C-1
Methane (CH ₄)	--	0.024	40 CFR 98 Table C-2
Nitrous Oxide (N ₂ O)	--	0.0035	40 CFR 98 Table C-2

Emission Calculations

	Maximum ⁶ lb/hr	Annual ^{4,5} ton/year
Particulate Matter (PM _{Total})	0.10	0.44
Particulate Matter (PM ₁₀)	0.09	0.38
Particulate Matter (PM _{2.5})	--	--
Particulate Matter (PM _{Cond})	0.01	0.06
Nitrogen Oxides (NO _x) ⁹	0.13	0.58
Carbon Monoxide	0.15	0.67
Sulfur Dioxide (SO ₂)	0.03	0.11
Combustion VOC	7.00E-04	3.07E-03
HCl	0.02	0.07
HF	2.10E-03	0.01
Carbon Dioxide (CO ₂)	87.850	384.78
Methane (CH ₄)	8.40E-03	0.04
Nitrous Oxide (N ₂ O) ¹⁰	1.23E-03	0.01
CO ₂ Equivalent (CO _{2eq}) ¹¹	--	387

GWP ⁶	
CH ₄	25
N ₂ O	298

Aux Furnace #3

Removed from Source 01 and relocated to new addition to Heraeus Wartburg facility. Particulate Matter controlled by new 43,000 CFM Baghouse.

Fuel Type	Charcoal ¹⁰				
Maximum Firing Rate	0.35	MMBtu/hr	Sulfur Content ⁹	6.0	%
Annual Firing Rate	3,066.0	MMBtu	Ash Content ⁹	6.0	%
Coal Btu Rating	12,500	Btu/lb			
Hourly Coal Usage	0.014	Tons/hr			
Annual Coal Usage	122.64	Tons/yr			

Emission Factors for Charcoal Combustion^{1,2}

Pollutant	lb/ton Charcoal	lb/MMBtu	Source
Particulate Matter (PM _{Total})	4.8	--	AP-42 Table 1.2-3
Particulate Matter (PM ₁₀)	13.8	--	AP-42 Table 1.2-4
Particulate Matter (PM _{2.5})	4	--	AP-42 Table 1.2-4
Particulate Matter (PM _{Cond})	0.48	--	AP-42 Table 1.2-3
Nitrogen Oxides (NO _x)	9.0	--	AP-42 Table 1.2-1
Carbon Monoxide	1	--	AP-42 Table 1.2-2
Sulfur Dioxide (SO ₂)	234	--	AP-42 Table 1.2-1
VOC	0.30	--	AP-42 Table 1.2-6
HCl	--	--	
HF	--	--	
Carbon Dioxide (CO ₂)	--	228.6	40 CFR 98 Table C-1 or 103.69 (kg CO ₂ /mmBtu)
Methane (CH ₄)	--	0.024	40 CFR 98 Table C-2 or 1.1 E -02 (kg CH ₄ /mmBtu)
Nitrous Oxide (N ₂ O)	--	0.0035	40 CFR 98 Table C-2 or 1.6 E -03 (kg N ₂ O/mmBtu)

Emission Calculations

	Maximum ⁶	Annual ^{4,5}
	lb/hr	ton/year
Particulate Matter (PM _{Total})	0.20	0.88
Particulate Matter (PM ₁₀)	0.19	0.85
Particulate Matter (PM _{2.5})	0.05	0.22
Particulate Matter (PM _{Cond})	0.01	0.03
Nitrogen Oxides (NO _x) ⁹	0.13	0.55
Carbon Monoxide	0.01	0.04
Sulfur Dioxide (SO ₂)	3.28	14.35
Combustion VOC	4.20E-03	0.02
HCl	--	--
HF	--	--
Carbon Dioxide (CO ₂)	80.0227575	350.50
Methane (CH ₄)	8.40E-03	0.04
Nitrous Oxide (N ₂ O) ¹⁰	1.23E-03	0.01
CO ₂ Equivalent (CO ₂ eq) ¹¹	--	353

GWP ⁶	
CH ₄	25
N ₂ O	298

Summary Table (Highest Emission Rate if either fuel is used)

	lb/hr	ton/year
Particulate Matter (PM _{Total})	2.00E-01	8.76E-01
Particulate Matter (PM _{10f})	1.93E-01	8.46E-01
Particulate Matter (PM _{2.5f})	5.04E-02	2.21E-01
Particulate Matter (PM _{Cond})	1.40E-02	6.13E-02
Nitrogen Oxides (NO _x)	1.33E-01	5.83E-01
Carbon Monoxide	1.54E-01	6.75E-01
Sulfur Dioxide (SO ₂)	3.28E+00	1.43E+01
Combustion VOC	4.20E-03	1.84E-02
HCl	1.68E-02	7.36E-02
HF	2.10E-03	9.20E-03
Carbon Dioxide (CO ₂)	8.79E+01	3.85E+02
Methane (CH ₄)	8.40E-03	3.68E-02
Nitrous Oxide (N ₂ O)	1.23E-03	5.37E-03
CO ₂ Equivalent (CO ₂ eq) ⁸	--	3.87E+02

Example Calculations/Notes:

- (1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Section 1.4, Tables 1.4-1 and 1.4-2, July 1998, Small Boilers < 100 MMBtu/hr; AP-42, Supplement D, Fifth Edition, Section 1.1, Tables 1.1-1, 1.1-3, 1.1-4, 1.1-5, 1.1-15 and 1.1-19 for Hand-fed units, Sept 1998
- (2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from $\text{lb}/10^6 \text{ scf}$ to $\text{kg}/10^6 \text{ m}^3$, multiply by 16. To convert from $\text{lb}/10^6 \text{ scf}$ to lb/MMBtu , divide by 1,020.
- (3) Assume $\text{PM}_{\text{Filt}} = \text{PM}_{2.5}, \text{PM}_{10}$
- (4) Maximum Emissions (lb/hr) = Emission Factor (lb/MMscf) * Natural Gas Usage (MMCF)
- (5) Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)
- (6) GWP from 40 CFR 98 Subpart A Table A-1; to convert kg/MMBtu to lb/MMBtu , multiply by 2.205
- (7) $\text{CO}_2, \text{CH}_4,$ and N_2O Annual Emissions (tpy) = Average Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)
- (8) CO_2 Equivalent (CO_2eq) = $\text{CO}_2(\text{t}) + [\text{GWP}_{\text{CH}_4} * \text{CH}_4(\text{t})] + [\text{GWP}_{\text{N}_2\text{O}} * \text{N}_2\text{O}(\text{t})]$
- (9) Sulfur content and Ash content of charcoal estimated at 6% based on engineering judgement
- (10) Anthracite Coal Emission Factors from AP-42, Supplement D, Fifth Edition, Section 1.2, Tables 1.2-1, 1.2-2, 1.2-3, 1.2-4, and 1.2-6 for Stoker-fired boilers used in place of regular charcoal like that used for grilling.