From:	Air.Pollution Control
To:	APC Permitting
Subject:	FW: ESRN 65-0049 Smelter Const. App. 5.25.21
Date:	Tuesday, May 25, 2021 2:24:38 PM
Attachments:	ESRN 65-0049 Smelter const. app 5.25.21.pdf

From: Shea Cofer <shea@stevensenvironmental.com>
Sent: Tuesday, 25 May, 2021 12:57
To: Doug S. Wright <Doug.S.Wright@tn.gov>; Air.Pollution Control <Air.Pollution.Control@tn.gov>
Cc: Taylor, Jimmy E. <jimmy.taylor@heraeus.com>; England, Todd <todd.england@heraeus.com>; Collin Scherdell <Collin@stevensenvironmental.com>
Subject: [EXTERNAL] ESRN 65-0049 Smelter Const. App. 5.25.21

Doug,

Heraeus (ESRN 65-0049) submits the attached construction application to install new processing equipment at the referenced facility.

Please let me know if you have any questions.

Shea

M. Shea Cofer, CHMM
Chattanooga Operations Manager / Partner
STEVENS
ENVIRONMENTAL CONSULTING

6505 Forest Park Dr.
Signal Mountain, TN 37377
615.418.1414

Heraeus Precious Metals North America LLC
1975 Knoxville Highway
Wartburg, TN 37887
Phone (423) 346-1041
Fax (423) 346-8655

May 25, 2021

Doug Wright
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 Precious Metals North America, LLC
ESRN 65-0049
Permit No. 570857
Construction Permit Application – Calciner, Smelter, and associated equipment

Dear Mr. Wright:

With this letter, Heraeus Precious Metals North America, LLC (Heraeus) submits a construction permit application to install new processing equipment at their facility located at 1975 Knoxville Highway, Wartburg, Tennessee. The equipment will consist of a calciner, ball mills, and blender with baghouse control, a smelter with lime injected baghouse control, a hammer mill with baghouse control, and silos and day bins controlled with bin vents. The appropriate forms, a process flow diagram, and calculations for the equipment described above are attached to this letter.

The new equipment will process material for precious metal recovery. The calciner will be used to dry filter cake before it is introduced into the smelter. A small amount of volatile organic compounds (VOCs) may be released in the calciner, so no VOCs are expected in the smelter because they will already be removed. The smelter will process material that will generate sulfur dioxide (SO2) and hydrogen chloride (HCl) emissions, so a lime injection system prior to the baghouse will be used to reduce SO2 and HCl emissions. The potential HCl emissions make Heraeus a major source of hazardous air pollutants (HAPs). However, there are no New Source Performance Standards (NSPS) or National Emission Standards for Hazardous Air Pollutants (NESHAP) that apply and Heraeus already operates under a Title V permit, so becoming a major source of HAPs will not subject the facility to new requirements due to a change from area source to major source of HAPs.

Dispersion models were performed to determine the stack height for the smelter to meet the 70.0 ug/m^3 HCl, 24-hour average, as indicated in TAPCR 1200-3-3-.03(1)(c). Summary information from the model is included as an attachment to this letter.

Condition E3-6 of Permit No. 570857 states Heraeus is subject to a single HAP limit of 9.9 tons per year (tpy) and a total HAP limit of 24.9 tpy. With this application, Heraeus requests the limit be removed from the permit. Furthermore, Heraeus agrees to the following emission limits and opacities.

Heraeus

Equipment	Stack ID	Pollutant	Limit	Reference
Calciner, ball mills, blender with baghouse control	14-1	PM	0.01 gr/dscf 10% opacity	TAPCR 1200-03-07-.01(5) TAPCR 1200-03-05-.01(4)
		SO2	0.002 lb/hr	TAPCR 1200-03-14-.01(3)
Smelter	14-2	PM	0.01 gr/dscf 10% opacity	TAPCR 1200-03-07-.01(5) TAPCR 1200-03-05-.01(4)
		SO2	21.88 lb/hr	TAPCR 1200-03-14-.01(3)
Hammer Mill	14-3	PM	0.01 gr/dscf 10% opacity	TAPCR 1200-03-07-.01(5) TAPCR 1200-03-05-.01(4)
Silos & Day Bins	14-Silos, 14-Day Bins	PM	0.02 gr/dscf	TAPCR 1200-03-07-.01(5)

I hereby certify that, based on information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete.

If you have questions or comments, please contact Jimmy Taylor, Environmental Manager at (423) 346-1053, or my consultant, Shea Cofer at (615) 418-1414.

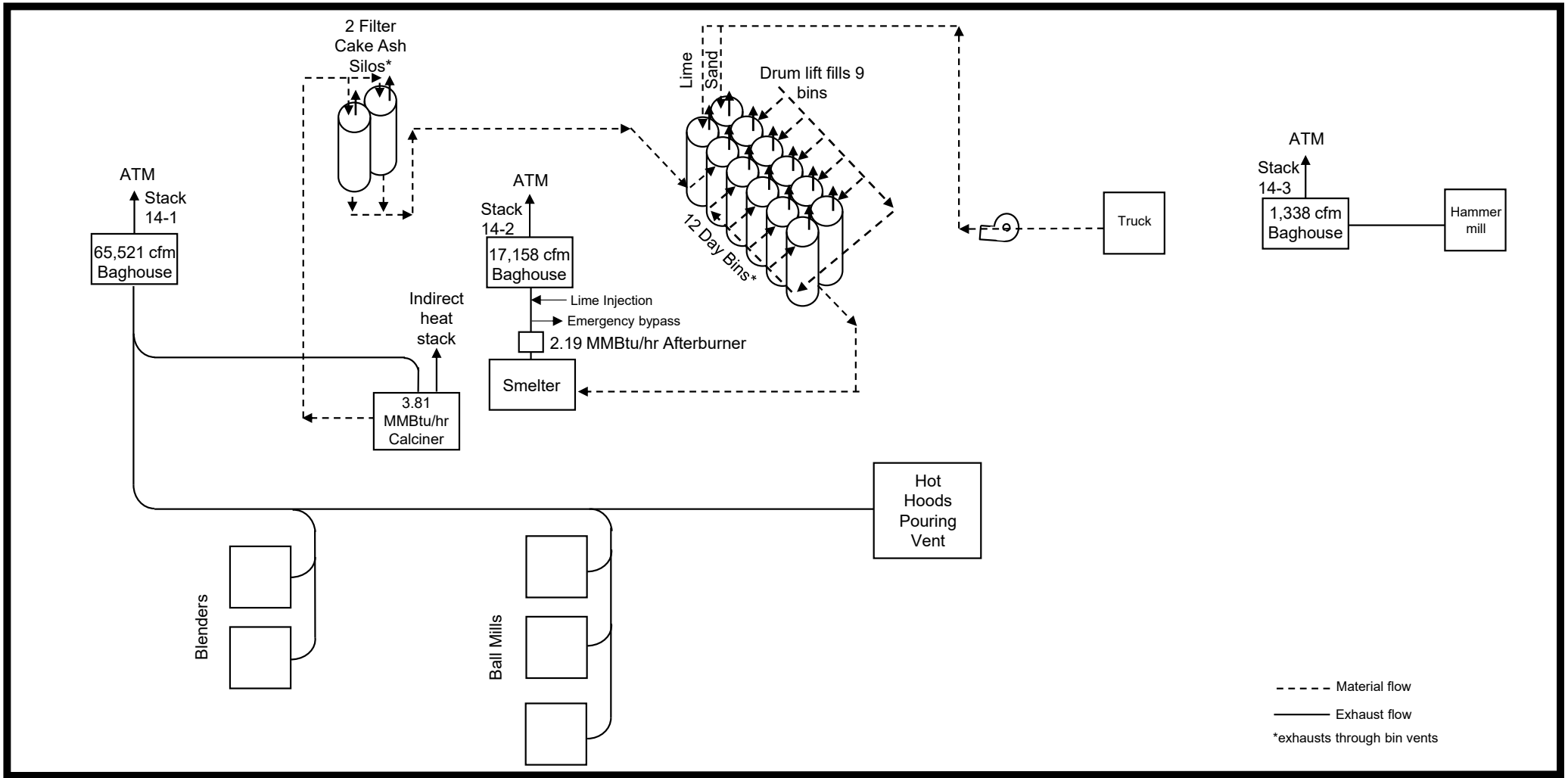
Sincerely,

Norbert Ritschel
Senior Vice President and Plant Manager

Attachments

Attachment:

Process Flow Diagram



STEVENS ENVIRONMENTAL CONSULTING

Heraeus Precious Metals North America LLC
Facility Process Flow Diagram

Date: April 16, 2021
MSC

Heraeus

Attachment:

Construction Application Forms
&
Emission Calculations

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

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	5
	APC Form 4, Fuel Burning Non-Process Equipment	2
	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	
	APC Form 15, Cyclones/Settling Chambers	
	APC Form 17, Wet Collection Systems	
	APC Form 18, Baghouse/Fabric Filters	5

(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	1
	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 43 pages and they are numbered from page 1 to 43 . 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.

Name and Title of Responsible Official	Telephone Number with Area Code
Norbert Ritschel, Senior Vice President	(423) 346-8200
Signature of Responsible Official	Date of Application
	5/25/2021

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

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

TITLE V PERMIT APPLICATION
FACILITY IDENTIFICATION

SITE INFORMATION				
1. Organization's legal name Heraeus Precious Metals North America, 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 Jimmy Taylor			Phone number with area code 423-346-1053	
8. Mailing address (St./Rd./Hwy.) 1975 Knoxville Highway			Fax number with area code	
City Wartburg	State TN	Zip code 37887	Email address jimmy.taylor@heraeus.com	
CONTACT INFORMATION (BILLING)				
11. Billing contact Jimmy Taylor			Phone number with area code 423-346-1053	
12. Mailing address (St./Rd./Hwy.) 1975 Knoxville Highway			Fax number with area code	
City Wartburg	State TN	Zip code 37887	Email address jimmy.taylor@heraeus.com	

TYPE OF PERMIT REQUESTED

13. Permit requested for:

Initial application to operate:		Minor permit modification:	
Permit renewal to operate:		Significant modification:	
Administrative permit amendment:		Construction permit:	✓

(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.
570857	65-0049

17. Page number: Revision number: Date of revision:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
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Telephone: (615) 532-0554

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.

Source No. 65-0049-new(14)
Description: One Smelter with lime injection baghouse control; one calciner, ball mills, & blenders with baghouse control; one hammer mill with baghouse control; Silos and day bins with bin vents

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

No insignificant equipment associated with this construction application

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:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

TITLE V PERMIT APPLICATION
MISCELLANEOUS PROCESSES

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Heraeus Precious Metals North America, LLC

2. **Process emission source (identify):**
65-0049-14 -One Smelter with lime injection baghouse control; one calciner, ball mills, & blenders with baghouse control; one hammer mill with baghouse control; Silos and day bins with bin vents

3. Stack ID or flow diagram point identification (s):
14-1, 14-2, 14-3, 14-Silos, 14-Day Bins

4. Year of construction or last modification:
2021

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 : 720766.2E UTM Horizontal: 3997280.3N

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	Material is stored in drums, silos, & day bins	15,330	15,330
Material		(Tons/Year)	(Tons/Year)
Slag Former	Stored in day bins	4,324	4,324
		(Tons/Year)	(Tons/Year)

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)
	Smelter Afterburner & Calciner		
Natural Gas	6.0	5,882 (scf/hr)	5,882 (scf/hr)

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:

State of Tennessee
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TITLE V PERMIT APPLICATION
FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Heraeus Precious Metals North America, LLC

2. **Stack ID or flow diagram point identification (s):**
Stack 14-1

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).
Calciner

4. Fuel burning equipment identification number:
Calciner

5. Fuel burning equipment description:
Equipped with a 3.81 MMBtu/hr natural gas burner

6. Year of installation or last modification of fuel burning equipment.
2021

7. Furnace type:
Calciner

8. Manufacturer model number (if available):

9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: 720766.2E UTM Horizontal: 3997280.3N

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)
3.81 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	33 MMCF			

14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control:
particulate emissions controlled by Baghouse

15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:
magnahelic gauge for pressure drop readings

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).
N/A

17. Page number: Revision Number: Date of Revision:

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Department of Environment and Conservation
Division of Air Pollution Control
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312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**

Heraeus Precious Metals North America, LLC

2. **Emission source (identify):**

65-0049-14

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):

14-1 Calciner

4. Stack height above grade in feet:

75

5. Velocity (data at exit conditions):

68.7 _____ (Actual feet per second)

6. Inside dimensions at outlet in feet:

4.5

7. Exhaust flow rate at exit conditions (ACFM):

65,521

8. Flow rate at standard conditions (DSCFM):

56,489

9. Exhaust temperature:

124 _____ Degrees Fahrenheit (°F)

10. Moisture content (data at exit conditions):

5 _____ 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 (for stacks subject to diffusion equation only):

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:

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TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:	2. Emission source (identify):
Heraeus Precious Metals North America, LLC	65-0049-14 - One calciner, ball mills, & blenders with baghouse control

3. Stack ID or flowdiagram point identification(s):
14-1

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: 65,521 ACFM
Minimum Pressure Drop: TBD
Air to Cloth Ratio: 4:1

5. Manufacturer and model number (if available):	6. Year of installation:
	2021

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

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 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:

State of Tennessee
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William R. Snodgrass Tennessee Tower
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TITLE V PERMIT APPLICATION
FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Heraeus Precious Metals North America, LLC

2. **Stack ID or flow diagram point identification (s):**
Stack 14-2

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).
Smelter afterburner

4. Fuel burning equipment identification number:
Smelter afterburner

5. Fuel burning equipment description:
Equipped with a 2.19 MMBtu/hr natural gas burner

6. Year of installation or last modification of fuel burning equipment.
2021

7. Furnace type:
afterburner

8. Manufacturer model number (if available):

9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: 720766.2E UTM Horizontal: 3997280.3N

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)
2.19 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	19 MMCF			

14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control:
N/A

15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:
N/A

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).
N/A

17. Page number: Revision Number: Date of Revision:

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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Heraeus Precious Metals North America, LLC

2. **Emission source (identify):**
65-0049-14

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):
14-2 Smelter

4. Stack height above grade in feet:
125

5. Velocity (data at exit conditions):
68.9 _____ (Actual feet per second)

6. Inside dimensions at outlet in feet:
2.3

7. Exhaust flow rate at exit conditions (ACFM):
17,158

8. Flow rate at standard conditions (DSCFM):
10,567

9. Exhaust temperature:
392 _____ Degrees Fahrenheit (°F)

10. Moisture content (data at exit conditions):
1 _____ 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 (for stacks subject to diffusion equation only):
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?
X _____ Yes _____ 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.

The smelter has an emergency bypass stack for upset conditions only.

14. Page number: Revision Number: Date of Revision:

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TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Heraeus Precious Metals North America, LLC

2. Emission source (identify):
65-0049-14 - One Smelter with lime injection baghouse control

3. Stack ID or flow diagram point identification (s):
14-2

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: 17,158 ACFM
Minimum Pressure Drop: TBD
Air to Cloth Ratio: 4:1
Lime injection prior to inlet of baghouse

5. Manufacturer and model number (if available):

6. Year of installation:
2021

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate	99%	Engineering Estimate
HCl	90%	Engineering Estimate
SO2	70%	Engineering Estimate

8. Discuss how collected material is handled for reuse or disposal.
Dust is captured and either recycled to reclaim any precious metals or sent for disposal.

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:

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Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
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Telephone: (615) 532-0554

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**

Heraeus Precious Metals North America, LLC

2. **Emission source (identify):**

65-0049-14

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):

14-3 Hammer mill

4. Stack height above grade in feet:

25

5. Velocity (data at exit conditions):

58 _____ (Actual feet per second)

6. Inside dimensions at outlet in feet:

0.7

7. Exhaust flow rate at exit conditions (ACFM):

1,338

8. Flow rate at standard conditions (DSCFM):

1,300

9. Exhaust temperature:

80 _____ Degrees Fahrenheit (°F)

10. Moisture content (data at exit conditions):

1 _____ 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 (for stacks subject to diffusion equation only):

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:

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Telephone: (615) 532-0554

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Heraeus Precious Metals North America, LLC

2. Emission source (identify):
65-0049-14 - One hammer mill with baghouse control

3. Stack ID or flow diagram point identification (s):
14-3

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: 1,338 ACFM
Minimum Pressure Drop: TBD
Air to Cloth Ratio: 4:1

5. Manufacturer and model number (if available):

6. Year of installation:
2021

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate	99%	Engineering Estimate

8. Discuss how collected material is handled for reuse or disposal.
Dust is captured and recycled 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:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**

Heraeus Precious Metals North America, LLC

2. **Emission source (identify):**

65-0049-14

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):

14-Silos (There are two identical silos. This represents each individual silos exhaust point.)

4. Stack height above grade in feet:

30

5. Velocity (data at exit conditions):

53 _____ (Actual feet per second)

6. Inside dimensions at outlet in feet:

0.2

7. Exhaust flow rate at exit conditions (ACFM):

100

8. Flow rate at standard conditions (DSCFM):

97

9. Exhaust temperature:

80 _____ Degrees Fahrenheit (°F)

10. Moisture content (data at exit conditions):

1 _____ 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 (for stacks subject to diffusion equation only):

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.

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TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Heraeus Precious Metals North America, LLC

2. Emission source (identify):
65-0049-14 - 2 Silos

3. Stack ID or flow diagram point identification (s):
14-Silos

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Each silo has a Bin Vent for PM control
Air Flow: 100 ACFM each
Equipment is properly inspected, maintained, and operated in accordance with good engineering practices, so as to assure proper operating range

5. Manufacturer and model number (if available):

6. Year of installation:
2021

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate	99%	Engineering Estimate

8. Discuss how collected material is handled for reuse or disposal.
Dust is captured and recycled 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:

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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**

Heraeus Precious Metals North America, LLC

2. **Emission source (identify):**

65-0049-14

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):

14-Day Bins (There are twelve identical day bins. This represents each individual day bin exhaust point.)

4. Stack height above grade in feet:

30

5. Velocity (data at exit conditions):	6. Inside dimensions at outlet in feet:
51 _____ (Actual feet per second)	0.7
7. Exhaust flow rate at exit conditions (ACFM):	8. Flow rate at standard conditions (DSCFM):
1,177	1,144
9. Exhaust temperature:	10. Moisture content (data at exit conditions):
80 _____ Degrees Fahrenheit (°F)	1 _____ 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 (for stacks subject to diffusion equation only):

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:

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TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Heraeus Precious Metals North America, LLC

2. Emission source (identify):
65-0049-14 - 12 day bins

3. Stack ID or flowdiagram point identification(s):
14-Day Bins

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Each day bin has a Bin Vent for PM control
Air Flow: 1,177 ACFM each
Equipment is properly inspected, maintained, and operated in accordance with good engineering practices, so as to assure proper operating range

5. Manufacturer and model number (if available):

6. Year of installation:
2021

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate	99%	Engineering Estimate

8. Discuss how collected material is handled for reuse or disposal.
Dust is captured and recycled 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:

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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 Precious Metals North America, LLC
2. Process emission source, fuel burning installation, or incinerator (identify): One Smelter; one calciner, ball mills, blender; hammer mill, silos, bins
3. Stack ID or flow diagram point identification(s): 14-1, 14-2, 14-3, 14-Silos, 14-Day Bins

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, SO2, HAP (HCl)

[✓] Monitoring Maintenance Procedures - APC 23
Pollutant(s): PM

[ ] Stack Testing - APC 24
Pollutant(s):

[ ] Fuel Sampling & Analysis (FSA) - APC 25
Pollutant(s):

[✓] Recordkeeping - APC 26
Pollutant(s): PM, VOC, SO2, & 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:

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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)
14-1, 14-2, 14-3

3. Emission source:
One Smelter with lime injection baghouse control; one calciner, ball mills, & blenders with baghouse control; one hammer mill with baghouse control

MONITORING DESCRIPTION

4. Pollutant(s) being monitored:
PM, SO2, HAP (HCl)

5. Description of the method of monitoring and establishment of correlation between the parameter value and the emission rate of a particular pollutant:

Pressure drop will be recorded daily while the source is in use.

Baghouse:
Within 30 days of the start-up of this operation, 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.

Lime Injection (Smelter Baghouse only):
Within 60 days after achieving the maximum production rate at which this source will be operated, but no later than 180 days after initial start-up, the owner or operator shall conduct a source test to determine the actual emissions of sulfur dioxide (SO2) and hydrogen chloride (HCl). During the emissions performance test, the following operating parameters shall be monitored and recorded: lime injection rate.

6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
Once per day for baghouse pressure drop and lime injection flow rate.

7. Page number: Revision number: Date of revision:

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TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY MONITORING MAINTENANCE PROCEDURES

The monitoring of a maintenance procedure shall be acceptable as a compliance demonstration method provided that a correlation between the procedure and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:

Heraeus Precious Metals North America, LLC

2. Stack ID or flow diagram point identification(s):

14-Silos, 14-Day Bins

3. Emission source (identify):

Silos and Day Bins with bin vents for PM control

MONITORING DESCRIPTION

4. Pollutant(s) being monitored:

PM

5. Procedure being monitored:

Maintenance Procedures

6. Description of the method of monitoring and establishment of correlation between the procedure and the emission rate of a particular pollutant:

The bin vents associated with the silos and day bins shall be checked for leaks and proper operation by visual inspection.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):

Compliance will be reported semi-annually.

8. 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 Precious Metals North America, LLC

2. Stack ID or flow diagram point identification(s):

14-1, 14-2, 14-3, 14-Silos, 14-Day Bins

3. Emission source (identify):

One Smelter with lime injection baghouse control; one calciner, ball mills, & blenders with baghouse control; one hammer mill with baghouse control; Silos and day bins with bin vents

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored:

PM, VOC, SO2, HAP

5. Material or parameter being monitored and recorded:

Material input, pressure drop across baghouse, lime injection flow rate

6. Method of monitoring and recording:

Material information will be retained at the facility that identifies VOCs and HAPs for a minimum of five (5) years.

Monthly emissions will be logged and recorded each month and retained for a minimum of five (5) years.

Pressure drop will be recorded daily while the source is in operation and retained for a minimum of five (5) years.

Lime Injection Flow will be recorded daily while the source is in operation and retained for a minimum of five (5) years.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):

As noted above.

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 Precious Metals North America, LLC

2. Stack ID or flow diagram point identification(s):

14-1, 14-2, 14-3, 14-Silos, 14-Day Bins

3. Emission source (identify):

One Smelter with lime injection baghouse control; one calciner, ball mills, & blenders with baghouse control; one hammer mill with baghouse control; Silos and day bins with bin vents

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 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:

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TITLE V PERMIT APPLICATION
EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Heraeus Precious Metals North America, LLC

2. Stack ID or flow diagram point identification(s):
14-1, 14-2, 14-3, 14-Silos, 14- Day Bins

3. Process emission source / Fuel burning installation / Incinerator (identify):
One Smelter with lime injection baghouse control; one calciner, ball mills, & blenders with baghouse control; one hammer mill with baghouse control; Silos and day bins with bin vents

EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS

4. Complete the following emissions summary for regulated air pollutants. 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)	39.23		39.23	
(Fugitive Emissions)				
Sulfur Dioxide	95.83		95.83	
(Fugitive Emissions)				
Volatile Organic Compounds	18.36		18.36	
(Fugitive Emissions)				
Carbon Monoxide	15.96		15.96	
(Fugitive Emissions)				
Lead	0.06		0.06	
(Fugitive Emissions)				
Nitrogen Oxides	2.75		2.75	
(Fugitive Emissions)				
Total Reduced Sulfur	NA		NA	
(Fugitive Emissions)				
Mercury	NA		NA	
(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	NA		NA	
(Fugitive Emissions)				
Beryllium	NA		NA	
(Fugitive Emissions)				
Vinyl Chloride	NA		NA	
(Fugitive Emissions)				
Fluorides	NA		NA	
(Fugitive Emissions)				
Gaseous Fluorides	NA		NA	
(Fugitive Emissions)				
Greenhouse Gases in CO_2 Equivalents	3,079		3,079	

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)
Total HAPs	50.05		50.05	
HCl (included in total total Haps)	49.22		49.22	

6. Page number: Revision number: Date of revision

Heraeus

Source 14 Emissions Summary

Equipment	PM_{Total}		PM_{10f}		$PM_{2.5f}$		PM_{Cond}		NO_x		CO		SO_2		VOC		CO_2eq	
	(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)
Calciners, Ball mills, Blender, pouring	4.87	21.33	0.01	0.03	0.01	0.03	0.02	0.09	0.37	1.64	0.31	1.37	0.002	0.01	4.18	18.31	--	1954.1
Smelter	0.92	4.04	0.00	0.02	0.00	0.02	0.01	0.05	0.25	1.11	0.53	14.59	21.88	95.82	0.01	0.05	--	1124.7
Silos & Bins	2.39	10.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hammer Mill	0.78	3.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	8.96	39.23	0.01	0.05	0.01	0.05	0.03	0.15	0.63	2.75	0.84	15.96	21.88	95.83	4.19	18.36	0.00	3078.84

Equipment	Chromium		Cobalt		Lead		Nickel		Selenium		Cadmium		HCl		Total 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)
Calciners, Ball mills, Blender, pouring	0.02	0.11	0.02	0.11	0.01	0.04	0.05	0.21	0.01	0.04	0.01	0.04	--	--	0.13	0.55
Smelter	--	--	--	--	--	--	--	--	--	--	--	--	11.24	49.22	11.24	49.22
Silos & Bins	0.01	0.05	0.01	0.05	0.00	0.02	0.02	0.10	0.00	0.02	0.00	0.02	--	--	0.06	0.27
Hammer Mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	--	0.00	0.01
Total	0.04	0.16	0.04	0.16	0.01	0.06	0.07	0.32	0.01	0.06	0.01	0.06	11.24	49.22	11.43	50.05

Heraeus

Calciner, Ball Mills, Blenders, Pouring

Particulate emissions controlled by Central Baghouse

Operating Hours	8,760	hr/yr
Max Input Rate	1	ton/hr
Annual Throughput	8,760	ton/yr

Flow Rate (ACFM)	Dia (ft)	Exit Velocity (ft/sec)	Exit Temp (F)	Moisture Content %	Flow Rate (DSCFM)	Exhaust PM Conc. (gr/dscf)	PM		Chromium			Cobalt		
							lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy
65521.0	4.5	68.7	124	5%	56489	0.01	4.84	21.2	0.5%	0.024	0.11	0.5%	0.02	0.11

VOC		
EF (lb/ton)	lb/hr	tpy
4.16	4.16	18.22

1. Metal HAP emissions based on HAP% of total processed material x PM
2. Exhaust concentration based on engineering judgement.
3. VOC EF from HPTP lab test report 4.8.2020 for wet filter cake
3. Input material includes wet filter cake for drying and pre-processed materials from Source 01.

Lead			Nickel			Selenium			Cadmium			**Total HAP**
%	lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy	**tpy**
0.2%	0.010	0.04	1.0%	0.048	0.21	0.2%	0.010	0.04	0.20%	0.01	0.04	0.55

Heraeus

Calciner (fuel combustion)
Source 14

Operating Parameters

Fuel Type	Natural Gas	
Burner Rating	3.8	MMBtu/hr
Operating hours	8,760	hr/yr

Annual Fuel Usage	Natural Gas
	33 MMCF

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_2O)	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})	0.03	0.12
Particulate Matter (PM_{10f})	7.10E-03	0.03
Particulate Matter ($PM_{2.5f}$)	7.10E-03	0.03
Particulate Matter (PM_{Cond})	0.02	0.09
Nitrogen Oxides (NO_x)	0.37	1.64
Carbon Monoxide	0.31	1.37
Sulfur Dioxide (SO_2)	2.24E-03	9.82E-03
Combustion VOC	0.02	0.09
Carbon Dioxide (CO_2)	445.68	1952.07
Methane (CH_4)	8.40E-03	0.04
Nitrous Oxide (N_2O)	8.40E-04	3.68E-03
CO_2 Equivalent (CO_2eq)[8]	--	1,954.09

GWP[6]	
CH4	25
N2O	298

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/10^6 scf to kg/10^6 m^3, multiply by 16. To convert from lb/10^6 scf to lb/MMBtu, divide by 1,020.

(3) Assume PM_{Filt} = $PM_{2.5}$, 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

(7) CO_2, 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) = CO_2(t) + [GWP_{CH4} * CH_4 (t)] + [GWP_{N2O} * N_2O (t)]

Heraeus

Smelter

Emissions controlled by Baghouse with lime injection

Operating Hours	8,760	hr/yr
Max Input Rate	1.75	ton/hr
Annual Throughput	15,330	ton/yr

Flow Rate (ACFM)	Dia (ft)	Exit Velocity (ft/sec)	Exit Temp (F)	Moisture Content %	Flow Rate (DSCFM)	Exhaust PM Conc. (gr/dscf)	PM	
							lb/hr	tpy
17158.0	2.3	68.9	392	1%	10567	0.01	0.91	3.97

CO[3]			CO2[4]			NOx			S02[5]				HCl[5]			
EF (lb/ton)	(lb/hr)	(tpy)	EF (lb/ton)	(lb/hr)	(tpy)	EF (lb/ton)	(lb/hr)	(tpy)	EF (lb/ton)	Control Eff. (%)	(lb/hr)	(tpy)	EF (lb/ton)	Control Eff. (%)	(lb/hr)	(tpy)
1.8	3.15	13.80	0.20	0.35	1.53	0.022	0.04	0.17	41.67	70%	21.88	95.81	64.22	90%	11.24	49.22

1. Dispersion model performed to determine stack height to meet TDEC 70 ug/m3 concentration.
2. Exhaust concentration based on engineering judgement and previous stack test results on similar equipment
3. CO and NOx emission factors based on AP-42 Section 12.5.1 for Electric Arc Furnaces.
4. CO2 is a ratio of CO based on sample test exhaust concentrations. CO was present at a concentration 9x that of CO2.
5. HCl & SO2 emission factors based on average concentration of HCl & S in feed material (EnglandT 155…)

Heraeus

Smelter Afterburner
Source 14

Operating Parameters

Fuel Type	Natural Gas	
Burner Rating	2.19	MMBtu/hr
Operating hours	8,760	hr/yr

	Natural Gas
Annual Fuel Usage	19 MMCF

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_2O)	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})	0.02	0.07
Particulate Matter (PM_{10f})	4.08E-03	0.02
Particulate Matter ($PM_{2.5f}$)	4.08E-03	0.02
Particulate Matter (PM_{Cond})	0.01	0.05
Nitrogen Oxides (NO_x)	0.21	0.94
Carbon Monoxide	0.18	0.79
Sulfur Dioxide (SO_2)	1.29E-03	5.64E-03
Combustion VOC	0.01	0.05
Carbon Dioxide (CO_2)	256.18	1122.06
Methane (CH_4)	4.83E-03	0.02
Nitrous Oxide (N_2O)	4.83E-04	2.11E-03
CO_2 Equivalent (CO_2eq)[8]	--	1,123.22

GWP[6]	
CH4	25
N2O	298

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/10^6 scf to kg/10^6 m^3, multiply by 16. To convert from lb/10^6 scf to lb/MMBtu, divide by 1,020.

3. Assume PM_{Filt} = $PM_{2.5}$, 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

7. CO_2, 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) = CO_2(t) + [GWP_{CH4} * CH_4 (t)] + [GWP_{N2O} * N_2O (t)]

Heraeus

Silos and Day Bins

Controlled by bin vents

Operating Hours 8,760 hr/yr

Silo

Flow Rate (ACFM)	Dia (ft)	Exit Velocity (ft/sec)	Exit Temp (F)	Moisture Content %	Flow Rate (DSCFM)	Exhaust PM Conc. (gr/dscf)	PM	
							lb/hr	tpy
100.0	0.2	53.1	80	1%	97	0.02	0.02	0.1
						2 Silos	0.03	0.15

Day Bin

Flow Rate (ACFM)	Dia (ft)	Exit Velocity (ft/sec)	Exit Temp (F)	Moisture Content %	Flow Rate (DSCFM)	Exhaust PM Conc. (gr/dscf)	PM		Chromium			Cobalt		
							lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy
1177.0	0.7	51.0	80	1%	1144	0.02	0.20	0.9	0.5%	0.001	0.00	0.5%	0.00	0.00
						12 Day Bins	2.35	10.30	--	0.01	0.05	--	0.01	0.05

1. The two silos handle the dried filter cake (filter cake ash) from the calciner.
2. The twelve day bins are used as follows: 1 for lime, 1 for sand, 1 for filter cake ash, 9 for misc. material primarily from Source 01.
3. Small concentrations of HAPs are associated with the Source 01 material.
4. Metal HAP emissions based on HAP% of total processed material x PM

Silos and Day Bins

Lead			Nickel			Selenium			Cadmium			**Total HAP**
%	lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy	**tpy**
0.2%	0.000	0.00	1.0%	0.002	0.01	0.2%	0.000	0.00	0.20%	0.00	0.00	0.02
--	0.00	0.02	--	0.02	0.10	--	0.00	0.02	--	0.00	0.02	0.27

Heraeus

Hammer Mill

Emissions controlled by 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		Chromium			Cobalt		
							lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy
1338.0	0.7	58.0	80	1%	1300	0.01	0.11	0.5	0.5%	0.001	0.00	0.5%	0.00	0.00

1. Metal HAP emissions based on HAP% of total processed material x PM
2. Exhaust concentration based on engineering judgement.

Hammer Mill

Lead			Nickel			Selenium			Cadmium			**Total HAP**
%	lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy	%	lb/hr	tpy	**tpy**
0.2%	0.000	0.00	1.0%	0.001	0.00	0.2%	0.000	0.00	0.20%	0.00	0.00	0.01

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

TITLE V PERMIT APPLICATION
CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:	2. Emission source number
Heraeus Precious Metals North America, LLC	65-0049-14

3. Describe the process emission source / fuel burning installation / incinerator.
One Smelter with lime injection baghouse control; one calciner, ball mills, & blenders with baghouse control; one hammer mill with baghouse control; Silos and day bins with bin vents

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)
14-1, 14-2, 14-3	Particulates	TAPCR 1200-3-07-.01(5)	0.01 gr/dscf	0.01 gr/dscf	IN
14-Silos, 14-Day Bin	Particulates	TAPCR 1200-3-07-.01(5)	0.02 gr/dscf	0.02 gr/dscf	IN
14-1, 14-2	VOC	TAPCR 1200-3-07-.07(2)	18.36 tpy	18.36 tpy	IN
14-1, 14-2	CO	TAPCR 1200-3-07-.07(2)	15.96 tpy	15.96 tpy	IN
14-1, 14-2	NOx	TAPCR 1200-3-07-.07(2)	2.75 tpy	2.75 tpy	IN
14-1, 14-2	SO2	TAPCR 1200-03-14-.01(3)	95.83 tpy	95.83 tpy	IN
14-1 = calciner, etc.					
14-2 = smelter					
14-3= hammer mill					

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

N/A					

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

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

TITLE V PERMIT APPLICATION
COMPLIANCE PLAN AND COMPLIANCE CERTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Heraeus Precious Metals North America, LLC

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

One Smelter with lime injection baghouse control; one calciner, ball mills, & blenders with baghouse control; one hammer mill with baghouse control; Silos and day bins with bin vents

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:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

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 Precious Metals North America, 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)	87.13		87.13	
Sulfur Dioxide	110.38		110.38	
Volatile Organic Compounds	74.57		74.57	
Carbon Monoxide	36.01		36.01	
Lead	0.49		0.49	
Nitrogen Oxides	26.36		26.36	
Total Reduced Sulfur	NA		NA	
Mercury	NA		NA	
Asbestos	NA		NA	
Beryllium	NA		NA	
Vinyl Chlorides	NA		NA	
Fluorides	NA		NA	
Gaseous Fluorides	NA		NA	
Greenhouse Gases in CO_2 Equivalents	52,153		52,153	

(Continued on next page)

(Continued from previous page)

EMISSIONS SUMMARY TABLE – HAZARDOUS AIR POLLUTANTS

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.

Air Pollutant & CAS	Summary of Maximum Allowable Emissions		Summary of Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour- Item 5, APC 28)	Tons per Year	Reserved for State use (Pounds per Hour- Item 5, APC 28)
Highest Single HAP (HCl)	52.50		52.50	
Total HAP	75.52		75.52	

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

Heraeus
Facility Wide
Emissions Summary

Source		PM_{Total}		PM_{10f}		$PM_{2.5f}$		PM_{Cond}		NO_x		CO		SO_2		VOC		CO_2eq	
Name	**ESRN**	**(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)**
8 Roasting Ovens, 1 Chamber Furnace, Burning Chamber and Cooling Chamber burners	65-0049-01	2.67	11.70	0.06	0.25	0.06	0.25	0.17	0.76	3.04	13.31	2.65	11.61	0.02	0.08	2.47	10.82	--	34018.5
Ball Mills 1, 2, 3, 4, 5, 6 and Blenders and Tray Loading	65-0049-04	2.50	10.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	--	615.46
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	--	7240.78
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	--	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	65-0049-12	4.96	21.74	4.96	21.74	0.12	0.51	0.04	0.17	0.66	2.88	0.50	2.19	3.29	14.40	7.33	32.11	--	2833.48
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	--	4103.07
Rh Furnace	65-0049-13	0.27	1.17	2.14E-03	9.39E-03	2.14E-03	9.39E-03	1.39E-03	6.10E-03	0.02	0.09	0.01	0.05	2.28E-04	1.00E-03	50.00	12.50	--	107.49
Smelter Expansion	new	8.96	39.23	0.01	0.05	0.01	0.05	0.03	0.15	0.63	2.75	0.84	15.96	21.88	95.83	4.19	18.36	0.00	3078.84
Facility Total		20.25	87.13	5.24	22.19	0.39	0.96	0.34	1.35	17.53	26.36	8.48	36.01	25.38	110.38	64.50	74.57	--	52153.72

Source		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		Mercury N458	
Name	**ESRN**	**(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)**
8 Roasting Ovens, 1 Chamber Furnace, Burning Chamber and Cooling Chamber burners	65-0049-01	0.20	0.87	0.17	0.73	0.07	0.29	0.10	0.42	0.08	0.36	0.25	1.09	0.02	0.07	1.66E-03	0.01	--	--
Ball Mills 1, 2, 3, 4, 5, 6 and Blenders and Tray Loading	65-0049-04	0.30	1.31	0.25	1.10	0.10	0.44	0.15	0.64	0.01	0.05	0.37	1.63	0.02	0.11	2.50E-03	0.01	--	--
Crucible Furnace	65-0049-06	0.04	0.18	0.04	0.15	0.01	0.06	0.02	0.09	0.00	0.01	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	--	--	2.46E-07	1.08E-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	65-0049-12	--	--	--	--	--	--	0.05	0.22	--	--	--	--	0.05	0.22	0.05	0.22	--	--
Plume Suppressor (Insignificant)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Rh Furnace	65-0049-13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Smelter Expansion	new	--	--	0.04	0.16	0.04	0.16	0.07	0.32	0.01	0.06	0.01	0.06	0.01	0.06	--	--	--	--
Facility Total		0.54	2.37	0.49	2.15	0.22	0.96	0.39	1.72	0.11	0.49	0.69	3.01	0.11	0.48	0.05	0.24	0.00	0.00

Heraeus
Facility Wide
Emissions Summary

Source Name	Methanol (lb/hr)	Methanol (tpy)	Tetrachloroethene 127-18-4 (lb/hr)	Tetrachloroethene 127-18-4 (tpy)	Benzene 71-43-2 (lb/hr)	Benzene 71-43-2 (tpy)	Toluene (lb/hr)	Toluene (tpy)	Xylene (lb/hr)	Xylene (tpy)	Ethylbenzene (lb/hr)	Ethylbenzene (tpy)	Manganese (lb/hr)	Manganese (tpy)	HCl (lb/hr)	HCl (tpy)	HF (lb/hr)	HF (tpy)	Total HAP (tpy)
8 Roasting Ovens, 1 Chamber Furnace, Burning Chamber and Cooling Chamber burners	0.40	1.77	--	--	--	--	--	--	--	--	--	--	--	--	0.75	3.27	0.002	0.01	8.90
Ball Mills 1, 2, 3, 4, 5, 6 and Blenders and Tray Loading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.29
Crucible Furnace	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.74
Rotary Oven	--	--	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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Rh Furnace	--	--	--	--	--	--	37.50	9.38					--	--	--	--	--	--	9.38
Smelter Expansion	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11.24	49.22	--	--	50.05
Facility Total	0.40	1.77	0.26	0.03	0.03	0.11	37.55	9.60	0.02	0.09	0.00	0.01	0.00	0.00	11.99	52.50	0.00	0.01	75.52

Attachment:

Dispersion Model Summary

Heraeus Scenario 5 Unitized Modeling Results (µg/m^3/g/s)

Description	Max Modeled 24-hr Unit Concentration	TN 24-hr HCl Standard	Target % of Standard	Passing HCl Emission Rate	
	µg/m^3/g/s	µg/m^3	%	g/s	lb/hr
Smelter Ht @ 125 ft, Exit Vel 70 ft/s, Diam 2.28 ft	7.85	70	90%	8.03	63.73

Heraeus Scenario 5 Unitized Modeling Results (µg/m^3/g/s)