

**DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection**

B872362686

FACILITY: HOWMET CORPORATION, HRC and PLANTS 5 & 10		SRN / ID: B8723
LOCATION: 1500 & 1600 S. Warner St. (HRC, Pit. 5), WHITEHALL		DISTRICT: Grand Rapids
CITY: WHITEHALL		COUNTY: MUSKEGON
CONTACT: Christopher Rohrer , Manager of Environmental Engineering		ACTIVITY DATE: 04/22/2022
STAFF: Eric Grinstern	COMPLIANCE STATUS: Compliance	SOURCE CLASS: SM OPT OUT
SUBJECT: FY 22 Compliance Inspection		
RESOLVED COMPLAINTS:		

FACILITY DESCRIPTION

The stationary source (SRN: B8723) is comprised of Plant 5, Plant 10 and the Howmet Research Center (HRC), which are all located on the South Campus.

Plant 5 contains the following business units: Titanium (Ti) Cast, Hot Isostatic Pressing (HIP), and Powdered Metals

Plant 10 is an investment casting operation that utilizes super alloys.

HRC conducts research and development activities, for which the processes have previously been determined to be exempt from permitting under Rule 283 but are included in PTI No 63-06A. In addition to R&D, a portion of the building is used for the design and assembly of furnaces used by Howmet.

REGULATORY ANALYSIS

The stationary source has one opt-out permit, PTI No. 63-06A. Many of the processes have minimal emissions and do not have specific emission limits or monitoring requirements within the opt-out permit.

PTI No. 62-06A has process specific requirements for the HF Primary Chemical Milling Tanks, Alternate Acid Bath Tank and Weak Acid Rinse located in Plant 5. Plant 10 and HRC do not have any process specific requirements but are included in the FGFACILITY PM and HAP emission limits for the stationary source.

The source is subject to 40 CFR 63 Subpart ZZZZZZ, Area Source Aluminum, Copper, and Other Nonferrous Foundries NESHAP.

The facility has previously submitted the required Notification of Compliance. Subpart ZZZZZZ does not require semiannual/annual certifications unless there are deviations. A current copy of the required management practices plan required by 63.11550(a)(2) was requested and provided during a previous inspection.

The facility has emergency generators that are Subject to 40 CFR 60 IIII (NSPS Subpart IIII) and 40 CFR 63 Subpart ZZZZ (RICE MACT).

COMPLIANCE EVALUATION

At the facility staff consisting of Eric Grinstern (EG) met with Chris Rohrer and Brandon Finn. Subsequent records and additional information were provided by Michelle Wazny.

PLANT 5

TITANIUM CASTNG (Ti Cast)

Ti Cast consists of the investment casting of titanium which encompasses the following processes.

Wax Pattern - Wax patterns are formed and assembled into clusters both by hand and robotic.

Monoshell - The wax molds are coated through a ceramic slurry / stucco process. All particulate emitting processes (stucco towers) are controlled by one (1) baghouse that is located outside and vents internally. The facility lists monoshell as permitted under PTI 63-06A. The process also appears that it could be exempt under Rule 285(2)(l)(vi)(B).

Boiler Clave - After the monoshell coating is dried, the wax is removed in a steam autoclave. *The facility has one (1) boiler clave that has a hood over the door to capture what is primarily steam. The hood ducts to a stack that emits to the outside atmosphere uncontrolled. The wax from the boiler clave is recovered and shipped offsite for recycling.* The facility lists the boiler clave as permitted under PTI 63-06A.

Burnout Oven – After the boiler clave, the molds are fired in a burnout oven to condition the shell to form a ceramic mold. No molds are processed in the burnout oven that have not had a majority of the wax removed in the boiler clave. The burnout oven does not have control and exhausts to the outside atmosphere uncontrolled. The facility lists the burnout oven as permitted under PTI 63-06A.

Preheat Ovens – The facility has two preheat ovens to heat the molds prior to casting (one for ISR and one for VAR). The preheat ovens vent to the outside atmosphere uncontrolled. The facility list the ovens as permitted under PTI No. 63-06A. The ovens also appear that they could be exempt under Rule 282(2)(a)(i).

Melting/Pouring - Induction Melting Vacuum Casting Furnaces. After being pre-heated, molds are poured from metal melted in either the ISR or VAR induction casting furnaces. The facility has one of each of the furnaces. The furnaces only vent via the vacuum system through an oil pump filter. The facility list the ovens as permitted under PTI No. 63-06A. Due to the size of the furnaces (less than 1,000 pound holding capacity) they also appear exempt from permitting under Rule 282(2)(a)(iv).

Cooling – After pouring, the castings are cooled under a hood that vents heat to the outside atmosphere uncontrolled. Each of the furnaces have an associated cooling hood. The facility lists the cooling hoods as permitted under PTI No. 63-06A.

Finishing - After cooling, the castings are sent off-site to Northern A-1, where the shell is removed via water blasting. The casting then comes back onsite and undergoes various cut-off, grinding, sanding, blasting, and other finishing processes. Emissions from the finishing operations are controlled by baghouses and wet collectors. The baghouses vent internally, while the three (3) wet collectors vent externally. Additionally, castings are processed in CNC cells that do not exhaust to the outside atmosphere, as well as electric heat treat furnaces. The heat treat furnaces exhaust to the outside atmosphere via the vacuum system through an oil pump filter. The facility lists the finishing operations as permitted under PTI 63-06A. The processes also appear that they could be exempt under Rule 285(2)(l)(vi)(B).

Welding – The facility has numerous small cells that conduct welding under a vacuum. The welding processes do not vent to the outside atmosphere. The processes appear to be exempt under Rule 285(2)(i).

FPI Process – The FPI inspection process utilizes Zyglo penetrant fluid. The facility lists the FPI Process as permitted under PTI 63-06A. The facility provided VOC emission records that document that the FPI Process could also meet Rule 290 exemption.

Emergency Generators – The plant has four (4) diesel generators. The capacity of the generators are as follows: 1,490 HP, 464 HP, 464 Hp, and 324 HP. The facility designates all of the generators as subject to NSPS Subpart IIII. The facility provided records of emergency and maintenance hours of operation. The facility provided documentation that all of the units are EPA certified engines. Based on the size of the generators they all appear to be exempt from permitting under Rule 285(2)(g).

Titanium Chemical Milling - Milling of the titanium castings is performed in one of the chemical milling/primary etch tanks (EUCHEMILL01, EUCHEMILL02) or the Alternate Acid Bath Tank

(EUALTACIDBATHTANK), both of which use hydrogen fluoride. The castings then undergo further finishing operations, i.e., grinding, sanding etc. After these processes, the castings return to this department to be cleaned in the weak acid rinse tanks (EUACIDRINSE01, EUACIDRINSE02).

The chemical milling processes were modified under PTI No. 63-01A, as described above. The facility started installation of the new processes with the addition of EUACIDRINSE01, EUACIDRINSE02 and the Weak Acid Scrubber that provides control for the two rinse tanks. The project has been slowed due to requirements by the local fire inspector. Until those issues are addressed the facility is continuing to operate the process as it did prior to the permit modification. EUALTACIDBATHTNK is controlled by the Small Acid Scrubber, the tank and control were not changed by the permit modification. EUPRIMMILLTANK was renamed EUCHEMMILL01. This tank is in operation and is controlled by the Large HF scrubber. The facility has not yet installed the second milling tank (EUCHEMMILL-02), which will also be controlled by the Large HF Scrubber. EUWEAKACIDRINSTK remains, which will be replaced by EUACIDRINSE01 and EUACIDRINSE02, when they are brought online along with the Weak Acid Scrubber. EUWEAKACIDRINSTK continues to be controlled by the Large HF Scrubber. The facility is complying with the monitoring and recordkeeping conditions under the permit modification, for the interim configuration of the milling operation.

EUALTACIDBATHTNK

Alternate acid bath (EUALTACIDBATHTNK, T-502), controlled by the Small HF Scrubber.

The Permit limits the emissions of HF to 0.03 tpy and HNO₃ to 0.005 tpy. Compliance with the emission limits is demonstrated through the proper operations of the small HF scrubber and the requirement that the facility maintain sufficient records to demonstrate compliance with the acid emission limits.

Proper operations is demonstrated through the requirement to implement and maintain an operation and maintenance plan for the small acid scrubber. The facility previously submitted a copy of the O&M Plan. Proper operation is also demonstrated through the requirement to maintain the scrubber with a water flow indication system. The water flow indication system was observed in operation during the inspection. Additionally, records were reviewed documenting the tracking of the flow rate. The established flow rate is 75-125 gpm. Reviewed records showed readings within the established range.

The facility supplied monthly and 12-month rolling time period emission records. The tpy records ending in March 2022 showed HF emissions of 0.0003 tpy and HNO₃ emissions of 0.0014 tpy, both in compliance with the permitted limits.

FGACIDRINSE

Two acid rinse tanks, each with an associated water rinse tank

EUACIDRINSE01, EUACIDRINSE02

Controlled by a packed bed Tri-Mer scrubber (the "weak acid scrubber")

As previously detailed, the new acid rinse tanks and scrubber have been installed but not put into operation. The facility is currently operating the existing weak acid rinse tank that is controlled by the Large HF Scrubber.

Proper operation is demonstrated through the requirement to implement and maintain an operation and maintenance plan for the weak acid scrubber. The facility previously submitted a copy of the O&M Plan. Proper operation is also demonstrated through the requirement to maintain the following:

- a. A device that continuously monitors the liquid flow rate.
- b. A device that continuously monitors the static pressure drop.
- c. A device that continuously monitors the pH of the scrubbing water.

- d. An alarm system that sounds when the pressure drops, or pH are outside of the ranges specified in the MAP.

The facility is required to monitor and record liquid flow rate and static pressure drop daily, for the new weak acid scrubber when it is put into operation.

During the inspection, the required monitoring devices were observed for the Large HF Scrubber, which is controlling EUWEAKACIDBATHNK. The facility is continuing to monitor the liquid flow rate. Review of the records showed the flow rate to be within the established ranges.

FGCHEMMILL

Two HF chemical milling/primary etch tanks, each with an associated water rinse tank

EUCHEMMILL01 and EUCHEMMILL02

Emissions controlled by a packed bed Tri-Mer scrubber (the Large HF Scrubber)

The facility has not completed the modifications under the most recent permit modification, which includes the installation of EUCHEMMILL02. The facility is operating EUCHEMMILL01 (formerly EUPRIMMILLTANK).

Proper operation is demonstrated through the requirement to implement and maintain an operation and maintenance plan for the weak acid scrubber. The facility previously submitted a copy of the O&M Plan. Proper operation is also demonstrated through the requirement to maintain the following:

- a. A device that continuously monitors the liquid flow rate.
- b. A device that continuously monitors the static pressure drop.
- c. A device that continuously monitors the pH of the scrubbing water.
- d. An alarm system that sounds when the pressure drops, or pH are outside of the ranges specified in the MAP.

During the inspection, the required monitoring devices were observed for the Large HF Scrubber, which is controlling EUCHEMMILL01. The facility is continuously monitoring the liquid flow rate. Review of the records showed the flow rate to be within the established ranges.

Hot Isostatic Pressing (HIP)

HIP involves the simultaneous application of elevated temperature and isostatic pressure for an extended period of time under a blanket of argon. This process is used to eliminate voids within a cast part or to consolidate a material, such as castings, powdered metals, or ceramic composites. The facility has thirteen (13) HIP units installed. The facility has exempted the units from permitting under Rule 282(2)(a)(i). Within the HIP department is a small bar cutting unit used for testing. The unit is controlled by an internally vented collector. The facility lists the unit and control as covered under PTI No. 63-06A. The process also appears that it could be exempt under Rule 285(2)(l)(vi)(B).

Powdered Metals

Within the powdered metals division, metal powders are blended and enclosed in containers. The containers of powdered metal are then placed in vacuum degassing ovens. The facility has four (4) vacuum ovens. The ovens (HIP PM Tent Degas Ovens) only vent via the vacuum system through an oil pump filter. Since powders are enclosed in containers, emissions are not expected. The blending and processing of the powders is controlled primarily by wet collectors that vent externally. The facility lists the powdered metal processes as covered under PTI No. 63-06A.

Plant 10

Plant 10 is an investment wax casting operation that utilizes super alloys (nickel/chromium/cobalt). All castings are either single crystal or directionally solidified.

Below is a summary of the primary processes within Plant 10.

Wax Pattern - Wax patterns are formed and assembled into clusters both by hand and robot. Within the wax pattern department, a small amount of xylene and Permabond adhesive (superglue) are used. The Permabond is used on ceramic cores under hoods and exhausted uncontrolled. Xylene is used at the wax cluster assembly stations. Xylene distribution and waste handling is conducted under hoods that vent uncontrolled. Additionally, mineral spirits are used in the wax room. The facility has designated the adhesive, xylene, and mineral spirit usage as exempt from permitting under Rule 290. The facility provided monthly and annual records documenting compliance with Rule 290.

Monoshell - The wax molds are coated through a ceramic slurry/stucco process. All particulate emitting processes (stucco towers) are baghouse controlled, which vent internally. The monoshell department has four cells that are controlled by two baghouses. The facility has designated the monoshell dust collectors as exempt from permitting under Rule 285(2)(l)(vi)(B).

Deplating - In preparation for dewaxing, a manual process removes the plates and is controlled by an internally vented Torit collector. The facility has designated the deplating operations as exempt from permitting under Rule 285(2)(l)(vi)(B).

Boiler Clave - After the monoshell coating is dried, the wax is removed in a steam boiler clave. *The facility has two boiler claves, each has a hood over the door to capture what is primarily steam. The hoods from each boiler clave duct to a common stack that emits to the outside atmosphere uncontrolled. The wax from the boiler claves is recovered and shipped offsite for recycling.* The facility has designated the exhaust from the boiler claves as exempt from permitting under Rule 281(2)(c) or 285(2)(l)(iii).

Burn-off Oven - After the boiler clave, the molds are fired in a burn-off oven to condition the shell to form a ceramic mold. No molds are processed in the burn-out oven that have not had a majority of the wax removed in a boiler clave. The burn-off oven does not have control and exhausts to the outside atmosphere uncontrolled. The facility has designated the burn-off oven as exempt from permitting under Rule 290. The facility provided monthly and annual records documenting compliance with Rule 290.

Casting - After burnout, the molds are poured. All melting and pouring is performed in vacuum furnaces. The facility has a total of fourteen (14) furnaces. The furnaces only vent via the vacuum system through an oil pump filter. Due to the size of the furnaces, (less than 1,000 pound holding capacity) they are exempt from permitting under Rule 282(2)(a)(iv).

Cooling - Castings are cooled under a hood that vents heat to the outside atmosphere uncontrolled.

Chill Plate Cleaning - Adjacent to the casting furnaces are chill plate wash stations that use abrasive pads and ammonia to remove metal and ceramic from the chill plates. The stations vent uncontrolled to the outside atmosphere. The facility has designated the wash stations as exempt from permitting under Rule 281(2)(e).

Heat Treat Furnaces - The facility has twelve (12) electric induction vacuum heat treat furnaces that exhaust to the outside atmosphere via the vacuum system through an oil pump filter, as well as an argon vent. The facility has designated the heat treat furnaces as exempt from permitting under Rule 282(2)(a)(i).

Finishing - The facility has numerous finishing (knock-off, cut-off, water jet cut-off, sanding, blasting) that are all controlled by collectors. A majority of the collectors vent internally. The facility has designated the finishing operation dust collectors as exempt from permitting under Rule 285(2)(l)(vi)(B).

Salt Baths - Castings are processed through caustic KOH salt baths to remove core and shell material. Emissions from the salt baths are vented uncontrolled. The facility has designated the salt baths as exempt from permitting under Rule 285(2)(l)(iii).

Acid Rinse Line - Following the salt baths is a hydrochloric acid rinse line that neutralizes the casting after being processed through the caustic salt baths. Emissions from the acid tanks are controlled by a wet scrubber. Observation of the scrubber process monitors showed the following: 7.33 pH, pressure drop: 2.3", liquid flow: 32.4 GPM. The facility established ranges for each of the parameters is as follows: pH: 7 or above, pressure drop: 0-6", liquid flow: 25-75 GPM. The facility has designated the acid rinse line as exempt from permitting under Rule 290. The facility provided monthly and annual records documenting compliance with Rule 290. The facility provided monthly and annual records documenting compliance with Rule 290.

Autoclaves - Castings are processed through one of four sodium hydroxide autoclaves that utilize high temperature and high pressure to remove ceramic core material. Upon decompression, emissions from the autoclaves vent through a separation chamber to reclaim liquid for reuse. The separation chamber contains media to assist in removing sodium hydroxide. The steam separator vents to the outside atmosphere. The facility has designated the process as exempt from permitting under either Rule 281(2)(c) or Rule 285(2)(l)(iii).

Heat Treat Furnaces – Castings are processed through additional electric induction heat treat furnaces. The facility has designated the heat treat furnaces as exempt from permitting under Rule 282(2)(a)(i).

Finishing Cells – Castings are processed through finishing cells that have internally vented collectors. The facility has designated the finishing operation dust collectors as exempt from permitting under Rule 285(2)(l)(vi)(B).

Acid Etch – The facility utilizes the Laue Method for grain inspection. This process requires castings to be processed through acid etch baths. The etch baths contain ferric acid, HCL, nitric acid and water. Additionally, phosphoric acid is utilized to etch castings. The acid baths containing ferric acid, HCL, nitric acid and water are ducted to a scrubber for control. The phosphoric acid tank vents uncontrolled. Observation of the scrubber showed a pressure drop of 2.5" and a water pressure of 20 psi. The facility has designated the acid etch line as exempt from permitting under Rule 290. The facility provided monthly and annual records documenting compliance with Rule 290.

N – Ray Prep – This is a small prep room that utilizes methanol and gadolinium nitrate in a process to conduct non-destructive testing to determine if all of the ceramic core material is being removed from the castings. The mixing, loading, and unloading of methanol and gadolinium nitrate occurs under a hood that vents uncontrolled. The parts along with the methanol and gadolinium nitrate are processed in a vacuum pressure vessel, after which they are rinsed and processed through a drying oven. Parts are then sent off site for processing at an N-Ray facility. The facility stated that a majority of the methanol and gadolinium nitrate is disposed of down the drain. The facility tracks methanol usage. The facility has designated the process as exempt from permitting under Rule 283(2)(d).

Natural Gas Furnaces – The facility has several small process ovens used to dry parts after processing (etch, N-Ray, core removal). The facility has designated the furnaces as exempt from permitting under Rule 281(2)(e).

Emergency Generator – The plant has one (1) 804HP diesel generator. The facility designates the generator as subject to NESHAP Subpart ZZZZ. The facility provided records of emergency and maintenance hours of operation. Additionally, the facility provided records documenting compliance with the maintenance requirements of Subpart ZZZZ. The generator appears to be exempt from permitting under Rule 285(2)(g).

Howmet Research Center (HRC)

HRC is essentially a smaller version of Plants 5 and 10 that conducts research and development activities, for which the processes have previously been determined to be exempt from permitting under Rule 283(2)(a) but are included in PTI No 63-06A. Some of the finishing operations could also be exempted from permitting under Rule 285(2)(l)(vi)(c). In addition to R&D, a portion of the building (M-Tech) is used for the design and assembly of furnaces used by Howmet.

Processes contain in HRC include, but are not limited to:

- Research Lab with various fume hoods, etc. used for the development of waxes, ceramics, and other components of the casting process.
- Wax presses, pattern cluster assembly (small amount of xylene/Permabond usage)
- Monoshell Room
- Core pre-bake oven
- Dewaxing Boiler Clave
- Burn-off oven to cure the ceramic molds, unit is equipped with an afterburner
- Three (3) vacuum melting furnaces ((2) super alloy, (1) titanium)
- Vacuum heat treat furnace – vents via vacuum pump system
- Ceramic shell knock-off – baghouse control
- Finishing operations (cutting, grinding, etc.) – baghouse control
- Welding operations

The facility has four (4) dust collectors controlling particulate emissions from HRC that vent to the outside atmosphere. The facility records the pressure drop and conducts weekly preventative maintenance on the dust collectors. None of the processes controlled by the dust collectors were operating at the time of the inspection.

Emergency Generators – The plant has two emergency generators (1) 450 KW and (1) 750 KW diesel generator. The facility designates the generators as subject to NESHAP Subpart IIII. The facility provided records of emergency and maintenance hours of operation. The facility provided documentation that the two units are EPA certified engines. Based on the size of the generators they all appear to be exempt from permitting under Rule 285(2)(g).

FGFACILITY

The permit limits emissions from the entire stationary source (Plant 5, Plant 10, and Research Center (HRC) to the following limits: PM emissions to 13 tpy, individual HAP to 3.0 tpy and combined HAPs to 6.0 tpy.

Compliance with the emission limits is demonstrated through the requirement that the facility calculate and maintain records of emissions. The facility provided records of emissions for FGFACILITY. The 12-month rolling total for PM ending December 2021 is 3.5 tons, Individual HAP (HCL) 0.13 tpy, Combined HAPs 0.99 tpy. Calculated emissions demonstrate compliance with the permitted limits.

Conclusion

Based on the information obtained and observations made during this inspection, the stationary source appears to be in compliance with all applicable air quality rules and regulations.

Records Attached

NAME Eric Grinstern

DATE 05/19/2022

SUPERVISOR 