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

N672661410

FACILITY: Heat Treating Services Corp - Plant 3		**SRN / ID:** N6726
LOCATION: 915 Cesar E. Chavez Avenue, PONTIAC		**DISTRICT:** Warren
CITY: PONTIAC		**COUNTY:** OAKLAND
CONTACT: Ken Rogghe , Corporate Engineering Manager		**ACTIVITY DATE:** 11/24/2021
STAFF: Adam Bognar	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** MINOR
SUBJECT: Scheduled Inspection		
RESOLVED COMPLAINTS:		

On Wednesday, November 24, 2021, Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) staff, I, Adam Bognar, conducted a scheduled inspection of Heat Treating Services Corporation of America – Plant 3 ("HTS" or the "facility"), located at 915 Cesar E Chavez Avenue, Pontiac, MI. The purpose of this inspection was to determine the facility's compliance status with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control of Natural Resources and Environmental Protection Act, 1994 Public Act 451; Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) rules; and Permit to Install No. 169-01C.

Records collected during this inspection, including the most recent stack test report for EUQUENCH can be found in the AQD shared drive at: S:\Air Quality Division\STAFF\Bognar, Adam\Inspection Documents\Heat Treating Services Plant 3 November 2021

I arrived at Heat Treating Services Corporation of America – Plant 3 ("HTS" or "the facility") at around 10 am. I met with Mr. Kenneth Rogghe, Corporate Engineering Manager and Ms. Lynn Jaskowski, Consultant, to perform an inspection. I identified myself, provided credentials, and stated the purpose of the inspection.

I explained that I will need to review records, inspect the processes at the facility, and verify compliance with the conditions of PTI 169-01C. Ms. Lynn Jankowski of Civil & Environmental Consultants Inc. (CEC) provided the records I requested after the inspection. It appears that CEC handles most of the environmental concerns for HTS.

Mr. Rogghe and Ms. Jaskowski gave me a tour of the facility.

HTS performs heat treating on ferrous metal parts. Nearly all parts treated here are used in the automotive industry. In metal heat treating, a controlled application of heat is used to alter the physical and chemical properties of the metal. Hardness, strength, toughness, ductility, and elasticity of a metal/alloy can all be manipulated depending on the desired application of the treated part. The driving force behind these changes is a heat induced phase transformation of the internal lattice structure of the ferrous part. This is also known as a change in the allotrope of iron. This change is somewhat analogous to a change between different types of carbon allotropes such graphite, diamond, and charcoal.

There are around 30-40 full time employees operating three shifts at this plant. The plant operates 24 hours a day and 7 days a week unless some type of maintenance is required. It is in their best interest to run continuously for two main reasons: (1) shutting down a furnace is time consuming as it can take as long as eight hours for a cold furnace to heat up again, and (2) this cooling and heating causes wear and tear on the furnace due to stresses arising from thermal expansion and contraction.

The main types of heat treating that occur at this facility are hardening, tempering, annealing, and normalization. In all of these processes, time, temperature, and atmospheric composition within the furnace are precisely controlled to achieve the desired properties in the end product. Ferrous metal products react differently to heat treating depending on their size, shape, and alloy composition. At this facility, most heat treating occurs in a "carbon neutral" environment, meaning the atmospheric concentration of carbon in the furnace is adjusted to match the carbon concentration within the part.

Hardening furnaces are also called austenitizing furnaces. To harden iron, it must be heated to its austenic crystal phase and then quickly cooled, or "quenched", usually by oil, water, or air. The rapid cooling causes a portion of the austenite to transform into martensite, a hard and brittle allotrope of iron. Martensite is formed because carbon atoms within the austenite phase do not have sufficient time to diffuse out of the crystalline structure in large enough quantities to form pearlite. Pearlite is a ductile iron allotrope consisting of alternating layers of cementite and ferrite.

Hardened martensitic iron/steel is generally too brittle for most applications. To reduce brittleness and increase ductility, parts generally undergo tempering after hardening. In tempering, the metal is heated to a lower temperature than in hardening (around 200-700 °C) for a set amount of time. This lower heat application causes a change in the size and distribution of carbon within the martensitic steel. Heating above 700°C is avoided during tempering so that the part does not reach the austenic crystal phase where the hard martensite would be affected.

Annealing is a process where the metal is heated above the recrystallization temperature (where austenite begins to form) and then slowly cooled to increase ductility and reduce hardness, making a part more workable. This prepares the part for further work such as shaping, stamping, and forming. Cooling is carried out slowly so that any austenite created does not transform into the hard martensite, but instead transforms into the more ductile/workable pearlite.

Normalization is an annealing process where the metal is cooled in air after heating to relieve stress. When a metal part undergoes physical work, i.e. bending, forming, stamping, welding, it hardens during this process. Normalization helps to return the metal to it's original, more ductile, state.

HTS Plant 3 has five heat treating lines: HR-1, HR2, R5, R7 and R8.

HTS currently operates one hardening/tempering line, HR-1 (EUHR-1H, EUQUENCH, EUHR-1D). HR-1 is a 15 MM BTU/hr natural gas fired hardening furnace equipped with a 3000-gallon oil quench tank and a 3 MM BTU/hr natural gas fired draw (tempering) furnace.

Parts exit the hardening furnace and are immediately lowered into the adjacent agitated oil quench tank. Parts remain in the oil tank for several minutes before being raised out onto a drip tray to allow oil to flow off parts. The area between the furnace and quench tank is nitrogen blanketed to prevent excessive oxidation of the parts. When parts descend into the quench tank a portion of the oil is vaporized. I observed the vaporized portion become captured by the fume hood above the quench tank. After quenching, parts are conveyed to the draw furnace for tempering. Parts are not washed before entering the draw furnace, so some amount of oil may be combusted/emitted during tempering.

Before PTI No. 169-01B was issued in April 2019, the quench tank fume hood was vented to a Flat-Bed HEAF dry filter particulate control system. This system has been completely removed as part of the issuance of PTI No. 169-01B. Due to removing the control technology and obtaining a new permit, the facility was required to perform VOC emissions testing on this furnace. This testing was performed in June 2019.

R7 is a 13.33 MMBtu/hour natural gas-fired hardening furnace located in the north building.

HR-2 and R5 are identical 10.9 MM BTU/hr belt model natural gas fired furnaces. They are located right next to each other. No quench oil is used. HR-2 and R5 are both located in the south building.

R8 is a 24.55 MMBTU/hr natural gas-fired hardening furnace equipped with a 6,000 gallon quench oil tank, drain table, and a tempering furnace. This furnace has the capability to either oil quench or air quench parts by sending parts down 1 of 2 conveyor belts. This brand new furnace has not been completely installed yet. I observed that no oil was in the quench tank and the piping to the quench tank was not connected.

PTI No. 169-01C – EUQUENCH

HR-1 is a 15 MM BTU/hr natural gas fired hardening furnace equipped with a 3000-gallon oil quench tank and a 3 MM BTU/hr natural gas fired draw (tempering) furnace.

Section I – S.C. 1: Establishes a VOC emission limit of 16.55 tons per year. The facility complies with this emission limit based on the records I reviewed. I reviewed records from January 2020 through October 2021. VOC emissions were highest during the 12-month period ending in January 2020 at 1.26 tons. During the 12-month period ending in October 2021, VOC emissions were 0.77 tons.

Section II – S.C. 1: Establishes a material throughput limit of 23,500 tons per year of metal through the furnace. The facility is in compliance with this emission limit based on the records I reviewed. I reviewed records from January 2020 through October 2021. Throughput was highest during the 12-month period ending in January 2020 at 17,451 tons. During the 12-month period ending in October 2021, throughput was 10,660 tons.

Section IV – S.C. 1: States that HTS shall not operate EUQUENCH unless the flame curtains are operated correctly. I observed that the flame curtains were functioning at the entrance and exit of the HR-1 hardening furnace.

Section V – S.C.1: Specifies stack testing requirements. HTS performed a stack test on June 4, 2019. The test was performed within 180 days of permit issuance. AQD received the results of this stack test on August 22, 2019. The stack test yielded an emission factor of 0.1439 lb VOC/ton metal processed.

Section VI – S.C. 1,2,3: Specifies recordkeeping requirements. HTS must maintain records of the tons of metal processed and the corresponding VOC emission rate on both a monthly and a 12-month rolling basis. Additionally, HTS must maintain records of the chemical composition of the quench oil and the VOC emission factor generated during the stack test. I verified that these records are maintained. Mr. Rogghe provided me with these records on the date of the inspection.

In the records provided to me during the inspection, Heat Treating Services was still using the “interim” emission factor of 1.41 lb VOC/ton of metal processed listed in the permit to install; however, this facility conducted a stack test on this emission unit in June 2019. I requested that Heat Treating Services resubmit the 12-month rolling records using the emission factor of 0.1439 lbs VOC/ton of metal processed determined during the June 2019 stack test. Ms. Jankowski provided me with these updated records on January 4, 2022. I used these updated records in my compliance evaluation.

The new emission factor from the most recent stack test is approximately 10 times lower than the interim emission factor listed in the permit.

The quench oil used is “A-1 Quench Oil 100” made by Wolverine Oil & Supply Co. It’s contents are 100% petroleum distillates (VOC) with carbon numbers predominantly in the range of C15 through C30.

Section VII – S.C. 1: Specifies reporting requirements. HTS appears to be in compliance with the reporting requirements of this permit. The facility submitted their MAERS report in March 2021.

Section VIII – S.C. 1-22: Specifies stack dimensions. Based on my view from the roof, stacks at HTS appear to be exhausted unobstructed vertically upwards to the ambient air. I did not verify stack dimensions.

EU-HR2, EU-R5, and EU-R7

PTI No. 169-01C states that HTS shall only use natural gas in these furnaces. All of these furnaces are designed to use only natural gas. All stacks at this facility appeared to be exhausted vertically unobstructed.

EU-R8

This furnace has not been fully installed yet. The emission unit conditions of EU-R8 were not evaluated during this inspection. The furnace is in the process of being installed. I informed Mr. Rogghe that Heat Treating Services Plant 3 needs to notify the AQD district supervisor within 30 days of the quench oil tank being filled or the beginning of trial operations.

Endothermic gas generators
There are several endothermic gas generators on-site that provide a controlled, carbon neutral, atmosphere to the furnaces. These units appear to be exempt from Rule 201 requirements pursuant to Rule 285 (2)(l)(iv). No ammonia associated with nitriding is used at this facility.

Shot Blasting
There are six shot blasting machines used to clean/polish metal on a production basis. Three are located in the north building and the other three are in the south building. Emissions from these machines are controlled by a fabric filter and ventilated to the in-plant environment. These units appear to be exempt from Rule 201 requirements pursuant to Rule 285 (2)(l)(vi).

Compliance Determination
Observations made during my inspection and record review indicate that Heat Treating Services Corporation – Plant 3 is operating in compliance with the requirements of the federal Clean Air Act; Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451); Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) Administrative Rules; and Permit to Install No. 169-01C.

NAME Adam Bogner DATE 1/6/2022 SUPERVISOR K. Kelly