DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection

N672649212

FACILITY: Heat Treating Services Corp - Plant 3		SRN / ID: N6726
LOCATION: 915 Cesar E. Chavez Avenue, PONTIAC		DISTRICT: Southeast Michigan
CITY: PONTIAC		COUNTY: OAKLAND
CONTACT: Ken Rogghe , Corporate Engineering Manager		ACTIVITY DATE: 06/04/2019
STAFF: Adam Bognar	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MINOR
SUBJECT: Scheduled Inspection		
RESOLVED COMPLAINTS:		

On Tuesday, June 4, 2019, 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. 169-01B.

I arrived at Heat Treating Services Corporation of America – Plant 3 ("HTS" or "the facility") at around 8 am. Stack testing was being performed on the quenching process of the HR-1 furnace to determine the VOC emission rate. AQD Technical Process Unit staff Tom Gasloli was present. I observed the first of three 60-minute stack testing runs. A separate stack test observation report can be found on file and in MACES (*CA_N672649130*). 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 169-01B. Mr. Rogghe obtained the required records from his consultant, Lynn Jankowski, of Civil & Environmental Consultants Inc. (CEC). It appears that CEC handles most of the environmental concerns for HTS.

A violation notice was issued to Heat Treating Services Corporation of America – Plant 3 on July 18, 2018 after AQD identified an unpermitted furnace (Furnace "R5") at the facility. In response to the violation, HTS applied for a permit modification in a timely manner. PTI No. 169-01B was approved on April 29, 2019.

In addition to including furnace R5, the modified permit allows for HTS to remove the particulate filter on the quench tank of Furnace R1. The particulate filter was designed to catch some of the larger oil droplets (VOC) entrained in the quench tank exhaust; however, in practice the filter proved to be a fire hazard. The permit contains a new condition that requires HTS to perform a stack test to determine VOC emissions from the quenching process. As of June 4, 2019, this violation notice is considered resolved.

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.

This facility operates continuously nearly 24 hours a day and 365 days per year 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 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, HP3, HR2, R5, and R7.

HTS 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.

HP-3 is a 45 MM BTU/hr natural gas fired pusher furnace. This furnace is used for annealing and normalizing. No quench oil is used. Both HR-1 and HP-3 are located in the north building.

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.

PTI No. 169-01B – EUQUENCH

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 (see attached). In 2019, the highest monthly reported VOC emissions was in February at 1.31 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 (see attached). In 2019, the highest reported monthly throughput was in February at 1858 tons of metal processed.

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 was in the middle of performing a stack test on EUQUENCH during this inspection. The test was performed within 180 days of permit issuance. AQD has not received the stack test results yet. Once these results are available, HTS must use the VOC emission factor generated from the stack test rather than the VOC emission factor listed in the permit to install.

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. These records are maintained (see attached).

Section VII – S.C. 1: Specifies reporting requirements. HTS appears to be in compliance with the reporting requirements of this permit.

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-HP3, EU-HR2, EU-R5, and EU-R7: Permit states that HTS shall only use natural gas in these furnaces. All of these furnaces are designed to use only natural gas.

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. 169-01B.

NAME Adam Boozer DATE 6/20/2019 SUPERVISOR SK