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

B650141337

FACILITY: SPECIALTY STEEL TREATING Inc.		**SRN / ID:** B6501
LOCATION: 34501 Commerce Road, FRASER		**DISTRICT:** Southeast Michigan
CITY: FRASER		**COUNTY:** MACOMB
CONTACT: Robert Bellia , Maintenance Manager		**ACTIVITY DATE:** 08/29/2017
STAFF: Francis Lim	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** MINOR
SUBJECT:		
RESOLVED COMPLAINTS:		

On August 29, 2017, I conducted a compliance inspection at Specialty Steel Treating Inc. ("SST") located at 34501 Commerce Road, Fraser, Michigan. The purpose of the inspection was to determine compliance 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 Environmental Quality, Air Quality Division (MDEQ-AQD) Administrative Rules; and Permit-to-Install (PTI) Nos. 226-01A and 316-01. Jim Couture, Plant Manager and Rob Bellia, Maintenance Manager assisted during the inspection.

SST is a heat treating facility. Majority of their business is aerospace (military, space shuttle, commercial aircraft) and the rest is commercial (automotive, heavy equipment, tool & die). Specialty Steel is an approved heat treat company for certain flight critical and flight safety configurations for the aerospace industry.

The heat treating process alters the chemical composition of the steel and transforms soft steel into hard steel capable of withstanding the pressure, abrasion, and impacts inherent in metal forming. The steel is slowly heated at elevated temperatures (1200-1800°F) until it reaches a certain critical temperature where a change in chemical composition of the steel occurs. This turns the steel into austenite. The steel is then cooled rapidly (by oil, water or air) to harden the steel. This fast cooling is called quenching. This turns the steel into martensite. If the steel is cooled slowly, the steel reverts back to its original chemical composition and hardening does not take place. After quenching, the steel becomes hard but brittle. As soon as the steel has been quenched to hand warm (125-150 F), the quenched steel is then tempered.

Tempering is a heat treating process to reduce some of the excess hardness of the steel. Tempering allows the excess carbon in the steel to diffuse out. This is done by reheating the metal below a certain critical point (800-1200°F), then cooling the steel in air. At SST, some austenitic steel parts go through cryogenic freezing (using liquid nitrogen) in order to enhance the hardness of the steel. After freezing, the steel is tempered.

NOTE: Mild steel and medium carbon steel lack enough carbon to alter their crystalline makeup, so these cannot be toughened or tempered.

PTI No. 226-01A

This permit is for 8 natural gas-fired integral heat treat quench furnaces. In the hardening furnace, the metal parts are manually loaded in the front end where a door opens up to allow the parts in. The parts are moved and heated in the different heating zones. After heating, the parts go back to the front end for oil quenching. The door to the quench oil compartment is opened, and the metal parts are moved inside the compartment. The parts are dipped (by an elevator) into the bottom pit quench oil tank. The parts are then raised and moved out of the

hardening furnace. There is a hood connected to an exhaust stack just outside the quench oil compartment hardening furnace to allow any fumes to be vented out. The parts stay under the hood for a few seconds before being moved to the hot water washer and then to the tempering furnace (also called draw furnace). Flares are installed to burn off the furnace atmospheric air as well as the fumes from the oil quenching process. There are eight tempering furnaces - the parts can go to any tempering furnace, depending on the operating conditions needed. The alloy steel is then allowed to cool to room temperature. Parts are manually transferred from the hardening furnace to the wash tank and subsequently to the tempering furnace.

The two hot water parts washers are equipped with a heater to maintain water temperature at 150 ^{o}F. A cleaner (Multi-Kleen 1573) and rust preventative are added to the wash water. Multi-Kleen 1573 contains about 10% monoethanolamine. Specialty Steel purchases about 8 55-gallon drums per year. A bactericide is no longer added at this time to the water wash tank since bacteria buildup has not been a problem. An oil skimmer is used to remove oil from the water wash tank.

For this permit, quench oil emissions are assumed to be emitted as VOCs. There is a monthly usage limit of 1,200 gallons of oil per month, and 11.0 tons VOC per 12-month rolling time period.

Facility reports monthly oil usage by summing all oil additions to the quench tank minus oil reclaimed and oil spillage for the month. Facility reports waste water/oil picked up by Usher Oil based on the capacity of the delivery truck tank. On average, 19% of the waste water/oil mix is recovered oil. On some months, reported net usage is negative since amount of oil added is less than the amount of oil recovered. For 2017, highest monthly oil usage is 266 gallons for March. VOC emissions for the 12-month period ending June 2017 are 5.20 tons. Please see attached report. NOTE: Facility acknowledged that reporting the amount of waste water/oil picked up by Usher Oil based on the capacity of the delivery truck tank is an oversimplification. They will improve their recordkeeping.

PTI No. 316-01

This permit is for the 8,000 gallon anhydrous ammonia storage tank. The ammonia is used for gas nitriding. Nitriding is a surface-hardening heat treatment that diffuses nitrogen into the steel surface (creating a nitride layer) at a temperature range between 930 to 1020°F. The steel is first hardened and tempered before ammonia nitriding.

Nitrogen used in nitriding is produced by the dissociation of gaseous ammonia. SST uses an ammonia dissociator to separate the nitrogen from anhydrous ammonia. Ammonia also dissociates into nitrogen and hydrogen when it comes into contact with the heated steel workpiece.

Process begins with the metal parts charged into the retort furnace. Acetylene is added to the furnace to supply and maintain the carbon content of the alloy steel. The furnace temperature is ramped up to approximately 975 ^{o}F while raw ammonia is charged to the furnace for about 3 hours. The next cycle is the addition of 20-24% dissociated ammonia for another 8 hours. The final cycle is the addition of 80-84% dissociated ammonia for approximately 30 hours. Cycle time may vary depending on the product that is being heat treated. Some parts are heat treated for almost a week.

Nitriding of certain alloys may require an addition of hydrogen to the nitriding atmosphere,

which improves the control of nitriding operations. However, additions of pure hydrogen are not practical. Instead, the hydrogen is supplied as a gas mixture composed of 75% molecular hydrogen and 25% molecular nitrogen. Such a mixture is produced from the ammonia dissociator.

The ammonia tank is inspected and maintained by their ammonia supplier. Check valves, relief valves, positive shut-off valves are inspected for operability. The facility has discontinued conducting the in-house inspection and maintenance activities. A contractor just recently conducted maintenance activities including replacement of relief valves. Since the contractor conducts major maintenance activities, SST now only conducts minor maintenance activities that include painting the tank and visual inspection of pipes and valves. Ammonia tank contents are remotely monitored by their supplier and anhydrous ammonia is automatically delivered.

The Emergency Response Plan for the ammonia storage tank is contained in their Risk Management Program. Facility also has a Pollution Incident Prevention Plan that contains a section regarding the anhydrous ammonia storage tank. The Fire Marshall regularly conducts training to SST personnel to prepare them in case of an ammonia leak. The Fire Marshall approves/reviews with the facility the Emergency Response Plan on a yearly basis. A copy of Part 78, Storage and Handling of Anhydrous Ammonia (MIOSHA 1910.111) also known as Rule 7801 should be kept on-site. AQD has a copy of this document. A remotely operated internal positive shut off valve is installed by the north wall.

The retort furnaces are exempt from permits. Heat treating furnaces are exempt if the furnaces do not involve molten materials, oil coated parts and oil quenching. NOTE: Updated Rule 282(2)(a)(i) no longer exempts heat treating furnaces involving ammonia.

A vapor combustor with afterburner that controls ammonia emissions from the retort furnaces was installed in 2010 to resolve a then ongoing complaint about ammonia odors. Exhaust from the purge cycle is released to a pipe which goes to the vapor combustor. A larger and more effective vapor combustor was installed last year. Because of the tight spot available for the vapor combustor, it took a tremendous amount of work to have this larger vapor combustor installed. Rob Bellia is very satisfied with the performance of the new vapor combustor. I verified that the vapor combustor was operating properly at a temperature above 1550 ^{o}F. Facility usually keeps the vapor combustor running even if they sometimes do not operate on certain weekends.

For 2016, facility purchased 180,403 pounds of anhydrous ammonia.

Halogenated Vapor Degreaser

Facility operates a perchloroethylene batch vapor degreaser subject to the degreaser NESHAP. Facility chose to comply with the NESHAP using Control Combination Option No. 6, which requires freeboard ratio of at least 1, and installation of a freeboard refrigeration device. The temperature of the vapor zone is about 60 ^{o}F. For perchloroethylene, maximum allowed temperature is 75 F. The degreaser is used primarily to clean up the parts that go to the retort furnace prior to gas nitriding.

During the inspection, I noticed that the cover of the degreaser was not in place. The operator was notified of this. He mentioned he was using the vapor degreaser and forgot to close it.

Facility submits a semi-annual exceedance report as required by the NESHAP.

For 2016, facility purchased 8,505 pounds of perchloroethylene. There is no perchloroethylene usage limit.

Other Equipment

Facility also operates vacuum heat treating furnaces. Vacuum heat treating is used to produce high quality, precision alloy steel parts.

Facility also operates five rotary furnaces which contains a turntable inside the furnace. Parts from the rotary furnace are oil quenched in any of the five Gleason quench presses (oil quenching machines). The Gleason quenching machines are designed for quenching and holding heated steel parts without being distorted. The parts to be treated are held together by a press while quench oil is pumped to the oil quenching chamber. Different steel parts require different dies for holding the parts in place. The dies are usually supplied by the client. After heat treating in the rotary furnace, the hot metal is manually transferred using a heat resistant glove to the Gleason press for oil quenching.

The rotary furnace with oil quenching is exempt under Rule 290. Oil usage from the Gleason oil quench press is very small. Emissions from the Gleason quenching machines are less than 1000 pounds per month. Attached are emissions records for 2016 and 2017 (until June).

Facility used to operate a natural gas-fired pusher furnace at the site. This pusher furnace has been moved to their facility in Farmington Hills.

NAME _____ DATE 09-06-17 SUPERVISOR _____