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

B650131265

FACILITY: SPECIALTY STEEL TREATING Inc.		**SRN / ID:** B6501
LOCATION: 34501 Commerce Road, FRASER		**DISTRICT:** Southeast Michigan
CITY: FRASER		**COUNTY:** MACOMB
CONTACT: Rick Carroll , Quality Control Manager		**ACTIVITY DATE:** 07/31/2015
STAFF: Francis Lim	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** MINOR
SUBJECT:		
RESOLVED COMPLAINTS:		

On July 31, 2015, 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. 226-01 and 316-01. Ms. Jennifer Bendle, Quality Manager and Tom Valenti, Director of Quality assisted during the inspection. Rick Carroll, was on-leave during the inspection.

SST is a heat treating facility. 98% of their business is aerospace (military, commercial aircraft, space shuttle), and 2% commercial (Automotive & Truck, Industrial Bearing, Heavy Equipment and Tool & Die). SST is an approved commercial heat treat company to heat treat certain flight critical and flight safety configurations for prime aerospace and helicopter companies.

The heat treating process alters the alloy distribution and transforms the soft alloy into a hard alloy capable of withstanding the pressure, abrasion and impacts inherent in metal forming. This slow heating process at elevated temperatures (1200-1800 °F) transforms the alloy into austenite, therefore calling this process austenitizing. This temperature is below the critical temperature where the alloy turns into a molten metal. The alloy must be cooled fast enough (by oil, water or air) to fully harden into martensite, which will provide the material's strength. This fast cooling is called quenching. Martensite is extremely brittle. If the alloy is machined in this condition, most alloy steels would shatter. To prevent this, a process called tempering is conducted after the hardening process. As soon as the alloy steel has been quenched to hand-warm (about 125/150°F), it should be immediately tempered. The tempering process involves reheating the alloy to about (800-1200 F) in a tempering (sometimes called "draw") furnace. At SST, some of the alloys go to a freezer (after hardening/tempering) to remove any microstructure defects.

PTI No. 226-01

This permit is for 7 natural gas-fired integral heat treat quench furnaces, identified as IQF Nos. 36 to 42. 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 (if any) 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. There are seven 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.There are flares in the heating furnace that burns off the furnace atmospheric air as well as the fumes from the oil quenching process.

For this permit, quench oil emissions are assumed to be emitted as particulates. There is a monthly limit of 1,050 gallons per month, 53 pounds PM/day, and 9.5 tons PM/year. For 2014, highest monthly oil usage is 901 gallons for October; highest monthly PM emissions are 422 pounds for October. Highest average daily PM emissions occurred in October with 13.6 pounds/day. Total PM emissions for 2014 are 1.6 tons. Oil usage and PM emissions are below limits. Please see attached report. Note that oil usage reported is oil added to the quench tanks. Net oil used (oil usage minus reclaimed minus cleanup oil) is used for emissions claculations.

The two hot water parts washers are equipped with a heater to maintain water temperature at 140 °F. A rust preventative additive is added to the wash water. A bacteriacide 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 wash water tank.

During the inspection, staff noted that there were 8 integral quench furnaces installed. Permit only allows 7 integral quench furmaces. A notice of violation will be sent to the facility. Specialty Steel will modify their permit.

PTI No. 316-01

This permit is for the 8,000 gallon anhydrous ammonia storage tank. The ammonia is used for gas nitriding in the heat treating process. Nitriding is a surface-hardening heat treatment that introduces nitrogen into the surface of steel at a temperature range (930 to 1020°F), while it is in the ferrite condition. Thus, nitriding is similar to carburizing in that surface composition is altered, but different in that nitrogen is added into ferrite instead of austenite. The alloy is first hardened and/or tempered before nitriding.

Nitrogen used in nitriding is produced by the dissociation of gaseous ammonia. The ammonia is first passed through an ammonia dissociator before it goes to the heat treating retort furnace.

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 °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. Ammonia concentration is measured through a bubbler (used for titration). Every hour, a gas sample from the retort furnace is passed through the bubbler to determine the ammonia concentration.

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 through dissociation of ammonia using 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. However, the facility conducts other maintenance activities that include painting the tank and visual inspection of pipes and valves.

The Emergency Response plan is contained in the Risk Management Program. Facility also has a Pollution Incident Prevention Plan that contains a section regarding the anhydrous ammonia storage tank. A remotely operated internal positive shut off valve is installed by the north wall. 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 and is attached to the permit.

There are 11 retort furnaces used for nitriding. The retort furnaces are exempt from permits under Rule 282(a)(i). Heat treating furnaces are exempt if the furnaces do not involve molten materials, oil coated parts and oil quenching.

For MAERS 2014, facility reported 83 tons of ammonia usage.

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 °F. For perchloroethylene, maximum allowed temperature is 75 F. The cover of the degreaser was in place. Facility submits a semi -annual exceedance report as required by the NESHAP. It is used primarily to clean up the parts that go to the retort furnace prior to gas nitriding.

For MAERS 2014, facility reported 153 gallons of perchloroethylene usage.

Other Equipment

Facility also operates vacuum heat treating furnaces. Vacuum heat treating is used to produce high quality, precision alloy steel parts. Vacuum furnaces are exempt under Rule 282 (a)(i).

Facility also operates a rotary furnace which contains a turntable inside the furnace. Parts from the rotary furnace are oil quenched in Gleason presses (quenching machines). The Gleason quenching machines are designed for quenching, with minimum distortion, small, flat, cylindrical parts.

The rotary furnace with oil quenching is exempt under Rule 290. Emissions from the Gleason quenching machines are less than 1000 pounds per month. Attached are emissions records for 2014 and 2015 (until July).

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.

A vapor combustor that controls ammonia emissions from the retort furnaces was installed in 2010 to resolve a then ongoing complaint about ammonia odors. At the end of the nitriding cycle, the retort furnaces are purged with nitrogen to remove the residual ammonia. Exhaust from the 3-hour purge cycle is released to a pipe which goes to the vapor combustor. During the plant inspection, I verified that the vapor combustor was operating. Specialty steel is installing a new vapor combustor to replace the existing one.

NAME Emily DATE 09-30-15 SUPERVISOR CJE