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

B592926690

FACILITY: COMMERCIAL STEEL TREATING CORPORATION		**SRN / ID:** B5929
LOCATION: 31440 STEPHENSON HWY., MADISON HTS		**DISTRICT:** Southeast Michigan
CITY: MADISON HTS		**COUNTY:** OAKLAND
CONTACT: Ajay Jain , Environmental Manager		**ACTIVITY DATE:** 07/10/2014
STAFF: Francis Lim	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** SM 208A
SUBJECT: Scheduled inspection		
RESOLVED COMPLAINTS:		

On July 10, 2014, I conducted an inspection at Commercial Steel Treating Corporation, located at 31440 Stephenson Highway, Madison Heights. During the inspection, staff was assisted by Dave Yanochko, Corporate Environmental Director.

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 the conditions of Permit-To-Install (PTI) Nos. 487-97, 488-97, 489-97, 167-99, 69-01, and 306-02B.

This facility is a sister company of Curtis Metal Finishing Company. This facility was a Rule 208a opt out facility. Since Rule 208a has been rescinded, the facility will be applying for an Opt-Out permit.

Commercial Steel heat treats customer supplied steel parts (primarily automotive) using a variety of metallurgical processes, which includes:

1) Gas nitriding
2) Carburizing
3) Case hardening
4) Tempering

Previously, salt bath nitriding was also conducted at the plant. The major products at the facility are heat treated fasteners and other small automotive steel components. The products are made up of primarily heat treated carbon and alloy steel.

The purpose of heat treating is to change the structure of the steel to make it harder, tougher, and workable. The process alters the material properties of the steel parts by changing the internal lattice structure of the steel through heating. Hardening furnaces are also called austenitizing furnaces (turning the steel into the austenite phase). Austenitizing is the process of heating up the metal and rapidly cooling it down by oil, water, or air quenching. The purpose of austenitizing is to harden the metal. However, this causes the metal to be brittle, so it is necessary to temper the metal. Tempering involves heating up the metal and slowly cooling it. The purpose of tempering is to soften, toughen and reduce the brittleness of the metal. In general, at this facility hardening temperature is 1500-1700 °F and tempering is 400-1100 °F.

From the hardening furnace, the metal is immersed in the oil quench tank. Continuous

furnaces have integral oil quench. The metal parts are then either manually (batch furnaces) or automatically transferred (atmospheric continuous furnaces) to a steam wash tank (immersion or spray) to remove residual oil. Parts washers, generally heated between 150-160 °F do not use any VOC containing solution. A limited amount of alkaline washing solution is used. Wash tanks are cleaned every six months. Some parts are delivered coated with oil, therefore oil is removed by prewashing before hardening.

After washing, the parts are tempered in the tempering furnaces (also called draw furnaces). After tempering, the parts are sometimes dipped in an oil/water emulsion to provide a rust protective coating.

All continuous furnaces have integral quench system. After hardening, parts go to the tempering furnace without exposing the parts to in-plant environment. For batch operations, the parts are manually removed from the hardening furnaces into the wash station and then transferred to the tempering furnaces. When the furnace doors are opened, heavy smoke and oily odor may be observed. The smoke is emitted through a hood and is flared before it exits through the stack.

The process of nitriding/carburizing followed by hardening is called case hardening – this gives an extremely hard wear resistance case. For case hardening, the carbon and nitrogen content of the steel at the steel surface is altered. Carburizing/nitriding increases surface hardness of the metal -higher carbon content, harder the steel. Nitrogen assists in the hardening of the steel.

Reducing atmosphere (very low oxygen) gas is passed through the hardening furnace. To increase the carbon content, natural gas (methane) is added to the furnace. To decrease the carbon content, air is added to the furnace. The excess atmosphere gas is flared upon exiting the hardening furnace. This also serves as an air seal to prevent any air in leakage, preventing an explosive hazard. The furnaces are kept at positive pressure – air leaks out, not into the furnace. The atmospheric gas (also called endothermic gas) used inside the furnaces is produced by the endothermic generators.

Anhydrous ammonia is used to supply nitrogen to two retort furnaces for nitriding. Retort furnaces are sealed vessels. For nitriding, both ammonia and atmospheric gas is introduced to the furnace; when carburizing is done, only atmospheric gas is introduced. The nitrogen in the atmospheric gas is not used for nitriding. The nitrogen from the atmospheric gas is only used as "filler gas". Only nitrogen from ammonia is used for hardening.

The permitted processes for this facility are mostly furnaces which have particulate limits, except for AC 737 which has a VOC limit. Quench oil is assumed to evaporate as particulate (or VOC). Quench oil addition is determined using flowmeters. An operator records each oil addition in a log sheet. The facility estimates amount of oil emitted by using an emission factor that they developed based on historical amount of oil recovered and recycled. Emission factor is unique for each furnace. Quench oil that accumulates in the wash tank is recovered by skimmers and sent to the waste oil storage tank.

Facility submits MAERS annually and presents a summary of emissions from each emission unit. Natural gas usage is obtained from gas meters. For furnaces that do not have gas meters, natural gas is estimated from furnace capacity and hours of operation.

Permit 487-97

This permit is for 3 atmospheric batch steel hardening furnaces (AB620, AB622, and AB623).

AB means atmospheric batch. These furnaces are normally used for case hardening – the carbon and nitrogen content of the steel is altered. Occasionally, the hardening furnaces are used for normalizing and annealing. Annealing is a heat treating process to induce ductility, soften material, and relieve internal stresses on the metal. Normalizing produces a more uniform carbon distribution – metal is not as soft compared to an annealed metal. After washing, tempering is done at any of the following tempering furnaces: AB621, AB624 and AB625. After tempering, the parts are sometimes dipped in an oil/water emulsion. These tempering furnaces are exempt. Facility complies with PM hourly limit of 0.80 lbs/hr. For AB 620, highest hourly emissions is 0.43 lbs/hr (October 2013); for AB 622, highest hourly emissions is 0.14 lbs/hr (June 2014); and for AB 623, highest hourly emissions is 0.38 lbs/hr. Annual emissions limit for all three hardening furnace is 3.5 tons/yr based on a rolling 12-month period. At the end of June 2014, emissions are 2.9 tons/yr. See attached.

Permit 488-97

This permit is for one atmospheric continuous steel heat treating process, line AC727. AC means atmospheric continuous.

Since this is a continuous line, the parts are fed into the hardening furnace automatically by conveyor belt; dropped off by elevator to a below grade oil quench tank (8-10 feet below); passed through a heated alkaline wash station; conveyed into a tempering furnace; and immersed into a tank containing oil/water emulsion. Facility complies with PM hourly limit of 2.35 lbs/hr – highest hourly emissions is 2.34 (October 2013). Facility complies with the annual limit of 10.3 tons/yr, based on a rolling 12-month period – at the end of June 2014, emissions are 7.8 tons/year. See attached.

Permit 489-97

This is for a 10,000 gallon ammonia storage tank. Anhydrous ammonia is used to maintain the nitrogen and hydrogen content of the atmosphere gases for the gas nitriding and case hardening process furnaces. Facility has an emergency response plan which is reviewed with the fire department annually. Facility implements a weekly and monthly maintenance and inspection program. Attached is a record of weekly inspection conducted July 3, 2014 and monthly inspection conducted June 23, 2014. The remotely operated internal positive shutoff valve is installed. A sign stating emergency phone numbers is installed. Although the tank has a 10,000 gallon capacity, the facility stores only a maximum of 2000 gallons in the tank. Condition 21 states that any vapor or liquid line requiring venting after ammonia transfer shall be vented through a water trap of 55 gallons minimum size. Facility does not vent any ammonia line to the atmosphere.

Gas nitriding with ammonia is done in two retort furnaces. Temperature is about 975 °F. A retort is a self-contained sealed (oil sealed) vessel. A gas nitriding cycle usually takes several hours up to several days. Initially, the retort is injected with raw ammonia. Subsequent injection of ammonia is of a lower concentration of ammonia, usually dissociated ammonia. Facility operates an ammonia dissociator for this purpose. Gas is vented out through a bubbler before it exhausts through a stack. Ammonia odor could possibly be emitted through the stack or through the oil seals during a sudden overpressure condition (burping) of the vessel.

Permit 167-99

This is for a case hardening furnace and steel tempering continuous line, AC 734. The method of surface hardening and tempering is similar to the method employed in AC 727. Facility complies with PM hourly limit of 1.6 lbs/hr – highest hourly emissions is 1.28 (January

2014). Facility complies with the annual limit of 7.0 tons/yr, based on a rolling 12-month period – at the end of June 2014, emissions are 2.9 tons/year. See attached

Permit 69-01
This is for 2 atmospheric batch steel hardening furnaces (AB 618 and AB 619). These furnaces are used to harden customer-supplied medium sized parts. Once hardening is complete, the parts go to the internal oil quench, manually transferred to a wash station and then transferred to any of three tempering furnaces (AB 621, AB624 and AB 625). Facility complies with PM monthly limit of 0.2 tons/month - highest monthly emissions is 0.18 (November 2013). See attached

Permit 306-02B
This is for 3 continuous hardening (with integral oil quench) and tempering furnaces (AC 735, AC 736, and AC 737). Facility complies with the monthly PM limit of 1.0 ton/month each for AC 735 and AC 736. Highest monthly emissions for AC 735 is 0.91 tons/month (August 2013) and for AC 736 is 0.99 tons/month (March 2014). Facility complies with the monthly quench oil usage limit of 282 gallons for each furnace – for AC 735 highest monthly oil usage is 252 gallons (August 2013) and for AC736 highest monthly oil usage is 275 gallons (March 2014). Facility complies with the annual VOC limit of 8.0 tons/year based on a rolling 12-month period for AC 737. VOC emissions at the end of June 2014 are 6.9 tons per year. Facility complies with the annual quench oil usage limit of 2208 gallons for AC 737. Yearly oil usage at the end of June 2014 is 1919 gallons. See attached.

The steam parts washer of AC 735 exhausts through a side building vent. The stack is vented sideways.

The oil from the skimmer is collected in a separate tank. Wolverine collects the oil and recycles it to be reused at the plant. Usher Oil collects the oily water.

Grandfathered Equipment
AC 730, AC 731 and AC 732 are older, atmospheric continuous hardening and tempering lines. AC 731 employs a rotary (with flights) hardening furnace. The rotary furnace is ideal for flat parts. The parts processed here are oil quenched.

AC 726 and AC729 are also older, atmospheric continuous hardening and tempering lines, with oil quenching.

AC 728 is an offline tempering furnace only. Although this is labeled AC, it is a continuous belt fed tempering furnace only, not a continuous hardening and tempering line.

Company claims these furnaces with oil quench are grandfathered equipment. Prior to April 17, 1992, "natural gas-fired, liquefied petroleum gas-fired or electrically heated furnaces for heat treating metals, the use of which does not involve molten materials" were exempt under Rule 282. The grandfathered equipment are natural gas-fired or electrically heated. Oil usage is monitored for MAERS purposes.

Permit 760-83 (Voided)
This is for the salt bath nitriding operation. Salt bath nitriding is a low temperature liquid nitriding salt bath case hardening treatment for mild, stainless and alloy steel, as well as cast iron. Equipment has been dismantled. At the time of inspection, the scrubbers for the salt bath nitriding and paint stripping process are still in place.

Permit 382-84 (Voided)
This is for the molten salt quench furnace used in salt bath nitriding. After the metal is immersed in the salt bath nitriding tank, the metal is "cooled" at the molten salt quench furnace. Equipment has been dismantled. At the time of inspection, the scrubbers for the salt bath nitriding and paint stripping process are still in place.

Permit 760-83A (Voided)
This is for the molten salt paint stripping process. This equipment is commonly used for stripping of paints applied to fasteners, if the wrong type of coating was applied. Paint is stripped by a combination of heat and chemical reaction. Equipment has been dismantled. At the time of inspection, the scrubbers for the salt bath nitriding and paint stripping process are still in place.

Consent Order CO No. 23-2009 (Terminated)
Facility has a consent order CO No. 23-2009, dated December 14, 2009 resulting from allegations by the AQD that Commercial Steel has operated the salt bath nitriding line, including the water quench tanks and molten salt quench furnace without the scrubber installed and operating properly. This consent order was terminated on May 2, 2014.

NAME _____ DATE 11-12-14 SUPERVISOR CE