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

B592965457

FACILITY: COMMERCIAL STEEL TREATING CORPORATION		**SRN / ID:** B5929
LOCATION: 31440 STEPHENSON HWY., MADISON HTS		**DISTRICT:** Warren
CITY: MADISON HTS		**COUNTY:** OAKLAND
CONTACT: john Bamford , General Manager		**ACTIVITY DATE:** 10/25/2022
STAFF: Adam Bognar	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** SM OPT OUT
SUBJECT: Scheduled Inspection		
RESOLVED COMPLAINTS:		

On Tuesday, October 25, 2022, Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) employee Adam Bognar conducted an unannounced scheduled inspection of Commercial Steel Treating (the "Facility" or "CST") located at 31440 Stephenson Highway, Madison Heights, 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 160-15.

This inspection was unannounced. I did not review records while on-site. I requested records electronically from John Bamford, General Manager the day after the inspection, on October 26, 2022.

Commercial Steel Treating hired consultant Stephanie Jarrett of Fishbeck to respond to my records request. Commercial Steel Treating provided me with the requested records on November 14, 2022.

I reviewed records from January 2021 through September 2022. These records can be accessed on the AQD shared drive at the following address: S:\Air Quality Division\STAFF\Bognar, Adam\Inspection Documents\Commercial Steel Treating FY2023

I arrived at Commercial Steel Treating around 11:30 am. I was greeted by someone at the front desk who called their manager to take me around the facility for my inspection. I met with John Bamford, General Manager and Gary Harrison, Technical Services. I introduced myself, provided credentials, and explained the purpose of the inspection. John explained current operations and gave me a tour of the manufacturing plant.

CST performs heat treating on customer supplied steel parts. Metallurgical processes at this facility include hardening, tempering, nitriding, and carburizing. Most of the parts are automotive related. CST is currently operating 24/7. There are approximately 60 employees working at CST.

The purpose of steel heat treating is to induce a change in the internal molecular structure (allotrope) of the steel workpiece. In hardening furnaces, steel workpieces are heated to a temperature at which the allotrope of iron changes from ferrite to austenite. The steel workpieces are maintained at this temperature for a period of time depending on the desired end product qualities. The Austenite allotrope of iron can hold more carbon than the ferrite allotrope. As the

workpiece sits in the austinite phase, carbon from the furnace atmosphere effuses into the iron. This carbon effusion into the workpiece is known as “carburizing”.

Carbon is provided to the furnaces by several endothermic gas generators which provide a carbon rich and oxygen poor environment to the furnaces. Oxygen in heat treating furnaces can be explosive and can also cause iron oxide (scale) to form on workpieces.

While still in the Austenite phase, the workpiece is quickly immersed in an oil bath to cool rapidly. If the cooling is rapid enough, the carbon that effused into the steel will not have enough time to diffuse back into the atmosphere and will become trapped in the workpiece. This transforms the steel into a new allotrope, martensite, which is a very hard form of steel. If cooling occurs too slowly, then the steel will effuse its carbon and revert back to ferrite during cooling. After quenching, excess oil is washed off the part in an alkaline wash. Some of this oil is eventually recovered and some is disposed of.

After hardening, most parts go through a tempering process. Hardening creates a very hard, but brittle steel. The purpose of tempering is to reduce the brittleness of the hardened workpiece. Tempering alters the size and distribution of carbon within the martensite by heating the workpiece to a temperature below the austenite phase for an extended period. Tempering improves toughness, or the ability to deform without fracturing, and reduces hardness. Tempering furnaces are also known as “draw” furnaces. It is important that any quench oil is cleaned off parts before tempering occurs, otherwise the quench oil will be burned off in the tempering furnace. After tempering, some parts receive an aqueous rust preventative coating.

CST is set up to perform nitriding in batch furnaces AB618, AB619, AB620, AB622, and AB623, as well as in continuous furnaces AC727, AC729, and AC730. Anhydrous ammonia is used to supply the furnace with nitrogen. Ammonia is injected into the furnace atmosphere where it dissociates into nitrogen and hydrogen. The nitrogen in the furnace atmosphere effuses into the surface of the steel workpiece creating a nitride layer. The nitride layer creates a very hard surface with desirable mechanical properties. Not all parts receive nitriding. Only a small amount of the ammonia used for nitriding should be expected to be emitted as ammonia, since the majority of NH_3 will have dissociated and combusted prior to atmospheric release.

Most of the parts processed at CST are for the automotive industry. Many of the parts are fasteners such as nuts and bolts.

Wastewater containing some amount of quench oil is disposed of by Usher Oil Company. Usher Oil Company provides an analysis to Commercial Steel Treating detailing the amount of oil contained in the waste water. The amount of oil in the wastewater is subtracted from the amount of oil added to the tanks to calculate VOC emissions. Waste with higher oil content is picked up by Wolverine Oil & Supply Company, who processes the oil/water mixture and reclaims as much oil as possible. Wolverine sends the reclaimed oil back to Commercial Steel Treating after processing. This reclaimed oil is subtracted from the amount of oil added to the quench tanks to determine VOC emissions.

The amount of reclaimed oil and disposed oil is subtracted from each emission unit on a weighted

basis. The emission units that have the highest amount of oil usage are the emission units which have highest amount of reclaim/disposed oil subtracted from their oil usage. This appears to be a reasonable approach to calculating VOC emissions and quench oil usage for each emission unit at Commercial Steel Treating. The quench oil usage is within 60% of the usage limit in any of the emission units based on the records I reviewed. If quench oil usage becomes greater than 80% of the usage limit in the future, then Commercial Steel Treating may need to find a more accurate way to track which quench tank reclaimed oil comes from and which quench tank disposed oil comes from.

Another smaller waste fraction with relatively high concentrations of sludge, metal parts, and water is picked up and disposed of by EQ Industrial Services. An analysis is likely available from EQ Industrial Services; however, this relatively small waste fraction is not accounted for in the mass balance tables (an approach that slightly overestimates quench oil usage & VOC emissions).

Stephanie provided me with records showing the amount of oil picked up by these companies and the amount of oil reclaimed from Wolverine Oil & Supply Company.

Permit to Install No. 160-15
Permit to Install No. 160-15 was issued to commercial steel treating on November 20, 2015 for 10 steel hardening lines.

EU-AC727
EU-AC727 is a 8.14 million Btu/hour natural gas fired atmospheric continuous steel hardening furnace with oil quench tank, post-washer, and continuous draw (tempering) furnace. Parts are automatically fed to the hardening furnace by a conveyor belt. Parts exit the hardening furnace into a below-grade oil quench tank. From the oil quench tank, parts are washed in an alkaline wash station before being conveyed into the tempering furnace. After the tempering furnace, parts are conveyed into an optional tank containing a rust preventative emulsion. Flash off from the oil quench tank goes to a stack uncontrolled.

Section I – SC 1,2: VOC emissions are limited to 2.35 lbs/hour and 10.3 tons per year. The hourly limit is based on a four-week period and the annual limit is based on 13 four-week periods. CST is in compliance with these emission limits based on the records I reviewed. The highest reported annual emission rate for the period I evaluated was 4.64 tons during the 12th 13-four week-period in 2022. The highest reported hourly emission rate was 2.09 lbs/hour during the 1st 4-week period in 2021.

Section VI – SC 1: Specifies recordkeeping requirements. CST must maintain records of VOC emissions in four-week periods and in 13 four-week (1 year) rolling time periods. These records are maintained.

EU-AC734
EU-AC734 was a 2.00 million Btu/hour natural gas fired atmospheric continuous rotary steel hardening furnace with oil quench tank, post-washer, and continuous draw (tempering) furnace. EU-AC734 was removed from the facility in 2019. I verified that this was removed during my inspection. I verified that the required records were kept prior to the removal date.

EU-AC737

EU-AC737 is a natural gas fired furnace line that includes a 4.165 MMBtu/hr continuous hardening furnace, oil quench, pre washer, post washer, and tempering furnace.

Section I – SC 1: VOC emissions are limited to 12 tons per year based on 13 consecutive 4-week time periods. CST is in compliance with these emission limits based on the records I reviewed. The highest reported annual emission rate for the period I evaluated was 5.11 tons during the 1st 13-four week (annual) period in 2022.

Section II – Quench oil use is limited to 3,384 gallons per year based on 13 consecutive 4-week time periods. CST is in compliance with the quench oil usage limit based on the records I reviewed. The highest reported quench oil usage is 1,439 gallons for the 1st 13-four week period in 2022.

Section VI – SC 1,2,3,4: Specifies recordkeeping requirements for EU-AC737. The permittee must maintain a current listing from the manufacturer of the chemical composition of each quench oil. This composition data must be used along with the amount of quench oil used, the amount of quench oil recycled, the amount of quench oil disposed of, and the amount of quench oil spilled to calculate the VOC emission rates.

Commercial Steel Treating provided me with the safety data sheet (SDS) and technical data sheet (TDS) for the quench oil used at the facility. The quench oil, "Perchem 1510-CV" contains up to 95% petroleum distillates. The majority of the distillates are "solvent-dewaxed light paraffinic". This data is used to calculate the VOC emission rates on an annual and 4-week basis. The quench oil is assumed to be 100% VOC in the calculations (7.1 lbs/gallon).

Section VIII – SC 1,2,3,4: Specifies stack parameters for EU-AC737. I did not verify stack dimensions during this inspection. Stacks appeared to be exhausted unobstructed vertically upwards to the ambient air.

EU-AMMONIA

EU-AMMONIA consists of one 10,000-gallon anhydrous ammonia storage tank. Records submitted by CST show that 16,049 pounds of ammonia were used in 2020. Their emission calculation assumes that 90% of the ammonia is dissociated by the furnace, or "cracked". This 90% value is described in a CARB ammonia emissions document. The calculation also assumes a 98% control efficiency (destruction) for the remaining 10% of un-cracked ammonia. The 98% control efficiency is assumed to be achieved through the use of an effluent burner and a flame curtain.

Section III – SC 1: States that CST shall comply with and maintain a copy of "Part 78, Storage and Handling of Anhydrous Ammonia". John was not able to locate this document while I was on-site. I had John print off a copy of this document. I asked him to keep it in the front office somewhere where he will be able to find it in case of an emergency.

Section III – SC 2: States that the permittee shall not operate EU-AMMONIA unless the inspection and maintenance program in Appendix A has been implemented and maintained. There is an appendix A in this permit to install; however, there is no mention of ammonia tank maintenance in

this appendix. This condition has a footnote 1 indicating that the condition is state only enforceable and was established in a previous permit to install. I checked the original permit for the ammonia tank, PTI No. 489-97, and did not see any mention of an Appendix A. The original permit states "Applicant shall not operate the facility unless an inspection and maintenance program, as approved by the District Supervisor, is in use."

The facility maintains an inspection & maintenance program that includes monthly, weekly, and annual inspection/maintenance. The plan includes weekly checks for ammonia smells, inspecting the lines for frost, and ensuring the fill lines are intact. See "S:\Air Quality Division\STAFF\Bognar, Adam\Inspection Documents\Commercial Steel Treating June 2020 Records" for records of the inspection & maintenance checklists.

AQD determined that Appendix A from the AQD ammonia tank general permit to install needs to be added to this permit. This table was omitted from PTI 160-15 in error. The appendix in the AQD general permit to install does contain inspection & maintenance items that are not included in Commercial Steel Treating's current weekly, monthly, and annual ammonia tank inspection list. For example, Commercial Steel Treating does not have checklist items requiring protective equipment be maintained nearby and a requirement that any ammonia containing hoses be no older than 5 years. I informed Commercial Steel Treating that AQD needs to modify PTI No. 160-15 to include Appendix A and the associated checklist items.

Contingent on Commerical Steel Treating modifying PTI 160-15 to include the inspection & maintenance checklist from the AQD general PTI, and since the ammonia tank inspection and maintenance checklist was erroneously left out of PTI 160-15 by AQD staff, no violation notice will be issued for Commercial Steel Treating's failure to inspect/verify all checklist items in the inspection and maintenance checklist from the general permit to install.

Section III – SC 3: States that CST shall not operate the ammonia tank unless an emergency response plan is implemented and maintained. This must be updated each spring season. I verified that an emergency response plan is in place. The emergency response plan covers several hazardous situations that could arise in this type of manufacturing environment such as fires, spills, natural gas leaks, and ammonia storage tank leaks. The plan states that in the event of an ammonia storage tank leak water should be used to control the release of vapors, and the emergency shutoff valve to the plant should be closed.

This plan must be reviewed by the local fire department prior to each spring season and make any necessary updates. John stated that this plan was not specifically reviewed with the local fire department; however, Commercial Steel Treating works closely with the local fire department on a regular (at least annual) basis to ensure the fire department is educated in how to put out any quench oil fires that may arise at the facility. I asked John to review the ammonia tank emergency response plan with the local fire department. John sent me proof that he reviewed the plan with the fire department on November 9, 2022. In the inspection report the fire department notes "Annual inspection of the facility with a specific inspection of the outdoor Ammonia Anhydrous above ground storage tank. Leak and spill mitigation was discussed and planned."

Section III – SC 4: States that the permittee shall not operate the ammonia tank unless all transfer operations are performed by a reliable person properly trained and made responsible for proper

compliance with all applicable procedures. All transfer operations are performed by a contractor, Tanner, who specialize in operation of ammonia tanks and ammonia transfer operations.

Section III – SC 5: States that the ammonia storage tank shall be filled to greater than 20% water capacity. This appears to be an error in Permit to Install No. 160-15. John stated that the tank is never filled above the 20% liquid level for safety reasons. There is a large sign on the ammonia tank stating “CAUTION: DO NOT FILL OVER 20 PERCENT”. There may be a higher potential for leaks/explosions with a higher liquid level.

I confirmed with AQD permit engineer Michelle Rogers that this condition was supposed to read "The ammonia storage tank, EU-AMMONIA, shall not be filled to more than 80% water capacity. (R 336.1901, 40 CFR Part 68)”. Commercial Steel Treating is in compliance with this condition according to facility staff John Bamford who stated the tank is never filled above the 20% liquid level. AQD is in the process of working with Commercial Steel Treating to modify PTI 160-15 to fix the error in th is condition.

Section IV – SC 1: States that the ammonia storage tank shall be fitted with safety release valves that are replaced, retested, or recertified every 5 years. According to the annual inspection records I reviewed; these safety release valves were changed in May 2020.

Section IV – SC 2: States that the permittee shall not operate EU-AMMONIA unless a remotely operated internal or external positive shut-off valve is installed. There is both a remote and manual shut-off valve installed on this tank. The tank can be opened and closed remotely from a control room.

Section IV – SC 3: States that the permittee shall not operate the ammonia tank unless a bulkhead, anchorage, or equivalent system is used at each transfer area. The ammonia tank is equipped with an anchorage system.

Section IV – SC 4: States that the permittee shall not operate the ammonia tank unless all liquid lines are equipped with back pressure check valves. All vapor lines must be equipped with properly sized excess flow valves. Liquid lines are equipped with check valves.

Section IV – SC 5: States that any vapor or liquid line that requires venting after ammonia transfer shall be vented through a water trap of 55 gallons in size or larger. No vapor or liquid lines require purging in this system.

Section IV – SC 6: States that a sign shall be present at the facility entrance stating the emergency phone numbers for the owner, primary operator, local and state police, local fire department, and ambulance service. I did not observe this sign at the facility entrance. I asked John to create this sign, post it at the facility entrance, and then send me a picture of the sign. John provided me with a picture showing that this signage was posed at the facility entrance on November 9, 2022.

Records of ammonia tank maintenance are maintained. During the weekly inspection employees check for ammonia odors, ensure vapor & liquid lines are intact, ensure clear access to tank, verify caution signs are in place, check for any tank damage, and check for frost on the lines outside. The monthly inspection has the same checklist, but also includes testing the sprinkler system over the ammonia tank. The annual tank inspection includes inspecting many individual parts for signs of

wear. The annual inspection is when any soon to be expired parts are replaced. Two pressure relief valves were replaced in February 2020. These valves will expire on February 28, 2025.

Section VII – SC 1: States that the permittee shall notify the PEAS and/or the AQD district supervisor immediately of any abnormal release of anhydrous ammonia from this tank. There have been no ammonia releases reported to MACES.

FG-AB618/619

FG-AB618/619 consists of two natural gas fired atmospheric batch steel hardening furnaces, each with an oil quench tank.

Section I – SC 1: VOC emissions are limited to 2.4 tons per year based on 13 consecutive 4-week time periods. CST is in compliance with these emission limits based on the records I reviewed. The highest reported annual emission rate for the period I evaluated was 1.40 tons in the 1st 13-four week (annual) period in 2022.

Section VI – SC 1: Specifies recordkeeping requirements. CST must maintain records of VOC emissions from FG-AB618/619 in four-week periods and in 13 four-week (1 year) rolling time periods. These records are maintained.

FG-AB620/622/623

FG-AB620/622/623 consists of three natural gas fired atmospheric batch steel hardening furnaces, each with an oil quench tank.

Section I – SC 1,2: VOC emissions are limited to 0.80 lbs/hour and 3.5 tons per year. The hourly limit is based on a four-week period and the annual limit is based on 13 four-week periods. CST is in compliance with these emission limits based on the records I reviewed. The highest reported annual emission rate occurred during the 9th 4-week period in 2022 at 0.69 tons of VOC. The highest reported hourly emission rate is 0.58 lbs/hour during the 6th 4-week period in 2022.

Section VI – SC 1: Specifies recordkeeping requirements. CST must maintain records of VOC emissions from FG-AB620/622/623 in four-week periods and in 13 four-week (1 year) rolling time periods. These records are maintained.

FG-AC735/736

FG-AC735/736 consists of two natural gas fired furnace lines. Both furnaces equipped with quench oil tanks.

Section I – SC 1,2: VOC emissions from EU-AC735 and EU-AC736 are limited to 12 tons per year each (24 tons total from both units) based on rolling 13 four-week periods.

In AC735, the highest reported annual emission rate for the period I evaluated was 5.49 tons during the last 13-four week period in 2021.

In AC736, the highest reported annual emission rate for the period I evaluated was 3.69 tons during the last 13-four week-period of 2021.

AC735 & AC736 appear to be in compliance with VOC emission limits based on the records I reviewed.

Section II – SC 1,2: Quench oil usage from EU-AC735 and EU-AC736 is limited to 3,384 gallons per year each (6,768 gallons total from both units).

In AC735, the highest reported quench oil usage was 1548 gallons during the last 13-4 week period of 2021.

In AC736, the highest reported quench oil usage was 1041 gallons during the last 13-4 week rolling period in 2021.

AC735 & AC736 appear to be in compliance with the quench oil usage limits based on the records I reviewed.

Section VI – SC 1: Specifies recordkeeping requirements. CST must maintain records of VOC emissions from FG-AC735/736 in four-week periods and in 13 four-week (1 year) rolling time periods. These records are maintained.

Other Furnaces
There are several more furnaces that are not included in the permit to install. These furnaces either appear to be exempt from Rule 201 requirements pursuant to Rule 282 (2)(a)(i) or are grandfathered into a previous exemption rule.

AC730 (currently operating) and AC 732 (currently shut down) are continuous hardening and tempering lines which utilize oil quenching. AC731 was been offline since 2011.

AC729 (currently operating) is a rotary hardening and tempering furnace line.

The company claims AC729, AC730, AC731, and AC732 are grandfathered under the previous exemption rule. 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 from permit to install requirements. Based on this information, these furnaces are exempt from Rule 201 requirements even though they utilize oil quenching.

AC728 is an older offline tempering furnace only.
AB624 is a temper only furnace with a heat input of 500,000 Btu/hr
AB625 is a temper only furnace with a heat input of 500,000 Btu/hr
AC728, AB624, and AB625 appear to be exempt from Rule 201 requirements pursuant to Rule 282 (2)(a)(i).
AB626 is used as a wash tank only. Water soluble wash solution is used.
AB627 is used as a wash tank only. Water soluble wash solution is used.
AB628 is used as a wash tank only. Water soluble wash solution is used.

AB626, AB627, and AB628 appear to be exempt from Rule 201 requirements pursuant to Rule 281 (2)(k).
GN284 is a "bell" furnace. A large metal, bell shaped, lid is lowered on top of workpiece(s). This enclosed space creates an environment for heat treating. Electric heating elements are used. No quench oil is used.

CB751, CB752: CB751 & CB 752 are out of service and have been for some time. According to John Bamford, there is no plan to bring these back online.

CB753, and CB754: CB753 is an electric hardener and CB754 is an electric tempering furnace. Parts are quenched after the hardener. This process includes a wash of the parts to remove oil residue prior to being processed in the tempering furnace. According to MACES, this process was installed in January 1961.

During a previous inspection I noted some heavy smoke coming from temper furnace CB754 venting to the general in-plant environment. After investigating this issue, Dave Scott (former employee) informed me that parts were inserted into the tempering furnace without an adequate wash. Dave agreed to work with staff to do a better job cleaning the quench oil off the parts before tempering.

During this inspection, I again noticed heavy smoke coming from this tempering furnace. I asked John why the furnace was smoking. John explained that the parts in the tempering furnace did not receive an adequate wash. John explained that although this furnace is not frequently operated, this has been an on-going problem at the facility for some time. John stated that Commercial Steel Treating is working on a solution to the problem, which may include heating or agitating the wash tank. John also stated that Commercial Steel Treating installed a roof vent directly above this tank to mitigate some of the smoke that was accumulating in the indoor plant environment.

I explained to John that this furnace has been smoking during two of my inspections now. During my inspection two years ago, I explained that Commercial Steel Treating needs to come up with a solution to reduce/eliminate the amount of smoke generated from this tempering furnace.

To this end, AQD is requiring that Commercial Steel Treating submit a fugitive dust control plan for temper furnace CB754. I requested this plan from Commercial Steel Treating on November 16, 2022.

Endothermic Generators
There are four endothermic generators in this facility that provide a carbon rich (and oxygen poor) atmosphere to the heat treat furnaces. Based on my observations during this inspection these units are exempt from Rule 201 requirements pursuant to Rule 285 (2)(l)(iv).

Shot Blasting
There is a shot blasting machine used to clean metal parts. A baghouse is installed to capture any particulate emissions from the shot blasting. I did not notice any evidence of shot blast materials on the ground near the unit. Based on my observations during this inspection, the shot blasting machine is exempt from Rule 201 requirements pursuant to Rule 285(2)(l)(iv).

FGFACILITY

Section I – SC 1: Facility-wide VOC emissions are limited to 82.4 tons per year based on rolling 13 four-week periods. The facility appears to be in compliance with VOC emission limits based on the records I reviewed. The period with the highest reported emissions is the last 13-4-week period in 2021 at 21.42 tons.

Section II – SC 1: Facility-wide quench oil usage is limited to 22,000 gallons per year based on rolling 13 four-week periods. The facility appears to be in compliance with the quench oil usage limits based on the records I reviewed. The last 13-four week period in 2021 has the highest usage for the period I evaluated at 6,034 gallons.

Section VI – SC 1,2,3,4: Specifies recordkeeping requirements for FGFACILITY. The permittee must maintain a current listing from the manufacturer of the chemical composition of each quench oil. This composition data must be used along with the amount of quench oil used, the amount of quench oil recycled, the amount of quench oil disposed of, and the amount of quench oil spilled to calculate the 4-week and rolling 13 four-week VOC emission rates from quench oil facility-wide.

These records are kept. The quench oil usage is calculated from oil addition to furnaces and subtracting the oil that is reclaimed, disposed, or recycled.

Compliance Determination

Commercial Steel Treating appears to be in 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 Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) rules; and Permit to Install No 160-15.

AQD is requiring that Commercial Steel Treating obtain a fugitive dust control plan for tempering furnace CB754.

NAME Adam Bognar DATE 1/3/2023 SUPERVISOR K. Kelly