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

B622043094

FACILITY: SELFRIDGE PLATING INC		SRN / ID: B6220
LOCATION: 42081 IRWIN RD, HARRISON TWP		DISTRICT: Southeast Michigan
CITY: HARRISON TWP		COUNTY: MACOMB
CONTACT: Lawrence Raymond , Environmental Compliance Officer		ACTIVITY DATE: 12/12/2017
STAFF: Adam Bognar	COMPLIANCE STATUS: Compliance	SOURCE CLASS: SM OPT OUT
SUBJECT: Scheduled Inspection		
RESOLVED COMPLAINTS:		

On Monday, December 12, 2017, AQD staff Adam Bognar, Joe Forth, and Francis Lim conducted a targeted scheduled inspection of Selfridge Plating, Inc. located at 48021 Irwin Road, Mount Clemens, 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 Environmental Quality, Air Quality Division (MDEQ-AQD) rules; Permit to Install Nos. 208-84A and 208-84B; 40 CFR Part 63 Subpart N – National Emissions Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks (Chrome NESHAP); and 40 CFR Part 63 Subpart T – National Emission Standards for Halogenated Solvent Cleaning.

We arrived at Selfridge Plating at 2 pm. We met with Mr. Lawrence (Joe) Raymond, Environmental Compliance Officer. We identified ourselves, provided credentials, and stated the purpose of the inspection.

During the pre-inspection meeting we discussed PTI's Nos. 208-84A and 208-84B, as well as the previous inspection report to see if any changes have occurred. I reviewed and collected records at this time. Mr. Raymond then gave us a tour of the facility.

Selfridge Plating Inc. plates, coats, and strips steel and aluminum parts used in military aircraft. Processes performed here include hard chrome plating, aluminum anodizing, black oxide conversion coating, copper cyanide stripping, zinc plating, cadmium plating, nickel sealing, copper cyanide plating, and chrome stripping. The manganese and zinc phosphating lines have recently been decommissioned. Mr. Raymond stated that Selfridge eventually plans to remove the cadmium plating line and reconstruct the zinc plating line. These processes are all covered under PTI number 208-84A. Additionally, there are six trichloroethylene (TCE) and five methylethylketone (MEK) batch cold cleaners covered by permit number 208-84B.

Mr. Raymond explained that four new plating lines will be installed in approximately one year. I reviewed the corresponding PTI application that was sent to AQD. The four new process lines will be for silver stripping, black oxide conversion coating, nickel cyanide stripping, and electroless nickel plating. A total of thirty-five tanks will be installed. The application states that thirty-three of these tanks will likely be exempt under Rule 285 (r) or Rule 290. Two of those the electroless nickel tanks will be externally ventilated and subject to permit to install requirements. In addition, there will be one new trichloroethylene cold cleaner consisting of one bucket. The permit application states that the cold cleaner will likely be exempt from permit to install requirements but subject to 40 CFR Part 63 Subpart T – NESHAP for Halogenated Solvent Cleaning.

Mr. Raymond stated that Selfridge plans to shut down their auxiliary facility, Selfridge Technologies, located at 56851 Gratiot, Chesterfield, MI. Shutdown will occur concurrently with the installation of the four new plating lines at the Mount Clemens facility in about a year.

Operations

In *Hard Chromium electroplating*, the workpiece to be plated is attached to the cathode and DC electrical current is applied to the anode. Both the cathode and anode are immersed in an electrolyte solution with contains chromic acid (Cr^{+6}) along with other ions that increase the conductivity of the solution. As current is applied to the anode, the negative electrons migrate towards the cathode (workpiece). The negative electrons supplied to the workpiece reduce the chromic acid (Cr^{+6}) in the solution to metallic chromium. This reduction takes place on the surface of the workpiece. The metallic chromium deposits onto the workpiece causing the desired plating action.

Aluminum anodizing is the process of oxidizing aluminum to increase the thickness of the layer of aluminum oxide on the surface of a workpiece. The thickened aluminum oxide layer protects the aluminum beneath it. At Selfridge this oxidation is achieved through electrolysis of a workpiece immersed in a chromic acid solution. The aluminum to be oxidized is the anode. As electric current is supplied to the anode, electrons migrate to the cathode. As electrons flow out of the anode (workpiece), oxygen is generated at the anodic surface, oxidizing the aluminum.

Cr+6 (Hexavalent chrome) emissions from the above two processes are primarily due to the oxygen and hydrogen gas bubbles liberated during electrolysis. The electrolytic process causes water to liberate oxygen at the anode and hydrogen at the cathode. As these liberated gas molecules coalesce and form bubbles, they rise to the surface of the tank and burst at the surface. This bursting action splashes the bath solution into the air above the liquid surface causing a mist to form. This mist contains quantities of chromic acid as well as other bath components.

Reducing the amount of mist formed above the tank is paramount to reducing emissions. This is the function of wetting agent type fume suppressants. Wetting agents are surfactants that reduce the surface tension of the chromium bath solution. The reduction in surface tension results in the formation of smaller gas bubbles during electrolysis. The smaller gas bubbles do not burst with as much force as larger gas bubbles, so less mist is formed. This results in a reduction in overall chromium emissions. Additionally, foam blanket type fume suppressants aid in reducing chromium emissions by restricting the movement of fumes from the bath.

At Selfridge, mist from the hard chrome electroplating tanks appeared to be adequately collected by inlet ducts located near the tank surface. The ducts appeared to be vented to an appropriately operated 3-stage mesh pad scrubber. Emissions from the aluminum anodizing tanks are controlled using both a foam blanket and a wetting agent type fume suppressant. I observed that the tanks had full foam coverage.

Black oxide conversion coating produces a black magnetite finish on a metal surface. The workpiece is immersed in a 300°F caustic solution. It is not a plating process since black oxide is not deposited on the surface, but instead is the result of a chemical reaction between the metal surface and oxidizing salts present in the solution. Electric current is not used.

In *copper cyanide stripping* the metal piece is immersed in a bath containing cyanide salts that strip the metal of copper. Initially, the copper is applied to section off the workpiece so that the copper plated section will not harden during heat treating. After heat treating, the undesired copper is stripped off in this process. Electric current is not used.

Chromium stripping uses a bath of hydroxide salts to strip the chromium from the workpiece. This is usually done to strip chrome from parts that were plated unsatisfactorily. This process is basically the reverse of chromium electroplating. In this case, the workpiece is the anode instead of the cathode. As the metallic chrome loses electrons it is oxidized into a state that is soluble in the electrolyte bath.

Zinc and cadmium electroplating **is a similar process to hard chrome plating, except the anode is composed of the metallic zinc and cadmium that will be plated on the workpiece. The workpiece is the cathode. As electrolysis proceeds, the metallic anode dissolves into the electrolyte solution and deposits onto the workpiece.**

Copper cyanide electroplating **is analogous to zinc and cadmium plating. The anode is a copper slab while the cathode is the workpiece. As electrolysis proceeds, the copper anode dissolves into the cyanide salt electrolyte solution and deposits onto the workpiece.**

The *nickel sealing* process fills up the pores in a workpiece with nickel for improved corrosion resistance. The workpiece is immersed in a nickel acetate bath. Electric current is not used.

In addition to the above surface coating processes, Selfridge operates six trichloroethylene (TCE) cold cleaners. There are two 22" diameter TCE cleaners and four 8-gallon TCE cold cleaners. These cleaners are used for wax removal from workpieces. There are 5 methyl ethyl ketone (MEK) cold cleaners used for parts cleaning.

Permit Number 208-84A: Plating Operations

Special Condition 13: This condition limits the chromium emissions from the 12 chromium tanks vented to the 3-stage mesh pad scrubber to 0.03 mg per dry standard cubic meter. A stack test was performed on the Duall Model No. HMF-90 mesh pad scrubber on October 23 & 24, 1996. The test indicated that the total chromium emissions were 0.0023 mg per dry standard cubic meter. To ensure that this performance is maintained, Selfridge conducts quarterly inspections of the inlet and outlet transition zones, spray nozzles, packed bed section, mesh pads, drain lines, fan motor, and fan vibration. Records of quarterly inspections are kept (Attachment 1). We did not perform a rooftop inspection of the scrubber.

EPA reduced emission rate to 0.015 mg / dry standard cubic meter on September 19, 2012. This new limit is established in the Chromium Electroplating NESHAP 40 CFR 63.342 (c)(1)(ii). Based on the records I reviewed the mesh pad scrubber should achieve this emission limit.

Special Condition 14: This condition states that the chromium emissions from the aluminum anodizing process tanks, using a chemical fume suppressant containing a wetting agent, shall not exceed 0.01 mg per dry standard cubic meter, corrected to 70°F and 29.92 inches of mercury. Compliance with this condition is demonstrated by maintaining the bath surface tension below 40 dynes/cm^2 when measured with a stalagmometer, therefore this condition is satisfied by complying with Special Condition 27.

Special Condition 15: This condition requires that emissions from all vented process tanks are not to exceed 0% opacity. I did not observe any visible emissions.

Special Condition 16: This condition states that the hard chrome tanks shall not be operated unless the 3-stage mesh pad dry scrubber is installed and operating properly. I observed that mesh pad washdown water is collected in a drum near the pressure gauge. A three stage pressure gauge was present which showed that each mesh pad had a pressure drop reading. I verified that an appropriate operation and maintenance manual is maintained on-site. A responsible official has signed an ongoing compliance report stating that the equipment has been operated in accordance with the operation and maintenance manual (Attachment 2).

Mr. Raymond stated that new filter packing balls have recently been purchased, but are not yet installed. The balls will replace the dirty packing balls before the first mesh pad filter. This was recommended by Duall (scrubber manufacturer) the last time they inspected the scrubber approximately three years ago. Replacement will occur during the next downtime.

Special Condition 17: This condition stipulates that Selfridge shall equip and maintain the 3-stage mesh pad scrubber with a pressure drop indicator. A Magnahelic three-gauge pressure drop indicator was present that indicated the individual pressure drop across each pad of the three-part scrubber. During the inspection three pressures totaled to approximately 2.4 inches of water. An average pressure drop of 3.3 inches of water was indicated during the initial performance test. The established range is between 2.3 and 4.3 inches of water.

Special Condition 18, 19, and 20: These conditions specifies stack requirements for the hard chromium tanks, cadmium and zinc tanks, and all other vented process tanks. The stacks appeared to meet permit requirements. AQD staff did not perform a rooftop inspection to verify stack dimensions.

Special Condition 21: This condition states that Selfridge shall prepare and submit an operation and maintenance plan including the start-up, shutdown, and malfunction plan to the District Supervisor by January 25, 1997. I verified that this plan is maintained onsite.

Special Condition 22: This condition states that within 40 days of the issuance of this permit, but not later than July 24, 1997, that Selfridge verify chromium emission rates from the hard chrome tanks via testing. A stack test was performed on the Duall Model No. HMF-90 mesh pad scrubber on October 23 & 24, 1996.

Special condition 23: This condition suggests that verification of chromium emission rates may be required for the aluminum anodizing tanks. This is not necessary since Selfridge uses a wetting agent type fume suppressant to maintain bath surface tension in accordance with the Chrome Electroplating NESHAP standard 63.342 (c)(iii). See Special Conditions 27 &28.

Special Condition 24: A) This condition requires the facility to inspect the mesh pad and packed beds on a quarterly basis. Quarterly inspections are performed and documented (Attachment 1). See Special Condition 13.

B) This condition requires the facility to wash down the mesh pads and packed beds per manufacturer's recommendations. The packed pads and beds are washed down daily with approximately 100 gallons of HCl. The waste water generated is stored in large on-site cisterns and eventually transported to a hazardous waste facility.

C) This condition stipulates that if the pressure drop across the air pollution control device varies by more than plus or minus 1 inch of water column, from the pressure drop determined during initial testing, that the variation be documented, and corrective actions taken. The records I reviewed did not show any exceedance of this standard. I collected samples of these records (Attachment 3).

Special Condition 25: This condition requires Selfridge to visually inspect the control device for proper drainage and to make sure there is no chromic acid buildup on the mesh pad and packed beds. Quarterly inspections are performed and documented (Attachment 1).

Special Condition 26: This condition states that Selfridge shall maintain records of inspections required to comply with applicable work practice standards of 40 CFR 63.342 (f). Selfridge maintains satisfactory records that document the required work place standards. Sample records are included in this report (Attachments 1 & 4).

Special Condition 27: This condition establishes an upper limit for bath surface tension in the aluminum anodizing tanks. Surface tension of the tank is reduced by using a wetting agent type fume suppressant called Haviland Mist Eliminator II. Mr. Raymond provided me with records of mist eliminator additions and stalagmometer readings (Attachment 4). Mr. Raymond was aware of the recent change in the Chromium Electroplating NESHAP that lowered the maximum surface tension threshold from 45 to 40 dynes/cm^2 and has adjusted his work practices and record sheets to meet this new standard.

The current fume suppressant used, Haviland Mist Eliminator II, does not contain

PFOS/PFOA or any per/poly fluorinated compounds. It is described as a "PF-Free" fume suppressant. The MSDS is included in this report (Attachment 5). Mr. Raymond stated during the inspection that the fume suppressant previously used was "Fumetrol 140". Based on an EPA study titled "PFOS CHROMIUM ELECTROPLATER STUDY", Fumetrol 140 contains PFOS and was historically a widely used fume suppressant in the chrome electroplating industry. An excerpt of this study is attached (Attachment 6). The MSDS for the Fumetrol 140 also indicates the presence of PFOS (Attachment 6). Our files show that Selfridge used Fumetrol 140 in 1997, when recordkeeping began, until 2006 when Haviland Mist Eliminator II replaced Fumetrol 140.

Special Condition 28: This condition requires Selfridge to monitor surface tension in the aluminum anodizing tanks. Selfridge uses a Stalagmometer to perform surface tension measurements. Since they have not had any exceedances or performed any bath changes, stalagmometer readings are taken every 40 hours of tank operation time.

Special Condition 29: This condition restricts the rectifier current input to the chromium tanks to 60 million amp-hr/yr based on a 12-month rolling time period. So long as the 60 million amp-hr/yr limit is not exceeded, Selfridge is considered an Area Source. Mr. Raymond provided me with 12 month rolling records for rectifier current. The records show that Selfridge is well below the 60 million amp-hr/yr limit (Attachment 7). The highest 12 month rolling total was approximately 16 million amp-hrs. Mr. Raymond stated that the maximum possible rectifier capacity is 227,760,000 amp hours.

Special Condition 30: This condition requires that Selfridge keep monitoring, recordkeeping, operation and maintenance information necessary to comply with the Chromium Electroplating NESHAP. Selfridge appears to be maintaining the proper information.

PTI number 208-84B for Cold Cleaners

Special Condition 14-17 +20: These conditions set emission limits for trichloroethylene (TCE), methylethylketone (MEK), and Toluene based on a 12-month rolling time period. Special Condition 20 requires certain records to be kept for each cold cleaner. Mr. Raymond maintains a spreadsheet that calculates the HAP emissions from the cold cleaners based on usage over a 12-month rolling time period. The spreadsheet includes information about each cold cleaner including the amount and type of solvent used, and concentrations of HAPS/VOC within the solution. Based on the spreadsheet data, Selfridge is well below the HAP emission limits for trichloroethylene (TCE). The emission rate of MEK is well below permit limits although it is no longer considered a HAP as of December 13, 2006. Toluene is no longer used.

Special Condition 18: This condition stipulates that there shall be no visible emissions from the cold cleaners. No visible emissions were observed during the inspection.

Special Condition 19: This condition requires that the disposal of collected air contaminants be performed in a manner which minimizes the introduction of air contaminants to the outer air. Most of the TCE is reclaimed and reused using a vapor recovery distillation device. Mr. Raymond stated that he is not able to recover MEK with this device because the quality of the MEK is compromised after distillation. During the inspection I noticed some that solvent drag out/splashing from the MEK cleaning tanks seemed excessive. There was wet and dried solvent spattered on the floor and walls near the cold cleaners, yet still within the containment booth designated for the cold cleaners. I informed Mr. Raymond that I was concerned with the messy work practices and he agreed to talk with his employees about minimizing solvent drag out/splashing.

Special Condition 21: This condition requires that all processes at the facility are operated in a manner which minimizes fugitive HAP emissions. Cold cleaners appeared to be operating in accordance with this rule. All lids were closed during the inspection.

Special Condition 22 and 23: These conditions state that all cold cleaners will be operated according to

MDEQ Rule 336.707 and the National Emission Standards for Halogenated Solvents as specified in 40 CFR, Part 63, Subpart T. Selfridge appears to be adhering to these regulations. The facility complies with this NESHAP by installing a cover, maintaining a freeboard ratio of at least 0.75, and following work practice standards.

Sand Blast Unit

The facility operates one aluminum oxide sand blast unit that exhausts outside after passing through an appropriately designed and operated fabric filter. This unit appears to be exempt from Rule 201 requirements pursuant to Rule 285 (2)(l)(vi).

Surface Coating

Selfridge operates a small painting area used to apply coating to parts. The coating is used to prevent plating on certain areas of a part. Areas that receive the coating are not plated. The paint is applied by hand with small brushes. There is no external vent for the painting process. The company provided me with their purchase records for 2017 (Attachment #8). The 2017 records indicate that a total of 165 gallons of coating was purchased between January 2017 and December 2017. The company uses less than 200 gallons of coating per month. The booth appears to be exempt from Rule 201 requirements pursuant to Rule 287 (2)(c).

Mr. Raymond informed me that he wants to increase his coating usage limit to 300 gallons annually. I informed him that the limit is 200 gallons per month to remain exempt from Rule 201 requirements. Even with his increased usage he should remain well below 200 gallons per month.

Boiler

Selfridge operates one natural gas fired boiler with a 1.2MM BTU/hr input. This is used as a process heater. This unit appears to be exempt from Rule 201 requirements pursuant to Rule 282 (2)(i). An additional boiler with a heat input of 800,000 BTU/hr will be installed along with the addition of the four new plating lines.

Other Plating Operations

Selfridge operates various other plating lines including a Cadmium Plating Line, a Nickel Strike Tank and Copper Cyanide Plating Line, and a Woods Nickel Strike Tank that are subject to the National Emission Standards for Hazardous Air Pollutants Part 63 Subpart WWWWWW (6W), Area Source Standards for Plating and Polishing Operations. The AQD has not taken delegation of this standard therefore compliance was not verified. Selfridge maintains a NESHAP compliance summary as well as records of the number of Nickel Strike Bath loads. Mr. Raymond provided me with these documents (Attachment 9).

The company does not have any emergency generators. The emergency generator located at the Chesterfield facility (Selfridge Technologies) will be relocated to Selfridge Plating in the future.

I left the facility around 3:30 pm.

Compliance Determination

Selfridge Plating 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 Environmental Quality, Air Quality Division (MDEQ-AQD) rules; Permit to Install Nos. 208-84A and 208-84B; 40 CFR Part 63 Subpart N – National Emissions Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks (Chrome NESHAP); and 40 CFR Part 63 Subpart T – NESHAP for Halogenated Solvent Cleaning.

NAME Adam Bogner DATE 1/23/18 SUPERVISOR SK