

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

N664659341

|  |                                      |                                  |
|--|--------------------------------------|----------------------------------|
| <b>FACILITY:</b> Owosso Graphic Arts, Inc  |                                      | <b>SRN / ID:</b> N6646           |
| <b>LOCATION:</b> 151 N Delaney Rd, OWOSSO  |                                      | <b>DISTRICT:</b> Lansing         |
| <b>CITY:</b> OWOSSO  |                                      | <b>COUNTY:</b> SHIAWASSEE        |
| <b>CONTACT:</b> Craig Ellenberg , Plant Manager & Owner  |                                      | <b>ACTIVITY DATE:</b> 08/11/2021 |
| <b>STAFF:</b> Julie Brunner  | <b>COMPLIANCE STATUS:</b> Compliance | <b>SOURCE CLASS:</b> SM OPT OUT  |
| <b>SUBJECT:</b> Scheduled inspection of Owosso Graphic Arts, Inc. (OGA). This inspection was a Partial Compliance Evaluation (PCE), conducted as part of a Full Compliance Evaluation (FCE). |                                      |                                  |
| <b>RESOLVED COMPLAINTS:</b>  |                                      |                                  |

**On August 11, 2021, I conducted an scheduled inspection of Owosso Graphic Arts, Inc. (OGA). This inspection was a Partial Compliance Evaluation (PCE), conducted as part of a Full Compliance Evaluation (FCE). The last inspection was on December 5, 2017.**

**Contacts:**

**Mr. Craig Ellenberg, Plant Manager, 989-725-7112, craig@owosso.com**

**Ms. Dottie Roy, Office Manager, 989-725-7112, dottie@owosso.com**

**Facility Description and Regulatory Overview:**

**OGA is America's largest producer of brass, copper, and magnesium dies. The company produces dies using copper and magnesium plates coated with a photosensitive material. The dies can then be used to imprint, cut, and/or emboss paper products and thin metals. The dies may also be used to stamp and cut adhesive decals, which is a large part of their business. They have been in business since 1949. Mr. Ellenberg purchased the plant in 2017. He is a longtime employee and now the owner/operator.**

**There are approximately 30 employees. Operations are one shift per day for 5 days per week. Operating hours are from 7:00 am to 6:00 pm.**

**The facility is on the westside outskirts of Owosso just north of M-21 on Delaney Road. The surrounding area is commercial with a church located northeast of the facility and a skate center to the south, and farm fields beyond. To the east with a farm field between is a senior citizen living complex, apartment complex, and residential housing.**

**This facility is a minor source due to the potential to emit (PTE) of less than 250 tons per year (tpy) of any regulated air contaminant. The facility is a synthetic minor for emissions of hazardous air pollutants (HAPs) with opt-out limits of less than 9.0 tpy of any single HAP and 22.5 tpy of aggregate HAPs. The facility is not subject to the Title V - Renewable Operating Permit Program.**

**The largest source of HAP emissions associated with the current operations is hydrogen chloride (HCl). The opt-out permit was Permit to Install (PTI) No. 272-99E which was revised in 2013 to include**

an additional magnesium etching line. PTI No. 272-99F (issued 11/19/2018) reauthorized the installation when it didn't occur within 18-months of permit issuance. The permit restrictions for nitric acid were removed in PTI No. 272-99E. The PTE for nitrogen oxides (NOx) was calculated at 52.6 tpy in the PTI 272-99E.

The emission units (EUs) on PTI 272-99F, and other exempt equipment at the facility are as follows:

| <b>Emission Unit ID</b> | <b>Emission Unit Description<br/>(Process Equipment &amp; Control Devices)</b>  | <b>Installation /<br/>Modification<br/>Dates</b>                        | <b>Flexible Group ID</b> |
|-------------------------|---|---|--------------------------|
| EUMAGETCH1              | One large magnesium plate etching machine controlled by a 10,000 CFM wet scrubber. It is capable of etching magnesium plates with dimensions of 2.5 feet by 10 feet. Including a clean off sink where n-methylpyrrolidone is used to clean off the finished plates. | 01-01-87  | FGMAGETCH,<br>FGFACILITY |
| EUMAGETCH2-05           | Magnesium plate etching machine controlled by a shared 8,000 CFM wet scrubber. Including associated shared clean off sink which uses n-methylpyrrolidone to clean off the finished plates.  | 01-01-87  | FGMAGETCH,<br>FGFACILITY |
| EUMAGETCH2-07           | Magnesium plate etching machine controlled by a shared 8,000 CFM wet scrubber. Including associated shared clean off sink which uses n-methylpyrrolidone to clean off the finished plates.  | 01-01-87  | FGMAGETCH,<br>FGFACILITY |
| EUMAGETCH2-06           | Magnesium plate etching machine controlled by a shared 8,000 CFM wet scrubber. Including associated shared clean off sink which uses n-methylpyrrolidone to clean off the finished plates.  | 01-01-87  | FGMAGETCH,<br>FGFACILITY |
| EUMAGETCH2-04           | Magnesium plate etching machine controlled by a shared 8,000 CFM wet scrubber. Including associated shared clean off sink which uses n-methylpyrrolidone to clean off the finished plates.  | Installed but not operational (notice of installation not provided yet) | FGMAGETCH,<br>FGFACILITY |
| EUMAGETCH3-01           | Magnesium plate etching machine controlled by a shared 5,000 CFM wet  | 01-01-87  | FGMAGETCH,<br>FGFACILITY |

| <b>Emission Unit ID</b> | <b>Emission Unit Description<br/>(Process Equipment &amp; Control Devices)</b>   | <b>Installation /<br/>Modification<br/>Dates</b> | <b>Flexible Group ID</b>            |
|-------------------------|--|--|-------------------------------------|
|                         | scrubber. Including associated shared clean off sink which uses n-methylpyrrolidone to clean off the finished plates.  |  |                                     |
| <b>EUMAGETCH3-02</b>    | Magnesium plate etching machine controlled by a shared 5,000 CFM wet scrubber. Including associated shared clean off sink which uses n-methylpyrrolidone to clean off the finished plates. | <b>01-01-87</b>                                  | <b>FGMAGETCH,<br/>FGFACILITY</b>    |
| <b>EUMAGETCH3-03</b>    | Magnesium plate etching machine controlled by a shared 5,000 CFM wet scrubber. Including associated shared clean off sink which uses n-methylpyrrolidone to clean off the finished plates. | <b>01-01-87</b>                                  | <b>FGMAGETCH,<br/>FGFACILITY</b>    |
| <b>EUCOPPERTECH1</b>    | Copper plate etching machine with associated shared clean-off sink. Hydrochloric acid is used in the clean-off sink.   | <b>01-01-99,<br/>01-01-06</b>                    | <b>FGCOPPERTECH,<br/>FGFACILITY</b> |
| <b>EUCOPPERTECH2</b>    | Copper plate etching machine with associated shared clean-off sink. Hydrochloric acid is used in the clean-off sink.   | <b>01-01-99,<br/>01-01-06</b>                    | <b>FGCOPPERTECH,<br/>FGFACILITY</b> |
| <b>EUCOPPERTECH3</b>    | Copper plate etching machine with associated shared clean-off sink. Hydrochloric acid is used in the clean-off sink.   | <b>01-01-99,<br/>01-01-06</b>                    | <b>FGCOPPERTECH,<br/>FGFACILITY</b> |
| <b>EUCOPPERTECH4</b>    | Copper plate etching machine with associated shared clean-off sink. Hydrochloric acid is used in the clean-off sink.   | <b>01-01-99,<br/>01-01-06</b>                    | <b>FGCOPPERTECH,<br/>FGFACILITY</b> |

**Exempt Equipment:**

**EU ID or Names      Emission Unit Description      Facility Names & Description**

| EU ID or Names                      | Emission Unit Description  | Facility Names & Description |
|-------------------------------------|--|------------------------------|
| Teflon coating process              | Spray booth and associated bake oven; exempt under Rule 287(2)(c).                     | Teflon coating process       |
| Roller coating booth                | Roll coating machine, for coating copper plates; exempt under Rule 287(2)(c).          | Roller coating booth         |
| Lab hood in copper etch room        | Hood over lab area used to test ferric chloride solution; exempt under Rule 283(2)(b). | Testing hood                 |
| EUROUTER                            | A router for engraving magnesium dies exempt under Rule 285(2)(l)(vi).                 | CNC routing unit             |
| Machining room                      | Room for machining metal, with Torit baghouse; exempt under Rule 285(2)(l)(vi).        | Machining room               |
| Band trim saw, and older CNC router | Metal working processes with baghouse; exempt under Rule 285(2)(l)(vi).                | Machining                    |

**Michigan Air Emissions Reporting System (MAERS):**

The facility reports to MAERS as an SM Opt-Out, Fee Category E. For the 2020 year, the following emissions were reported:

NOx = 10.5 tons

Hydrogen Chloride (HCl) = 0.2 tons

**Inspection:**

Arrived: 9:00 am

Weather: 73°F, wind S @ 7 MPH, UV 1

Departed: 10:52 am

No visible emissions (VEs) were observed from any of the facility exhaust stacks upon arrival. No odors were identified surrounding the facility.

A pre-inspection meeting was conducted with Mr. Craig Ellenberg, Plant Manager/Owner. The facility operations were discussed. He had purchased the facility in mid-2017. There are no emergency generators and the facility is heated by natural gas-fired heaters. There have been no changes in operations since my last inspection.

#### **FGMAGETCH (PTI 272-99F):**

There are eight (8) emission units defined on PTI 272-99F for etching magnesium plates. Acid gas emissions from the eight (8) etching machines are controlled by three (3) aqueous scrubbers that make up a flexible group on the PTI. The scrubbers operate 24/7 whether production is occurring or not.

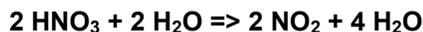
The process begins when they receive a customer's graphic or artwork, which they would like to be made into a die. Magnesium plates of various sizes and thicknesses are kept in stock at the plant, coated by the manufacturer with a polyvinyl photosensitive material. The plate is exposed to ultraviolet light in the negative or positive of the image desired, and the light hardens the coating. The material which was not exposed to the light remains soft, and it is removed from the plates in one of two washing stations which use n-methylpyrrolidone. Years ago, this was once done in a trichloroethylene (TCE) solvent degreaser. They voluntarily moved away from using TCE, to the ecologically safer material they now use.

The magnesium plate, with the hardened coating, is then placed in one of the magnesium etching machines, where it is sprayed with nitric acid, while being rotated. A number of factors, including speed, strength of the acid bath, temperature, and time in the machine all affect how much metal is removed from the plate. The more metal that is removed, the deeper the etch will be. Emissions from the etching process are controlled by wet scrubbers, which use water as the scrubbing solution. The nitric acid bath is 20% nitric acid, 5% etching additive, and the rest is water. Once a plate has been etched, it is rinsed in a wash station with a n-methylpyrrolidone stripping solution.

The chemical reaction in the baths is as follows:



The nitric acid emissions (vapor) are converted to  $\text{NO}_2$  when scrubbed with water as follows:



EUMAGETCH1 is the largest magnesium etch machine in the US, and is controlled by a 10,000 CFM scrubber with a vertical exhaust stack that is expected to be 90% efficient in reducing acid emissions. It handles magnesium plates 30" wide by 10' long. It could actually process wider metal plates than that, but the 30" wide metal plates are the largest size of coated magnesium plate currently on the market. The process runs a couple of times per week, but it may not operate for up to 3 weeks at a time. In the recordkeeping, it is identified as the Owosso Magnesium Etching Machine (OMEM).

EUMAGETCH2-04, EUMAGETCH2-05, EUMAGETCH2-06, and EUMAGETCH2-07 have associated shared sink or washing stations where n-methylpyrrolidone is used to clean off the finished plates.

These etching machines are controlled by an 8,000 CFM scrubber with a vertical exhaust stack. The scrubber is expected to be 70% efficient in reducing acid emissions.

EUMAGETCH3-01, EUMAGETCH3-02, and EUMAGETCH3-03 each have an associated shared sink or washing station where n-methylpyrrolidone is used. The etching machines are controlled by a 5,000 CFM scrubber with a vertical exhaust stack. The scrubber is expected to be 70% efficient in reducing acid emissions.

Also, PTI 272-99F included the installation of etching machine in EUMAGETCH2-04 which the 18-month window to install had lapsed. This etching machine is installed but not yet operational. The electrical connections are needed. And, then notice of installation per special condition (SC) VII.1 needs to be submitted within 30 days after completion.

A Malfunction Abatement Plan (MAP) for FGMAGETCH is maintained per SC III.1. It includes operating parameters, auditing, and maintenance procedures for the scrubbers to demonstrate that the scrubbers are operating satisfactorily. A copy is in the file with the last revision date of June 13, 2018 and is considered approved. A litmus paper test is done daily on the scrubber water to ensure pH is in the 6-8 range but there may be electrical upgrades to the pH monitoring made. Also, I recommend checking with the equipment manufacturer to get pressure drop ranges for proper operation if possible. (Pressure drop on a wet scrubber can be finicky.)

The control devices (scrubbers) appeared to be operating properly per the requirements of SC IV.1. A device to measure pressure drop across each scrubber is installed. The pressure drop on the 5,000 cfm scrubber was reading 0.1 inches, the 8,000 cfm scrubber was reading 2.4 inches, and the 10,000 cfm scrubber was reading 4.4 inches. A device to measure the liquid flow rate (recycle) isn't quite installed. The hardware is installed but the connections were never completed.

Testing for the NO<sub>x</sub> emission rate from EUMAGETCH2-04 will be needed within 180-days of trial operation per SC V.1. When the notice of completion of installation for EUMAGETCH2-04 is submitted, the clock will start for testing to be completed.

Records of the chemicals used in FGMAGETCH are kept in accordance with SC VI.2. SDS for the chemicals used in the process (Mego 20X Etching Additive, nitric acid, etc.) were reviewed and are kept in a satisfactory manner.

SC VI.3 requires monitoring and recording the pH, pressure drop, and liquid flow rate for each scrubber in FGMAGETCH on a daily basis. The monthly log for June and July 2021 was obtained. The pH and scrubber pressure drop are being recorded for the operating days. The pH for all 3 scrubbers consistently runs 7. The liquid flow rate is not being recorded. Craig has committed to getting the liquid flow rate monitoring equipment operational so that this parameter can be recorded.

VOC (all n-methylpyrrolidone) monthly emission records on a 12-month rolling time period that are required to be kept per SC VI.4 were obtained for January 2018 to July 2021. In July 2021, the 12-month rolling VOC emission rate was 4.78 tons. The VOC emission limit for FGMAGETCH is 7.4 tpy so compliance is demonstrated.

#### **FGCOPPERETCH (PTI 272-99F):**

The copper etch room is where all copper etching machines are located. Copper is more durable than magnesium, so it is used for making dies for customers who need to produce large quantities of an image. If a customer needed a die for limited production, they would go with magnesium.

Copper plates which have been coated with a photosensitive material (much of it done in their roller coating booth) are exposed to ultraviolet light, in the positive or negative of the desired image. The ultraviolet light hardens the coating. The unexposed coating material is washed away, in a wash station. The plates are then submerged in a ferric chloride solution for 10 to 30 minutes. The solution, which is 66 to 67% ferric chloride, and 33% water, etches away the copper that is not protected by the hardened photosensitive coating. A mask washing solution, sodium silicate, is used to wash away the remaining photosensitive coating.

HCl (muriatic acid) is used to wash oils from the copper plates in a large sink in the middle of the room before etching. They have four (4) copper etching machines, and three (3) hoods in the room that vent to one external exhaust stack (SVCOPPERETCH). Two of the machines used to be by the Teflon coater and two were installed in 2006 when the copper etch room was built.

Records of the chemicals used in FGCOPPERETCH are kept in accordance with SC VI.2. SDS for the chemicals used in the process (PF Etchant, Acid Muriatic 18 Deg, Copper Chem 13A, Copper Chem 13B, Copper Chem 676, etc.) were reviewed and are kept in a satisfactory manner.

#### **FGFACILITY (PTI 272-99F):**

Annual HAP emission limits (SC I.1 and 2) are 9.0 tons individual HAP per year and 22.5 tons aggregate HAPs per year based on a 12-month rolling time period. The two (2) HAPs in the facility that are tracked are muriatic acid and methyl isobutyl ketone (MIBK) which is in the black Teflon coating. These appear to be the only HAPs in the materials used by the facility. Monthly HAP records were provided for January 2018 to July 2021. On a 12-month rolling basis in July 2021, muriatic acid emissions were estimated at 0.35 tons and MIBK emissions were estimated at 0.013 tons. Total HAP emissions on a 12-month rolling basis in July 2021 were estimated at 0.36 tons in compliance with the HAP emission limits.

#### **Exempt Equipment:**

The copper etch room has a small lab style hood that is used by technicians to test the ferric chloride bath. This unit is uncontrolled, and is exempt under Rule 283(2)(b), for laboratory equipment.

#### **Roller Coating Booth; Rule 287(2)(c):**

The roller coating booth was installed on January 25, 2011. The rollers apply a photosensitive coating to copper plates. They are able to coat most of the copper plates they use, although they do purchase some pre-coated copper for customers who have very specific tolerances. On a monthly basis, they use about 1/4 gallon of the photosensitive coating material, far below the 200 gallons per month of coatings allowed by the Rule 287(2)(c) exemption for coating lines. They use about 5 gallons of a cleaner, glycol ether PM acetate, per month, to clean the process. An electric bake oven is part of the

process, and it exhausts to the outside air. This process appears to be exempt under Rule 287(2)(c). The records provided (obtained for January 2018 to July 2021) track the PM acetate usage in the booth. The highest monthly usage was 113.7 gallons in October 2019, and VOC emissions on a 12-month rolling basis in July 2021 were estimated at 0.6 tons.

**Teflon Coating Process; Rule 287(2)(c):**

They have a small spray booth where they apply a Teflon coating to certain dies. The booth has an associated natural gas-fire bake oven. The spray applicators are high volume low pressure (HVLP) and paint overspray is controlled by a panel filter. The black Teflon paint is received in 1 gallon cans and a new can is opened about every 2 to 3 weeks. The "Black Top Tracking Log" (posted by the booth) shows a new can was opened on 6-30-2021, 7-14-2021, and 8-4-2021. This process appears to be exempt under Rule 287(2)(c).

**Machining room; Rule 285(2)(l)(vi):**

They have a machining and tooling room where grinders, bandsaws, and other cutting and grinding equipment are. These are considered exempt under Rule 285(2)(l)(vi)(B). The room is controlled by a small, blue Torit baghouse, which self-cleans its bags with a vibrating mechanism. The Torit baghouse vents inside. There is also a brown baghouse which serves a band trim saw, and an older CNC router. This device also self-cleans its bags with a vibrating mechanism. The baghouses are cleaned once per week.

**EUROUTER, Rule 285(2)(l)(vi):**

They have a CNC routing unit, in a dedicated room, for engraving magnesium dies. Because magnesium is highly flammable, the unit is enclosed, and does not emit the shavings. It is considered exempt under Rule 285(2)(l)(vi)(B).

**EUBOILER, Rule 282(2)(b)(i):**

A small natural gas-fired boiler (less than 1 MMBtu/hr) is on-site. It appears that the boiler is exempt from the Area Source Boiler MACT, 40 CFR Subpart JJJJJJ due to the size and type of fuel used.

**Waste Treatment; Rule 285(2)(m):**

Spent ferric chloride solution from the copper etching process is stored in a tank on-site. This spent solution is treated and the resulting filter cake is taken offsite as solid waste to be used as a raw material for another industry.

Spent nitric acid from the etching machines is pumped to a storage tank, where it is neutralized with sodium hydroxide. Sediment settles out, and is harvested, and disposed of as a non-hazardous waste. The water is sent to the City of Owosso's waste water treatment plant.

Metal scrap and shavings from the processes are sent to Owosso Iron and Metal for recycling.

**Records:**

Records obtained for this inspection are in the file.

**Summary:**

The facility appears to be in compliance with PTI No. 272-99F, and the air quality rules and regulations. Follow-up items include getting the liquid flow rate monitoring equipment operational so that this scrubber operating parameter can be monitored and recorded as required in the PTI. Also, the recordkeeping is greatly improved since the last inspection.



**Image 1(IMG 0228) :** EUMAGETCH2-04 (still needs electrical connections)

NAME Julie L. Brunner

DATE 9/8/2021

SUPERVISOR B.M.