

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

N188863316

FACILITY: Gentex Corporation		SRN / ID: N1888
LOCATION: 600 N. Centennial Street, ZEELAND		DISTRICT: Grand Rapids
CITY: ZEELAND		COUNTY: OTTAWA
CONTACT: Justin Olejniczak , Environmental Health and Safety Manager		ACTIVITY DATE: 06/17/2022
STAFF: Chris Robinson	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: FY '22 on-site inspection to determine the facility's compliance status with MI-ROP-N1888-2022.		
RESOLVED COMPLAINTS:		

I – Introduction

Chris Robinson (CR) from the Department of Environment, Great Lakes, and Energy's (EGLE) Air Quality Division (AQD) was on site to conduct an inspection of Gentex Corporation (SRN N1888) on June 17, 2022. The facility's headquarters is located at 600 North Centennial Street in Zeeland, Ottawa County Michigan. Prior to arrival CR surveyed the perimeter of the buildings for odors and visible emissions, none were observed. Weather conditions were fair with a temperature of approximately 73°F and northwest winds at 10 mph (www.weatherunderground.com).

Upon entry, CR met with the Gentex's Environmental Health and Safety Manager, Justin Olejniczak. Identification was provided and CR informed him of the purpose of the visit which was to conduct a routine inspection to determine compliance with the facility's Renewable Operating Permit (ROP) MI-ROP-N1888-2022 and any other applicable air quality rules and regulations. Prior to entering the plant CR and Mr. Olejniczak reviewed the facility's permit and discussed any changes or concerns. Per Mr. Olejniczak there have been no changes to the facility since the 2020 inspection.

II - Facility Description

Gentex manufactures products for the automotive and aerospace industries. Products include auto-dimming rearview mirrors, and imagers/cameras for the automotive industry and dimmable aircraft windows. Many of the components are manufactured onsite by use of plastic injection and metal casting. Glass is purchased and then cut and bent to shape onsite. Manufacturing also includes microelectronics which involves the soldering of components to circuit boards either by surface-mounting and/or through-hole technique. Other processes include chemical development and product assembly. The stationary source consists of multiple buildings with the headquarters located at 600 North Centennial Street. Gentex is located in Ottawa County and is surrounded by commercial and other industrial sectors with a public secondary school approximately 1 mile to the northeast.

Locations associated with SRN N1888:

1. **9001 Riley Street (North Riley Campus):** Electronic assembly and final interior mirror assembly
2. **58 East Riley Street (Also includes chiller plant):** Interior mirror final preparation before assembly, Materials Lab/adhesive, and glue blending
3. **675 North State Street:** Exterior glass manufacturing, mirror manufacturing, laser ablation, glass coating, final assembly, and fluid formulation
4. **220 East Riley Street:** Subassembly, Synthetic Chemistry & Warehousing
5. **600 North Centennial:**

- **Headquarters**
- **Central Chiller Plant**

- **West:** Automotive glass and aerospace window manufacturing, microelectronic assembly (MEA), aerospace photolithography
- **East:** Electrical assembly and interior mirror manufacturing including full display assembly

6. 790 Case Karsten Drive: Facilities Maintenance

This location is not specifically discussed below, however there are no processes that have the potential to release pollutants. This building is for vehicle maintenance and general maintenance for the entire campus.

7. 310 East Riley Street: Tool Group

This location is not specifically discussed below, however emissions from the generator, boiler and heaters are being tracked.

Other nearby locations that do not appear to be associated to N1888 and are not discussed in this report below:

1. **11768 James Street (Holland):** SRN N2748
2. **10985 Chicago Drive (Zeeland):** Recycling (Only used for collection and storage of scrap metal and plastics)
3. **864 East 24th Street (Holland):** Oats building, high frequency testing (no chemicals or processes that have potential to emit pollutants)

III - Compliance Evaluation

a) MI-ROP-N1888-2022

Since the previous 2020 inspection all semi-annual and annual ROP report Certifications have been received on time, complete, and with no deviations or issues noted. Previous semi-annual certifications were received on 3/1/2022, 8/11/2021, and 3/18/2021 while the last annual ROP Compliance Certification was received on 3/1/2022. Stack dimensions noted throughout the ROP were not explicitly measured but were observed and they appear to be correct. This was discussed with Mr. Olejniczak who confirmed that there have been no changes since the 2020 inspection. All stacks appeared to be discharging unobstructed vertically to ambient air.

1) Source-wide Conditions

Gentex is subject to source-wide emission limits (Special Conditions (SC) I.1-3) of 9 tons per year (TPY) individual Hazardous Air Pollutants (HAPS), 22.5-tpy aggregate HAPs, 224.9-tpy of Volatile Organic Compounds (VOC's) and a material limit (SC II.1) of 95,680,000 mirror units produced per year (based on a 12-month rolling time period). The following records are being maintained as required per SC VI.2-3 which are included.

- Gallons/pounds of each HAP containing material used/reclaimed (Monthly).
- HAP content of each HAP containing material used (Monthly).
- Individual and aggregate HAP emission calculations (Monthly & 12-month rolling)
- VOC emission rate using an emission factor of 0.0047 pounds VOC/mirror unit assembled (Monthly and 12-month rolling).
- Records of the number of mirror units produced (Monthly and 12-month rolling).

The following was based on the provided records, which demonstrates that Gentex appears to be operating within the source-wide limits.

Pollutant or Material	Limit	Time Period	Total from June 2021 – May 2022	Within Limit (Yes/No)
Each Individual HAP	9-tpy	12-month Rolling	Highest Individual = 0.67 tons (May 2022 for xylene)	Yes
Aggregate HAPs	22.5-tpy		Max = 2.14 tons (Aug 2021)	Yes
VOC	224.9-tpy		Max = 71.76 tons (Sept 2021)	Yes
Mirrors produced	95,680,000/year		32,208,687 mirrors	Yes

The facility currently determines HAP content of materials by using either the highest range provided in Safety Data Sheets (SDS) or, if one is not provided in the SDS, by requesting it from the manufacturer. Per discussions with Mr. Olejniczak and a review of records, Environmental Data Sheets (EDS) are being used to determine HAP contents of materials used.

2) ROP Emission Unit/Flex Group Requirements

a) EURILEYMATLAB (58 East Riley Street)

The interior mirror final preparation involves glass processing prior to assembly. This location has multiple glass processing lines with various configurations, all of which begin with mirrored glass. The mirror is scored in a sheet of glass then finish cut with water. The only glass cleaning conducted in this building is done with automatic cleaners that use “G Solve” cleaning solution which consists of approximately 75% VOCs. Gentex is currently using Rule 290 to exempt the automatic cleaning processes from requiring a permit. There are three (3) manual cleaning stations and based on emission records provided VOC emissions are approximately 833 pounds per month each, which is under the 1,000 pound (uncontrolled) limit.

Once the glass is prepared it is cleaned with acetone or “G Solve” then two pieces of glass are adhered together using an adhesive. A proprietary dimming liquid is injected into the space between the two pieces of glass. Primary emissions from this process are from the initial cleaning of the glass with acetone or “G solve.” The adhesive used in the process is prepared in the Materials Lab located on the second floor.

The Materials Lab is relatively small and consists of a few blending stations with small fume hoods. The lab blends together adhesives/glues/epoxies along with conductive materials, including lead. Emission unit EURILEYMATLAB is subject to a VOC emission limit of 6.0tpy based on a rolling 12-month period. VOC records are being maintained. Based on provided records the facility’s maximum 12-month rolling VOC emissions were 0.0036 tons.

b) EUSTATEFLUIDFORM (675 North State Street)

This location produces a significant number of base components for the mirrors starting with clear glass. Various processes are used to cut and shape the glass and there are seven (7) glass coating lines in this area. The glass coating applied by “sputtering” which is done under a vacuum and does

not appear to emit to the outside air. The processes are internally vented through what appeared to be a series of filters.

The mirrored glass is then sent for further processing which includes cutting the glass sheets to shape and then laser ablation. Laser ablation is used to remove some of the reflective coating in specified patterns.

The fluid formulation area (EUSTATEFLUIDFORM) is a small lab used for blending the dimming fluid. This emission unit is subject to a VOC emission limit of 6.0 tpy based on a rolling 12-month period. VOC records are being maintained and provided. Based on these records the facility's maximum 12-month rolling VOC emissions were 0.002 tons.

c) EU220RILEYMATLAB (220 Riley Street)

This building is used for partial assembly of base components that are eventually sent to different areas of the plant for completion. No chemicals are used in the assembly area.

The synthetic chemistry area is where the facility makes their adhesive and epoxy. It consists of multiple reaction vessels. The batches react for an extended period of time, which restricts the total amount of material throughput. The reactors can use either atmospheric distillation or vacuum distillation. These processes recollect the solvent through cold traps. This emission unit (EU220RILEYMATLAB) is subject to a VOC emission limit of 2.0-tpy. Records are being maintained based on batch calculations. Maximum 12-month rolling emissions were 0.0003 tons which is well below the 2.0 tpy limit.

d) FGRILEYMANCLN, FGSTATEMANCLN, FGCENTMANCLN and FG9001RILEYMANCLN

During the most recent ROP Renewal PTI no. 57-21 (issued August 18, 2021) was rolled into the ROP. These conditions changed Flexible Groups FGRILEYMANCLN, FGSTATEMANCLN, FGCENTMANCLN and FG9001RILEYMANCLN to emission units by building so manual cleaning operations can be tracked per building instead of per station. All now include emission limits for both Acetone and VOC's which is noted in the table below along with calculated emissions provided by the facility for the time period of June 2021 through May 2022. The facility uses a material tracking program to calculate the usage of the cleaning solvents. This includes a point of use record and assumes all cleaning material is used.

Equipment (Building)	Emission Limits (12-mth rolling)		Max 12-mth rolling Emissions	
	Acetone (TPY)	VOC (TPY)	Acetone	VOC
EURILEYMANCLN	66.0	10.0	24.10 (May 2022)	2.25 (May 2022)
EUSTATEMANCLN	30.0	70.0	13.59 (May 2022)	36.38 (May 2022)
EUCENTeMANCLN	5.0	19.0	0.00	1.62 (April & May 2022)
EU9001RILEYMANCLN	5.0	40.0	0.00	3.78 (May 2022)

*Does not include automatic cleaning stations.

Monthly and annual (12-month rolling) records are being properly maintained by the facility and have been provided as requested.

e) FGSIXISTRICE & FGSINEW (All Emergency Generators)

Emergency generators EUCENTNGGEN1, EUCENTNGGEN2, EUSTATENGGEN1, and EU58RILEYNGGEN at the stationary source are subject to the National Emission Standards for Hazardous Air Pollutants for Existing Spark Ignition Reciprocating Internal Combustion Engines promulgated in 40 CFR Part 63, Subparts A and ZZZZ since they were installed prior to June 12, 2006.

Emergency generators EU220RILEYNGGEN, EU310RILEYNGGEN, EU380RILEYNGGEN1, EU9001RILEYNGGEN, EU9001RILEYNGGEN2, EUSTATENGGEN2, EUSTATENGGEN3, EUCHILLERNGGEN, and EUCENTNGGEN3 at the stationary source are subject to the National Emission Standards for Hazardous Air Pollutants for New Spark Ignition Reciprocating Internal Combustion Engines promulgated in 40 CFR Part 63, Subparts A and ZZZZ since they were installed after June 12, 2006 and they are subject to the Standards of Performance for Stationary Spark Ignition Internal Combustion Engines promulgated in 40 CFR Part 60, Subparts A and JJJJ. Due to the size and the age of these Emission Units, the only provisions of 40 CFR Part 63, Subpart ZZZZ (40 CFR 63.6590(c)(1)) that these Emission Units must comply with are the New Source Performance Standards (NSPS) for Stationary Spark Ignition Internal Combustion Engines promulgated in 40 CFR Part 60, Subparts A and JJJJ.

Mr. Olejniczak provided records demonstrating that Gentex is conducting regular maintenance. Since the generators have not reached 500 hours of operation, annual requirements are being met as required. All of the emergency generators are being operated under Rule 201 permitting exemption Rule 285(2)(g) for Internal combustion engines that have a maximum heat input of less than 10,000,000 Btu/hour.

f) FGRULE287(2)(c) (600 North Centennial East & West)

Finished components are assembled at 600 North Centennial East on various production lines where the mirrors are manually cleaned using Isopropyl Alcohol (IPA). IPA usage is tracked. VOC and Acetone emissions are calculated, which are summarized above. Electrical assembly is similar to the electrical assembly area located at the Riley Campus, except the completed electronics are sealed with a conformal coating to help prevent corrosion. The conformal coating usage is tracked, and the process appears to meet the 287(c) exemption as claimed by the facility. Based on records provided the maximum monthly usage was 53.24 gallons in August 2021. Which is well under the 200 gallon/month limit.

Centennial West has a photolithography lab. The processes primary emissions are from the use of cleaning solvents which is tracked.

Centennial West assembles dimming aerospace windows. The process starts with a sheet of glass that is scored so that the shape of the window can be broke out. The glass is then washed with water and soap then a VOC based conductive paste is applied and cured in an oven. The oven is exhausted internally. The facility tracks the adhesive usage. Once assembled the glass is cured a second time in an electric oven which is also internally vented. The glass is then filled with the dimming fluid and cleaned with acetone or IPA. The facility has claimed that the application of the auto dimming fluid is exempt under Rule 287(2)(c). This process is limited to 200 gallons per month of dimming fluid, as applied, minus water and per emission unit. Based on records provided the maximum monthly usage was 31.70 gallons in February, June & July of 2020.

Centennial West is also used for microelectronic assembly which includes an automatic cleaning station that only uses water.

g) FGRULE290

The electronic assembly process at the North Riley Campus starts with a blank circuit board. The boards are loaded into machines that add preloaded circuits that are coated in lead free soldered. Once the boards are heated in an externally vented curing oven the soldering paste melts and the component is retained in place. The solder paste has a low VOC content, which is accounted for in the facility record keeping.

The final interior mirror assembly includes multiple lines which combine preassembled components. These lines use isopropyl alcohol (IPA) to clean the glass not acetone because acetone can damage the more sensitive components. IPA usage is tracked and covered under the manual cleaning operations noted above. Other Rule 290 emission units being operated at this facility include the following:

Installed on or after December 20, 2016:

EU9001RILEYLASER, EU9001RILEYBRDWASH, EU9001RILEYPASTE, EURILEYELMWSH203, EURILEYELMWSH110, EURILEYINKJET2, EURILEYINKJET3, EURILEYELMWSH202.

Installed prior to December 20, 2016:

EUCENTeLASER, EUCENTwDEFLASH, EUSTATEVACUUM, EU220RILEYSYNCEM, EURILEYVACUUM, EUCENTeBRDWASHER, EUSTATEPOTTING, EUSTATESANDBLAST, EURILEYSANDBLAST, EUCENTePASTE, EUCENTwMISCSOL, EUCENTwVACUUM, EUCENTwPHOTOLITH, EUSTATECHEMCUT.

Rule 290 records were provided. VOC emissions from only EU-RILEYVACUUM, EU-STATEVACUUM, and EU-CENTwVACUUM are controlled and would be subject to the 500 lb./month emission limit. Between these three emission units, the month with the highest emissions was March 2022 at 13.3805 pounds for EU-CENwVACUUM, which is under the 500 lb./month limit. The remaining 290 emission units appear to be subject to the 1,000 lb./month limit. The highest monthly emissions for the remaining Rule 290 emission units are 814.3 pounds during the month of March 2022 for EU-CENTwMISCSOL, which is below the limit.

h) Rule 285 (FGCOLDCLEANERS)

Gentex has four (4) cold cleaners (EUCENTeCOLDCLEAN, EUSTATECOLDCLEAN, EURILEYCOLDCLEAN, EU220RILEYCOLDCLEAN, EU9001RILEYCOLDCLEAN) containing Safety Kleen Premium Solvent. These units are maintained by Safety Kleen and do not contain any halogenated compounds. Lids are kept closed when not in use and each has a surface area of less than 10 square feet.

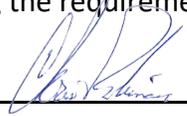
4) MAERS Review

Manual Cleaning ROP Flex Groups were converted to emission units during the last ROP renewal issued in 2021 so that cleaning stations were no longer needed to be tracked individually and could now be tracked on a per building basis. Since the previous and current ROP covered a portion of 2021, the applicant included emissions data for each individual manual cleaning station through issuance of the most recent ROP and data for the new emission units from the date the recent ROP was issued through the end of 2021. No changes were made to the database as submitted.

Pollutant	Tons
CO	4.72
LEAD	0.00002
NOX	4.89
PM10, PRIMARY	1.52
SO2	0.03
VOC	63.59
ACETONE	46.37
ACETONITRILE	0.21
ACRYLIC ACID	0.001
DIMETHFORMAM	0.09
ETHYLBENZENE	0.13
HCL	0.001
HEXANE	0.11
METH ETH KET	0.001
METH IODIDE	0.42
METHANOL	0.08
TOLUENE	0.19
TRIETHAMINE	0.004
XYLENES ISO	0.53

IV – Compliance Determination

Based on observations and discussions made during the inspection and a subsequent records review, Gentex appears to be in compliance with applicable air quality rules and regulations including the requirements specified in MI-ROP-N1888-2022.

NAME 

DATE 7/11/2022

SUPERVISOR 