

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

N188871833

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: 03/26/2024
STAFF: Chris Robinson	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: FY '24 on-site inspection to determine the facility's compliance status with MI-ROP-N1888-2022.		
RESOLVED COMPLAINTS:		

I - Introduction

Chris Robinson (CR) and Laura Martin (LM) from the Department of Environment, Great Lakes, and Energy's (EGLE) Air Quality Division (AQD) were on site to conduct an inspection of Gentex Corporation (SRN N1888) on March 26, 2024. The facility's headquarters is located at 600 North Centennial Street in Zeeland, Ottawa County Michigan. Prior to arrival CR and LM surveyed the perimeter of the buildings for odors and visible emissions, none were observed. Weather conditions were cloudy with a temperature of approximately 53°F and south-southeast winds at 17 mph (www.weatherunderground.com).

Upon entry, AQD staff met with 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 AQD staff and Mr. Olejniczak reviewed the facility's permit and discussed any changes or concerns. Per Mr. Olejniczak there have been no changes to the equipment since the 2022 inspection and he had no concerns.

II - Facility Description

Gentex manufactures auto-dimming rearview mirrors, and imagers/cameras for the automotive industry and dimmable aircraft windows. Processes include chemical development, mirror glass, product assembly and microelectronics. Microelectronics involves the soldering of components to circuit boards either by surface-mounting and/or through-hole technique. All other mirror components are purchased. The stationary source consists of multiple buildings (listed below) with the headquarters located at 600 North Centennial Street.

Locations associated with SRN N1888:

1) 9001 Riley Street: North Riley Campus (NRC) consists of 3 separate buildings)

- **NRC1:** Electronic assembly and final interior mirror assembly
- **NRC2: Warehouse**
- **NRC3:** Final Assembly. Footings were initially poured in 2021 and construction was finished in either late 2023 or early 2024. Per discussions with the site construction was completed with no definite plans for how the building was to be used.

2) 58 East Riley Street:

- Interior mirror final preparation before assembly, Materials Lab/adhesive.
- Chiller Plant (Separate Building)

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

6) **790 Case Karsten Drive (Facilities Maintenance):** Vehicle and general maintenance

7) **310 East Riley Street:** Tool Group

III - Compliance Evaluation

1) MI-ROP-N1888-2022

Since the previous AQD inspection (6/17/2022) semi-annual and annual ROP report Certifications were received on time, complete, and with no deviations noted. Stack dimension requirements noted throughout the ROP were not explicitly measured but were observed and appeared correct. This was discussed with Mr. Olejniczak who confirmed that there have been no changes to stacks nor with the processes or equipment since the 2022 inspection. All stacks appeared to be discharging unobstructed vertically to ambient air.

a) Source-wide Conditions

Gentex is subject to the source-wide emission limits listed in the table below. Records are being maintained, were provided, and are attached. Emissions are summarized in the table below which demonstrates that Gentex appears to be operating within these Limits.

Pollutant or Material	Limit	Total from June 2021 – May 2022
Each Individual Hazardous Air Pollutants (HAP)	9-tpy	Highest Individual = 1.12 tons (Feb 2024 for xylene)
Aggregate HAPs	22.5-tpy	Max = 1.90 tons (Feb 2024)
Volatile Organic Compounds (VOCs)	224.9-tpy	Max = 95.42 tons (Feb 2024)
Mirrors produced	95,680,000/year	38,086,041 mirrors

The facility determines HAP content by using either the highest range provided on the Safety Data Sheet (SDS) if the material is listed or Environmental Data Sheets (EDS) if it is not listed. HAP contents are required to be determined using manufacturers formulation data. CR discussed this with Mr. Olejniczak, and they will begin transitioning to EDS.

b) EURILEYMATLAB (58 East Riley Street)

58 east Riley includes both exempt processes for glass manufacturing and permitted process EURILEYMATLAB which is located on the 2nd floor. The first floor has multiple glass processing lines with various configurations where sheets of mirrored glass are scored, cut with water, then sent through an automatic cleaning process, called elemental wash, that uses "G Solve" cleaning solution. G Solve consists of approximately 75% VOCs and Gentex is currently using Rule 290 to exempt it from requiring a permit under Rule 201. There were 4 elemental wash lines, EURILEYELMWSH110 was decommissioned in January 2024. Elemental wash EURILEYELMSH202 is equipped with a scrubber, therefore it is limited to 500 lbs./month of VOCs while the other two (EURILEYELMWSH201 and EURILEYELMWSH203) do not have controls, so they are limited to 1,000 lbs./month of VOCs. Based on emission records provided, the month with the highest emissions for EURILEYELMWSH110, EURILEYELMWSH201 and EURILEYELMWSH203 was September 2023 at 575.9 lbs. (EURILEYELMWSH203) and the month with the highest VOCs for EURILEYELMSH202 was March 2023 at 35.5 pounds.

Once the glass is cleaned, two pieces of glass are adhered together using an adhesive that is prepared in the Materials Lab (EURILEYMATLAB). The lab consists of a few blending stations equipped with fume hoods and the adhesive is prepared by blending adhesives/glues/epoxies together. Once the two pieces of glass are adhered a proprietary liquid that is manufactured in the fluid formulation lab at the 675 North State Street building is injected into the space between the two pieces of glass to achieve an auto dimming mirror. Emission unit EURILEYMATLAB is subject to a VOC emission limit of 6.0 tpy (12-month rolling). Based on VOC records the maximum 12-month rolling VOC emissions emitted were 0.0006 tons (Oct-23 through Jan-24).

c) EUSTATEFLUIDFORM (675 North State Street)

This location produces the base components for mirrors which starts with cutting and shaping clear glass by use of various processes. The glass is then coated in a reflective material in one of seven (7) coating lines using a process known as "sputtering". This is done under a vacuum so there are no emissions being emitted to the outside air. The now "mirrored glass" is then cut to shape and then some of the reflective coating is removed by use of laser ablation to create specific 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 (12-month rolling). Based on VOC records, the maximum 12-month rolling VOC emissions were 0.003 tons (Nov-23 through Feb-24).

d) EU220RILEYMATLAB (220 Riley Street)

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

A synthetic chemistry lab is located in this building which is where the facility makes 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. EU220RILEYMATLAB is subject to a VOC emission limit of 2.0-tpy. Based on VOC records the maximum 12-month rolling VOC emissions emitted were 0.0006 tons (Oct & Nov 2023).

e) EURILEYMANCLN, EUSTATEMANCLN, EUCENTeMANCLN and EU9001RILEYMANCLN

Manual cleaning operations are permitted and tracked on a per building basis and each building has its own emission unit in the ROP. Each emission unit is subject to an emission limit for both Acetone and VOC's which is summarized in the table below along with calculated emissions provided by the facility. The facility uses a material tracking program to calculate the usage of the cleaning solvents which includes a point of use record and assumes all cleaning material purchased is used.

Emission Unit	Emission Limits TPY (12-mth rolling)		Max 12-mth rolling Emissions (Tons)	
	Acetone	VOC	Acetone	VOC
EURILEYMANCLN	66.0	10.0	40.05 (Feb-24)	3.6 (Jun-23, Jul-23, Sept-23, Oct-23, & Feb-24)
EUSTATEMANCLN	30.0	70.0	24.46 (Feb-24)	64.85 (Feb-24)
EUCENTeMANCLN	5.0	19.0	0.00	2.88 (Feb-24)
EU9001RILEYMANCLN	5.0	40.0	0.00	3.24 (March-23 & Feb-24)

f) FGSIXISTRICE & FGSINEW (All Emergency Generators)

EUCENTNGGEN1, EUCENTNGGEN2, EUSTATENGGEN1, and EU58RILEYNGGEN are subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) 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.

EU220RILEYNGGEN, EU310RILEYNGGEN, EU380RILEYNGGEN1, EU9001RILEYNGGEN, EU9001RILEYNGGEN2, EUSTATENGGEN2, EUSTATENGGEN3, EUCHILLERNGGEN, and EUCENTNGGEN3 are subject to the NESHAP 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 (NSPS) 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 provision of 40 CFR Part 63, Subpart ZZZZ (40 CFR 63.6590(c)(1)) is that they must comply with 40 CFR Part 60, Subparts A and JJJJ.

Mr. Olejniczak provided records demonstrating regular maintenance is being conducted. Since the generators have not reached 500 hours of operation, annual requirements are being met. 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.

g) 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 total usage was approximately 135 gallons in February 2024 which is 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 broken 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 claims 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 134.6 gallons in February 2024.

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

h) 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 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, EU220RILEYSYNCHER, EURILEYVACUUM,
EUCENTeBRDWASHER, EUSTATEPOTTING, EUSTATESANDBLAST, EURILEYSANDBLAST, EUCENTePASTE,
EUCENTwMISCOSOL, EUCENTwVACUUM, EUCENTwPHOTOLITH, EUSTATECHEMCUT.

Rule 290 records were provided. VOC emissions from only EU-RILEYVACUUM, EU-STATEVACUUM, and EUCENTwVACUUM are controlled and would be subject to the 500 lb./month emission limit. Between these three emission units, the months with the highest emissions were March, May, July, August October, December of 2023, and February 2024 at 18.03 pounds for EU-CENwVACUUM, which is under the 500 lb./month limit. The remaining Rule 290 emission units, except for automatic wash line EURILEYELMWSH202 discussed above, appear to be subject to the 1,000 lb./month limit. The highest monthly VOC emissions emitted for the remaining Rule 290 emission units was 844.3 lbs. (Oct-23 & Dec -23) for EU-CENTwMISCOSOL, which is below the limit. EURILEYELMWSH110 was decommissioned in January 2024.

i) FGCOLDCLEANERS (Rule 285)

EUCENTeCOLDCLEAN, EUSTATECOLDCLEAN, EURILEYCOLDCLEAN, EU220RILEYCOLDCLEAN, EU9001RILEYCOLDCLEAN are maintained by Safety Kleen and use Safety Kleen Premium Solvent, which does not contain any halogenated compounds. Lids are closed when not in use and each have a surface area less than 10 square feet.


2) 2023 Annual Emissions Inventory Review

The facility's 2023 annual emissions inventory was submitted on time and complete. No changes were made to the database as submitted. Results for Criteria Pollutants submitted by the facility are provided in the table below.

Pollutant	Tons
CO	6.52
LEAD	0.00003
NOX	6.91
PM10, PRIMARY	2.27
SO2	0.04
VOC	85.46

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 5/9/2024

SUPERVISOR 