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

B402264541

FACILITY: DOW Silicones Corporation		**SRN / ID:** B4022
LOCATION: 5300 11 MILE RD, AUBURN		**DISTRICT:** Bay City
CITY: AUBURN		**COUNTY:** BAY
CONTACT: Dean Dittenber , Site EH&S Manager, SK Siltron		**ACTIVITY DATE:** 09/08/2022
STAFF: Kathy Brewer	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** SM OPT OUT
SUBJECT: Two companies at one site SRN for OPT-OUT tracking purposes. SK Siltron on site inspection and records review. PTI #184-18 Draft report		
RESOLVED COMPLAINTS:		

The SK Siltron Auburn Michigan facility manufactures and tests silicone carbide wafers. The site uses furnaces to "grow" the wafers (epitaxy), and grinds, cleans, polishes, inspect, and tests wafers. The final product can be used in the semiconductor industry. Except for EUAUB-55 the individual contaminant emitting activities at the SK Siltron portion of the site with SRN B4022 all meet a Rule 201 air permit requirement exemption.

The facility with assigned SRN B4022 was originally one site. The site was issued a Title 5 Opt-Out permit. In 2018 the site split assets between two companies and PTIs were issued to each company on December 11, 2018. The current owners are Dow Chemical and SK Siltron. Dow Chemical was issued PTI #13-14C . SK Siltron purchased assets from Dow Dupont that are in PTI #184-18. Each of the PTIs contain facility emission limits (FGFACILITY) that divide emissions based on assets owned to maintain emissions below the Opt-out stationary source total.

Each company submits a separate MAERS (only one PIN/ SRN allowed). The SK Siltron emissions are submitted by hard copy. One MAERS report for the SRN B4022 site emission is maintained.

A pre-inspection meeting was held with the company to review site processes emitting air contaminants, emission control devices, and what air regulatory required records are maintained.

I conducted an on site inspection of the air regulated activities on September 8, 2022.

The inspection included a review of production areas, control devices, and on site records.

The company appeared to be in compliance at the time of the inspection.

Attachments

Acid bath operating hours April 13, 2022, August 13, 2021, and January 13, 2022

Filter change tracking Acid bath (10/13/2021), Lift station and Tote station (4/10/2021)

EUAUB-53 May 2022 on site records screen shot

EUAUB-55 (MOD5) Stack photos

May 2022 FGFACILITY production summary

EUAUB-55

We viewed the wafer Testing booth, Acid bath, Lift station, and Tote station areas and associated filter locations. In the testing booth a mercury microdot is applied, testing tool utilized, and mercury microdot removed. The wafer is then sent to nitric acid bath.

I. EMISSION LIMIT(S)

The PTI does not contain any Special Conditions for EUAUB-55 emissions limits.

II. Material limit(s)

The PTI does not contain any Special Conditions for EUAUB-55 material limits.

III. PROCESS/OPERATIONAL RESTRICTION(S)

SC 1. requires replacement of the activated charcoal in the testing booth filters at least once every 6 months. Facility records of test booth filters changes on July 15, 2021 and December 31, 2021 are attached.

SC 2. requires replacement of the activated charcoal in the acid bath two part filter at least once every 519 hours that the bath is operated. The filters ("nitric bench filters") were changed on October 13, 2021. The following operating records were reviewed. Screen shots are attached.

Activity	Monitor ID	Jan 13, 2022	Aug 13, 2021	April 13, 2020	Aug 27, 2022
"Acid bath on" hours	PI Vision: Corrosive Exhuast Filter Timer	211 – 221 hrs (10 hours operation)	259 – 268 hrs (9 hours operation)	143 – 148 hrs (5 hours operation)	20.3 – 24.6 hrs (4.3 hours operation)

SC 3. requires replacement of the activated charcoal filters at least once every two years for filters controlling the lift station and the tote station. in the testing booth filters at least once every 6 months. Records were provided for test booth filters changes on July 15, 2021 and January 15, 2022.

Control device	Most recent change out (PM or other record documenting task completion)	Date/Time since last change out on Jan 13, 2022	Date/Time since last change out on Aug 13, 2021	Time since last change out on April 13, 2020
SC.1 Test booth filter (1/6 months)	6/30/2022	12/31/2021	7/15/2021	3/1/2020

Control device	Most recent change out (PM or other record documenting task completion)	Date/Time since last change out on Jan 13, 2022	Date/Time since last change out on Aug 13, 2021	Time since last change out on April 13, 2020
SC 2. Acid bath two-part filter (519 hours bath on)	8/3/2022 (239 hrs). This was changed out earlier than the 519 hrs because of an equipment failure.	10/13/2021 (489 hrs) 211 hrs on filter as of January 13, 2022	2/24/2021 (473 hrs) 259 hrs on filter as of August 13, 2021	12/18/2019 (475 hrs) 143 hrs on filter as of April 13, 2020
SC 3.a. two part activated charcoal filter wastewater lift station (every two years)	4/10/2021	4/10/2021	4/10/2021	4/17/2019
SC 3.b..two part activated charcoal filter tote station (every two years) (Totes hold waste liquid from nitric acid bench)	4/10/2021	4/10/2021	4/10/2021	4/17/2019

IV. Design/Equipment Parameters

The filters for the testing booth, acid bath, lift station, and tote station appeared to be installed and operated properly as required by SC 1., SC 2., and SC 4.

The Acid bath hours of operation are monitored and recorded as required by SC 3. Example monitoring is attached.

V. Testing/Sampling

The PTI does not contain any Special Conditions for EUAUB-55 testing or sampling requirements.

VI. Monitoring/Recordkeeping

Review of on site monitoring and maintained records indicate the facility is in compliance with recordkeeping and monitoring requirements.

VII. Reporting

The PTI does not contain any Special Conditions for EUAUB-55 reporting requirements.

VIII. <u>STACK/VENT RESTRICTION(S)</u>

The following stack information was reviewed. Photos of stacks are attached.

Stack & Vent ID	Maximum Exhaust Diameter / Dimensions (inches)	Minimum Height Above Ground (feet)	Description
1. SVA-MOD5-37	20	36.5	EPI can vent to either
2. SVA-MOD5-38	20	36.5	EPI can vent to either
3. SVA-MOD5-32	36	41.5	Nitric acid bath, Lift station, Tote station post filters

FGFACILITY

The SK Siltron Aubirn facility acquired site MOD5 and MOD6 assets from DDP. HAP and VOC emissions for Product Family 37, 38, and 39 are associated with MOD5 and MOD6 were evaluated as part of the original site wide PTI # 13-14 . We viewed the felt cutting area, some furnaces, grinding and polishing areas, wafer Testing booth Acid bath, Lift station, and Tote station areas and associated filter locations.

The emission units, R201 permit exemption, and whether controlled or uncontrolled emissions, are listed below.

Emission Group	Process name	Controled/Uncontroled	Group Status
MOD 5			
EGAUB-50	HF Cleaning Bench	Uncontrolled	290
EGAUB-51	Epi & Aixtron Reactors w/ scrul	Controlled	290
EGAUB-53	Wafer Grinding & Polishing	Controlled	290
EGAUB-54	KOH Bench System	Uncontrolled	291
EGAUB-55	Nitric Acid Bench	Controlled	Permitted
EGAUB-56	CSS Analytical Area	Uncontrolled	290
EGAUB-57	DAC Neutralization System	Uncontrolled	290
MOD 6			
EGAUB-60	CSS Growth Area	Controlled (dust collecto	290
EGAUB-61	CSS Furnace Area	Controlled	290
EGAUB-62	CSS Fabrication Area	Uncontrolled	290
EGAUB-63	CSS High Bay Wafer Process	Uncontrolled	290
EGAUB-64	CSS Felt Processing	Uncontrolled	290

I. **EMISSION LIMIT(S)**

Review of the following emission records indicate the facility is in compliance with FGFACILTY emission limits.

utant	Limit	Time Period / Operating Scenario	Jan 2022	Aug 2021	April 2020
PM, M10, M2.5	Less than 9.9 tpy	12-month rolling time period as determined at the end of each calendar month	0.974722854	0.951224803	0.949950851
VOC	Less than 6.0 tpy	12-month rolling time period as determined at the end of each calendar month	0.145013317	0.135017679	0.137285294
Total HAPs	Less than 0.8 tpy	12-month rolling time period as determined at the end of each calendar month	0.164683506	0.143722694	0.143253825

utant	Limit	Time Period / Operating Scenario	Jan 2022		Aug 2021	April 2020
Each Individual HAP	Less than 0.4 tpy	12-month rolling time period as determined at the end of each calendar month	HCL	0.075120927	0.054406441	0.053263157
			HF	0.086010023	0.086010023	0.086010023
			Mercury	0.000312656	0.0008704	0.001400252
			MIBK	0.003239891	0.002435823	0.002580385
			Cumene	3.99524E-09	3.07091E-09	3.26446E-09
			Naphthalene	5.19074E-09	3.98983E-09	4.24129E-09
			KOH (lbs)	808.13898	808.13898	808.13898

II. MATERIAL LIMIT(S)

Production records reviewed indicate the facility is in compliance with the allowed material limits.

Material	Limit	Time Period / Operating Scenario	Jan 2022	Aug 2021	April 2020
1. Product Family 37	133,000 wafers per year	12-month rolling time period as determined at the end of each calendar month	54389	43896	41281
2. Product Family 38	66,000 EPI wafers per year	12-month rolling time period as determined at	7806	2306	1994

Material	Limit	Time Period / Operating Scenario	Jan 2022	Aug 2021	April 2020
		the end of each calendar month			
3. Product Family 39	7,000 boules per year	12-month rolling time period as determined at the end of each calendar month	3406	2591	2783

II.PROCESS/OPERATIONAL RESTRICTION(S)

SC 1. Of the PTI requires installation, and operation of dust collectors in a satisfactory manner including target pressure drop ranges. Review of on site monitoring equipment records the facility is in compliance with this requirement.

ector	Collector ID	Target pressure drop range (inches water column)	Jan 13, 2022	Aug 13, 2021	April 13, 2020	Aug 30, 2022 3 PM	Sept. 8, 2022
D6	DV3750-FL1	0.1 < pressure drop < 7.0	0.184892401 1.275925279	0.177874342 0.163104609	0.538084269 1.703877091	0.264855325 0.410621375	0.49
D6 t	DV3750-FL2	0.1 < pressure drop < 7.0	0.269357085 2.493036032	0.278501153 0.26137042	0.413971335 1.443880081	0.298637807 0.475783139	0.49

IV. Design/Equipment Parameters

The dust collectors were each equipped with a working pressure drop indicator.

V. Testing/Sampling

The PTI does not contain any Special Conditions for EUAUB-55 testing or sampling requirements.

VI. Monitoring/Recordkeeping

Review of on site monitoring and maintained records indicate the facility is in compliance with recordkeeping and monitoring requirements.

SC VI.2 requires monitoring and recording of pressure drop across dust collectors at least once each shift. Once each 12 hour shift the operator records the dP. The records are reviewed monthly for minimum and maximum dP values.

The dust collectors operate continuously. The facility operations use continuous electronic monitoring for pressure drop of dust collectors. Example records for April 2020, August 2021, and January 2022, dust collector differential pressure were reviewed. (See SC II.1)

SC VI.3 requires the site calculate particulate emissions for FGFACILITY.

SC VI 4. requires the site record the quantity of each product family and VOC emissions monthly and rolling 12 month period for FGFACILITY.

We reviewed the production tracking system and the steps for determining and tracking emissions by Product Family, for EU exemption records, and FGFACILITY. Detailed records were provided by the facility.

Operators log into the tracking system. Data is pulled into the production tracking system and provided to environmental staff monthly.

The site is in the process of going from multiple data tracking systems, that required available data reports to be manually pulled or combined for production and emission data tracking, to implementation of a new system (CMF) that can use data in the sites Spotfire data system to generate production and emission reports.

Emissions are based on production and emission estimates used for the PTI #184-18. Worse case default emission values may also be used.

May 2022 product totals, an edited subset of monthly example production records, and example monthly emission records are below.

May 2022 production summary

Product	May totals
Boules	1061
EPI Wafers	1029
Nitric Acid Cleaned	5274
Wafers	458

Seeds	**252**

Product	Operation	Step	Area	Area2	Step2	Form	Primary	Sub Material	Total	Total 2
Boule	TrackOut	Sliced Wafer Dispo	Slice	03. MWS	1404-Sliced Wafer Dispo	Lot		0	23	23	23
	TrackIn	Sliced Wafer Dispo	Slice	03. MWS	1404-Sliced Wafer Dispo	Lot		0	23	23	23
	TrackOut	Char Shape Measure	Slice	03. MWS	1402-Wafer Shape (M)	Lot		0	23	23	23
	TrackIn	Char Shape Measure	Slice	03. MWS	1402-Wafer Shape (M)	Lot		0	23	23	23
	TrackOut	Sliced Wafer Dispo	Slice	03. MWS	1404-Sliced Wafer Dispo	Lot		0	23	23	23
	TrackIn	Sliced Wafer Dispo	Slice	03. MWS	1404-Sliced Wafer Dispo	Lot		0	23	23	23
	TrackOut	Char Shape Measure	Slice	03. MWS	1402-Wafer Shape (M)	Lot		0	23	23	23

Flow	**(Multiple Items)**		**Product**	**(All)**		
Sum of Total Quantity2	**Column Labels**					
Row Labels	**AbortProcess**	**RecordLoss**	**TrackIn**	**TrackOut**	**(blank)**	**Grand Total**
01. Growth	**2**	**79**				
02. Fabrication		**8**				
03. MWS	**459**	**200**	**DATA REMOVED BY K.BREWER**			**DATA REMOVED BY K BREWER**
05. Grind	**1140**	**182**				
06. Polish	**246**	**19**				
07. Clean	**197**	**1**				

Emission calculations for R290 exempt EUAUB53 May 2022 were also reviewed and indicate compliance with allowed emissions.

April 2020 Emissions Data:

Chemical Name	CAS #	Emission Factor	Units	Current Month (lbs)
2-Methoxymethylethoxy	34590-94-8	0.02	lbs/day	0.6
Potassium Permangonate	7722-64-7	6	g/wafer	47.17014409
citric acid	77-92-9	0.84	g/wafer	6.603820173

phosphoric acid	**7664-38-2**	**0.1428 g/wafer**		**1.122649429**

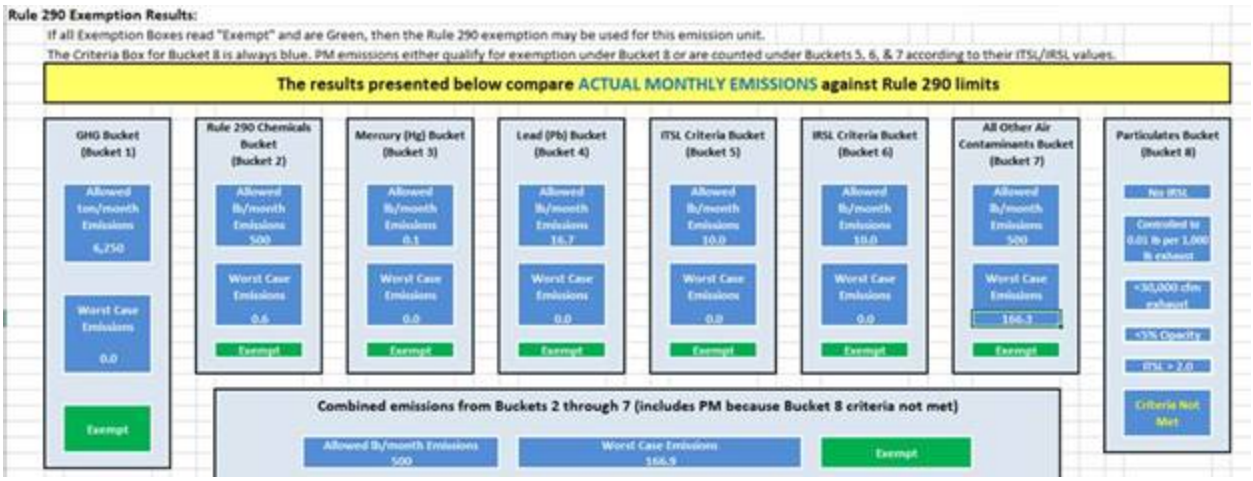
August 2021 Data:

Chemical Name (lbs)	CAS #	Emissions Factor	Units	Current Month
2-Methoxymethylethoxy	**34590-94-8**	**0.009135 g/wafer**		**0.132496087**
Potassium Permangonate	**7722-64-7**	**8.25 g/wafer**		**119.6598485**
citric acid	**77-92-9**	**0.42 g/wafer**		**6.091774105**
phosphoric acid	**7664-38-2**	**0.000119 g/wafer**		**0.001726003**

January 2022 Data:

Chemical Name (lbs)	CAS #	Emissions Factor	Units	Current Month
2-Methoxymethylethoxy	**34590-94-8**	**0.009135 g/wafer**		**0.131388428**
Potassium Permangonate	**7722-64-7**	**8.25 g/wafer**		**118.6595002**
citric acid	**77-92-9**	**0.42 g/wafer**		**6.040847281**
phosphoric acid	**7664-38-2**	**0.000119 g/wafer**		**0.001711573**
Hydrogen Peroxide	**7722841**	**2.5 g/wafer**		**35.95742429**

Example on site record system for EUAUB-53 May 2022



The PTI does not contain any Special Conditions for Reporting, Stack/Vent restriction(s), or Other Requirements

NAME Kathy Brewer DATE 10/3/2022 SUPERVISOR Chris Hare