



STATEMENT OF BASIS
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BAQ Air Permitting Division

Company Name:	Silfab Solar	Permit Writer:	David D. Nasol
Agency Air Number:	2440-0293	Date:	March 1, 2024
Permit Number:	CP-50000090 v1.0		

DATE ACCEPTED INTO EXPEDITED REVIEW: June 12, 2023

DATE APPLICATION RECEIVED: June 05, 2023 with updates received: February 20, 2024 and February 22, 2024

- February 20, 2024 – full application resubmittal
- February 22, 2024 – revision to emission calculations and form D-2573 of the February 20, 2024 application

PROJECT DESCRIPTION

Silfab Solar (Silfab) submitted a synthetic minor construction permit application to install and operate a new solar cell and panel production facility in Fort Mill, South Carolina.

The following will be installed with this construction permit:

Module Manufacturing

Module Manufacturing will include three (3) module assembly lines, a module assembly laboratory, and gel content testing. The three (3) module assembly lines will use isopropyl alcohol (IPA), fluxes, and EVA Film. VOC and HAP/TAP emissions will be generated from the use of these materials in the module assembly production lines. VOC and HAP/TAP emissions will also be generated in the labs and from gel content testing.

Solar Cell Manufacturing

Solar Cell Manufacturing includes two (2) solar cell manufacturing phases containing enclosed machines and clean rooms to make solar wafer cells. The individual process steps are considered confidential – details can be found in the confidential application. Most of these processes are performed inside enclosed machines or clean rooms that are vented to two (2) wet acid scrubbers designed with a 96% removal efficiency for hydrochloric acid and hydrofluoric acid. Information from the scrubbers' vendor is forthcoming and will be submitted to the Bureau of Air Quality upon receipt. Residual silane (SiH₄) emissions from this process will be sent to a direct fired thermal oxidizer (DFTO) to destroy the remaining silane followed by a venturi scrubber to control particulate matter. Criteria pollutants and HAP/TAP emissions will be generated from the solar cell manufacturing process. The HAPs/TAPs emitted, hydrochloric acid and hydrofluoric acid, will be sent to the acid scrubbers for removal.

Storage Tanks

There will be two (2) 5,280-gallon storage tanks that will store 37% HCl and two (2) 7,925-gallon storage tanks that will store 49% HF onsite. These tanks will be equipped with nitrogen blankets to reduce HCl and HF emissions. The working and breathing losses from these tanks will emit HCl and HF emissions, both considered HAPs and TAPs. Emissions from these sources will be vented to the acid scrubbers to control HCl and HF emissions.



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There will be two (2) tube trailers each holding 13,228 lbs of silane, that will be used to store silane in a specially designed area. Silane is an inorganic compound and is not designated as a VOC, HAP, or TAP; however, this tank will be designed to meet all applicable Occupational Safety and Health Administration (OSHA) regulatory standards to prevent potential releases. Based on process reaction equations, VOCs will not be produced from the process steps utilizing silane. See confidential email from Matt Korzelius dated 8/4/23 for the reaction equations.

There will be two (2) liquid potassium hydroxide storage tanks (45%) that will be used in the cell manufacturing process, tools, cleaning, and wastewater treatment. Potassium hydroxide is not a regulated air pollutant.

Emergency Generator

One (1) 300 HP diesel-fired emergency generator will provide backup electrical power during outages. PM, SO₂, NO_x, CO, VOCs, and HAP emissions will result as a by-product of diesel fuel combustion. The generator will be limited to 100 hours/year for routine testing and maintenance.

FACILITY DESCRIPTION

SIC CODE: 3674
NAICS CODE: 334413

Silfab Solar proposes to construct a new facility for the manufacturing of solar cells and panels. The facility will be located in Fort Mill, South Carolina.

OPERATING PERMIT STATUS

This project is for a new facility, so it does not currently have an operating permit. Once constructed, the Silfab shall apply for a conditional major operating permit.

EMISSIONS

The module manufacturing process emissions were calculated using material balance calculations, safety data sheet (SDS) data using the maximum anticipated material usage based on another Silfab facility in Washington.

The solar cell manufacturing process emissions were calculated using material balance calculations, SDS data, maximum anticipated material usage, vendor-supplied usage and emissions data, and AP-42 Chapter 1.4, Tables 1.4-1, 1.4-2, and 1.4-3.

Emissions for the HCl and HF storage tanks were calculated using EPA's TANKs 4.09d program. The net throughput for the storage tanks was estimated based on continuous operation. The emissions from the liquid KOH and possible liquid NaOH were not calculated since as liquids, they are not regulated as VOC/TAP sources.

The emissions form the diesel-fired emergency generator were calculated using AP-42, Chapter 3, Table 3.3.1 emission factors for industrial engines assuming it was operated 100 hours/year.



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PROJECT EMISSIONS						
Pollutant	Uncontrolled		Controlled		PTE	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
PM	4.66	20.38	0.461	2.02	4.66	20.38
PM ₁₀	4.66	20.38	0.461	2.02	4.66	20.38
PM _{2.5}	4.66	20.38	0.461	2.02	4.66	20.38
NO _x	0.681	2.581	--	--	0.681	2.581
SO ₂	0.010	0.013	--	--	0.010	0.013
CO	0.514	1.805	--	--	0.514	1.805
VOC	17.30	75.71	--	--	17.30	75.71
Toluene	0.109	0.48	--	--	0.109	<10.0
HF	2.12	9.28	0.09	0.38	0.09	<10.0
Highest Single HAP: HCl	44.43	194.58	1.74	7.62	1.74	<10.0
Total HAP	46.55	203.90	1.83	8.00	1.84	<25.0

SOURCE TEST REQUIREMENTS

Initial source tests shall be conducted within 45 days after achieving the maximum production rate or 180 days after startup, whichever comes first, and every two (2) years thereafter to verify the wet acid scrubbers' HCl and HF control efficiencies. The control efficiencies of each wet acid scrubber shall be at least 96% for HCl and HF, each. The control efficiencies will be used for calculating emissions to demonstrate compliance with the synthetic minor limits.

REGULATIONS

Applicable - Section II(E) (Synthetic Minor)

Synthetic Minor Limits					
Permit ID	Equipment ID	Permit Issue Date	Pollutant	Emission Limit (TPY)	Explanation
CP-50000090 v1.0	Facility-wide	--	Single HAP	<10.0	Title V and 112(g) case-by-case MACT avoidance. Compliance will be demonstrated by: Recordkeeping of HAP containing materials; use of wet scrubbers; HCl and HF source tests; monitoring wet acid scrubber pressure drop, liquid flow rate, and pH; and operation and maintenance checks on the scrubbers
CP-50000090 v1.0	Facility-wide	--	Total HAP	<25.0	Title V and 112(g) case-by-case MACT avoidance. Compliance will be demonstrated by: Recordkeeping of HAP containing materials; use of wet scrubbers; HCl and



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Synthetic Minor Limits					
Permit ID	Equipment ID	Permit Issue Date	Pollutant	Emission Limit (TPY)	Explanation
					HF source tests; monitoring wet acid scrubber pressure drop, liquid flow rate, and pH; and operation and maintenance checks on the scrubbers

Not Applicable - Standard No. 1 (*Emissions from Fuel Burning Operations*)

The DFTO and emergency diesel generator do not meet the definition of fuel burning operations.

Applicable - Standard No. 3 (state only) (*Waste Combustion and Reduction*)

The DFTO used in cell manufacturing meets the definition of an industrial incinerator and is subject to this standard. The DFTO is subject to an opacity limit of 20% (Section I(1)) and a PM emission limit of 0.5 lb/MMBtu (Section I(2)). Silfab is exempt from waste analysis (special knowledge of the waste) (Section V(G)(1)), source testing requirements (Section VIII(A)), and operator training (Section IX(D)).

Applicable - Standard No. 4 (*Emissions from Process Industries*)

This facility is subject to the PM limits from Section VIII. See the Standard No. 4 Allowable Table below.

Standard No. 4 Allowable					
Process	Process Weight Rate (tons/hr)	PM Allowable (lb/hr)	Uncontrolled PM Emissions (lb/hr)	Controlled PM Emissions (lb/hr)	Monitoring
Cell Manufacturing	0.5	2.58	4.6	0.46	Monitoring required. Compliance will be demonstrated by: use of a venturi scrubber; monitoring venturi scrubber pressure drop and liquid flow rate; and operation and maintenance checks on the venturi scrubber

All emission sources facility-wide are subject to 20% opacity limits from Section IX.

Not Applicable - Standard No. 5 (*Volatile Organic Compounds*)

This facility is not an existing process since it was not in existence or under construction on July 1, 1979 or July 1, 1980.



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Not Applicable - Standard No. 5.2 (*Control of Oxides of Nitrogen (NO_x)*)

Per Section I(B)(1), the diesel engine is exempt from the requirements in this Standard since it is only used for emergency operation.

Per Section I(B)(3), the DFTO is exempt from the requirements in this Standard since the total uncontrolled potential to emit is less than 5 tons per year for NO_x.

Not Applicable - Standard No. 7 (*Prevention of Significant Deterioration*)

This facility is minor for all PSD pollutants.

Applicable - 61-62.6 (*Control of Fugitive Particulate Matter*)

This facility is subject to the state-wide fugitive emissions requirements of Section III.

40 CFR 60 and 61-62.60 (*New Source Performance Standards (NSPS)*)

Not Applicable - Subpart Kb (*Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984*)

This Subpart does not apply to the tanks since they do not store volatiles organic liquids.

Applicable - Subpart IIII (*Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*)

The 300 HP diesel-fired emergency generator will be constructed after July 11, 2005. It is subject to this Subpart and must comply with all applicable requirements.

40 CFR 61 and 61-62.61 (*National Emission Standards for Hazardous Air Pollutants (NESHAP)*)

Not Applicable - All Subparts

None of this facility's processes fall under the source categories listed under this Standard.

40 CFR 63 and 61-62.63 (*National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories*)

Applicable - Subpart ZZZZ (*National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*)

The 300 HP diesel-fired emergency generator is subject to this Subpart. It shall meet the requirements of Subpart ZZZZ by complying with 40 CFR Part 60, Subpart IIII.

Applicable - 61-62.68 (*Chemical Accident Prevention Provisions*)



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Hydrochloric acid and Silane will be used and stored in quantities above their respective threshold quantities. Hydrofluoric acid is regulated by 61-62.68 at concentrations $\geq 50\%$. This facility will store Hydrofluoric acid at a concentration of 49% and will not be subject to 61-62.68 for Hydrofluoric acid.

This facility is required to submit a Risk Management Plan (RMP) for Hydrochloric acid and Silane in accordance with this regulation.

Not Applicable - 40 CFR 64 (*Compliance Assurance Monitoring*)

This regulation applies to units at sources major for Title V. This source is taking synthetic minor limits to be minor for Title V.

AMBIENT AIR STANDARDS REVIEW

Not Applicable - Standard No. 2 (*Ambient Air Quality Standards*)

Criteria pollutants are below exemption rates.

Applicable - Standard No. 8 (state only) (*Toxic Air Pollutants*)

HCl and HF emissions are above their respective de minimis rates and were modeled for this Standard. Toluene emissions are below the de minimis rate and exempt from modeling for this Standard. See modeling report dated 6/27/23.

PERIODIC MONITORING

ID	Regulatory Requirement	Measured Parameter	Required Monitoring Frequency	Reporting Frequency	Monitoring Basis/ Justification
SCR1	S.C. Regulation 61-62.1, Section II(E)	Pressure Drop, liquid flow rate, pH	Daily	Semiannually	Compliance with limit maintained through use of control device
SCR2	S.C. Regulation 61-62.1, Section II(E)	Pressure Drop, liquid flow rate, pH	Daily	Semiannually	Compliance with limit maintained through use of control device
SCR3	S.C. Regulation 61-62.5, Standard No. 3 and No. 4	Pressure Drop, liquid flow rate	Daily	Semiannually	Compliance with limits maintained through use of control device

PUBLIC NOTICE



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This construction permit(s) will undergo a 30-day public notice period, in accordance with SC Regulation 61-62.1, Section II(N) and SC Regulation 61-62.1, Section II(E) to establish synthetic minor limits of <10.0 TPY for any single HAP and <25.0 for total HAP for Title V and 112(g) case-by-case MACT avoidance. The initial comment period was open from August 9, 2023 through September 7, 2023. During which time a public hearing was requested, and the comment period was extended from September 22, 2023 to November 3, 2023 and was placed on the BAQ website during that time period. A Public Meeting and Hearing were held on October 30, 2023. Comments were received during both comment periods.

The following updates were made following the public notice period:

- The Hazardous Air Pollutants (HAP) reporting frequency in Condition B.1 has increased from annually to semiannually.
- The reporting frequency of occurrences of operation outside of operational ranges in Condition B.4 has been increased from annually to semiannually.
- The source (or stack) test condition B.6 has been updated from requiring the initial source tests within 180 days after startup to within 45 days after achieving the maximum production rate or 180 days after startup, whichever comes first. The periodic source test frequency has increased from every five (5) years to every (2) years.
- The requirement for the documentation of operation and maintenance checks in Condition B.8 has been updated from maintaining the records on-site to submitting the records semiannually, in addition to maintaining such records on-site. The condition was also modified, removing the exemption that allowed the process to run during periods of scrubber malfunction or mechanical failure.
- Conditions were added to the permit for the direct fired thermal oxidizer and associated venturi scrubber. The statement of basis was updated accordingly.
- A correction was made to the statement of basis to correct the inequality symbol used in the S.C. Regulation 61-62.68 section.
- An update to the silane storage description was made in the statement of basis to properly identify the type of storage and total amount of that storage in pounds.

SUMMARY AND CONCLUSIONS

It has been determined that this source, if operated in accordance with the submitted application, will meet all applicable requirements and emission standards.