

DRAFT ENGINEERING EVALUATION

Plant #23966: Carbon, Inc.

1089 Mills Way

Redwood City, CA 94063

Application #28899: "New" Wipe Cleaning Operation and Composite Window Manufacturing Operation

I. BACKGROUND

Carbon, Inc. has submitted Application #28899 to obtain an Authority to Construct (AC) and/or Permit to Operate (PO) for the following operations:

S-1: Wipe Cleaning Operation
IPA: 380 gallons/year and Acetone: 375 gallons/year

S-2: Composite Window Manufacturing Operation
Custom Made, 1,746 gal/yr, 0.30 gal/hr, with
Electric Oven (Espec, PVH-332)

Abated by

A-1: Cold Trap, Labconco, CentriVap-105, 4 L

and

A-2: Cold Trap, Labconco, CentriVap-105, 4 L

Carbon, Inc. applies proprietary technology in a process that uses digital light projection, oxygen permeable optics, and programmable liquid resins to produce parts with excellent mechanical properties, resolution, and surface finish.

Carbon, Inc. utilizes acetone and isopropyl alcohol for wipe cleaning operations (not surface preparation). Carbon, Inc. manufactures composite windows using a proprietary process. The film mixture is heated in an electric oven during the process. The emissions from the oven are included in the total emissions from S-2. Approximately 85% of the perfluoro compound solutions are captured for re-use.

II. EMISSIONS CALCULATIONS

Wipe Cleaning Operation (S-1):

Hours of Operation = 16 hr/day, 5 day/wk, 52 wk/yr

The applicant requests the following wipe cleaning throughput:

<u>Solvent</u>	<u>(gal/yr)</u>
100% Isopropyl Alcohol	380
100% Acetone	375

Emissions from S-1:

IPA = 380 gal/yr x 6.55 lb VOC/gal = 2,489 lb/yr

Total POC emissions = 2,489 lb/yr or 1.245 ton/yr

Daily POC emissions = 2,489 lb/yr / 52 wk/yr / 5 day/wk = 9.573 lb/day

Hourly POC emissions = 2,489 lb/yr / 52 wk/yr / 5 day/wk / 16 hr/day = 0.598 lb/hr

Acetone = 375 gal/yr x 6.60 lb NPOC/gal = 2,475 lb/yr

Total NPOC emissions = 2,475 lb/yr or 1.238 ton/yr

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Daily NPOC emissions = 2,475 lb/yr / 52 wk/yr / 5 day/wk = 9.519 lb/day

Hourly NPOC emissions = 2,475 lb/yr / 52 wk/yr / 5 day/wk / 16 hr/day = 0.595 lb/hr

Composite Window Manufacturing Operation (S-2):

Hours of Operation = 16 hr/day, 5 day/wk, 52 wk/yr

Table 1 summarizes the composition of the chemicals used at S-2:

Table 1: Composition of Chemicals at S-2

Chemical Name	Constituents	Composition (Maximum Percentage by Weight)
Proprietary Chemical 1	Ethylbenzene	1%
Proprietary Chemical 2	No hazardous ingredients	N/A
Frekote Wolo Pint Can Mold Release	Naphtha (petroleum), light alkylate	100%
	Naphtha, hydrotreated heavy; (petroleum)	60%
	Silane Derivative	1%
	Proprietary Resin	1%
Proprietary Chemical 3	Perfluoro compounds	100%
Isopropyl Alcohol	2-Propanol	100%
Trichlorosilane	Trichlorosilane	100%
Acetone	Acetone	100%
AF Amorphous Fluoroplastic Resin AF2400	Poly (4,5-difluoro-2,2-bis(trifluoromethyl)-1,3-dioxole/tetrafluoroethylene)	100%
Dow Corning PR-1200 RTV Prime Coat Clear	Solvent naphtha (petroleum), light aliph.	94%
	Tetrakis(2-butoxyethyl) orthosilicate	6%
	Titanium tetrabutanolate	6%
Proprietary Chemical 4	Perfluoro compounds, C5-18	100%

Table 2 summarizes the POC and NPOC emissions from the chemicals used at S-2:

**Table 2: POC and NPOC Emissions from S-2
(Operating Schedule = 260 days/yr and 16 hrs/day)**

Chemical Name	Annual Usage (gal/yr)	Chemical Density (lb/gal)	POC Content (lb/gal)	NPOC Content (lb/gal)	Annual Emissions		POC Emissions			NPOC Emissions		
					Emissions (lbs)	Emissions (lbs - after process recovery) ¹	lbs/day	lbs/yr	TPY	lbs/day	lbs/yr	TPY
Proprietary Chemical 1	260.0	9.263	0.093	0.0	24.180	24.180	0.093	24.180	0.012	0.0	0.0	0.0
Proprietary Chemical 2	35.0	8.596	0.200	0.0	7.000	7.000	0.027	7.000	0.004	0.0	0.0	0.0
Frekote Wolo Pint Can Mold Release	5.0	6.050	6.050	0.0	30.250	30.250	0.116	30.250	0.015	0.0	0.0	0.0

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Chemical Name	Annual Usage (gal/yr)	Chemical Density (lb/gal)	POC Content (lb/gal)	NPOC Content (lb/gal)	Annual Emissions		POC Emissions			NPOC Emissions		
					Emissions (lbs)	Emissions (lbs - after process recovery) ¹	lbs/day	lbs/yr	TPY	lbs/day	lbs/yr	TPY
Proprietary Chemical 3	55.0	15.022	0.0	15.022	826.210	123.932	0.0	0.0	0.0	0.477	123.932	0.062
Isopropyl Alcohol	300	6.551	6.551	0.0	1,965.300	1,965.300	7.559	1,965.300	0.983	0.0	0.0	0.0
Trichlorosilane	3.0	11.20	11.20	0.0	33.600	33.600	0.129	33.600	0.017	0.0	0.0	0.0
Acetone	3.0	6.593	0.0	6.593	19.779	19.779	0.0	0.0	0.0	0.076	19.779	0.01
AF Amorphous Fluoroplastic Resin AF2400	30.0	14.855	14.855	0.0	445.650	445.650	1.714	445.650	0.223	0.0	0.0	0.0
Dow Corning PR-1200 RTV Prime Coat Clear	5.0	6.343	6.343	0.0	31.715	31.715	0.122	31.715	0.016	0.0	0.0	0.0
Proprietary Chemical 4	1,050.0	15.022	0.0	15.022	15,773.10	2,365.965	0.0	0.0	0.0	9.100	2,365.965	1.183
TOTAL	1,746.0				19,156.784	5,047.371	9.760	2,537.695	1.270	9.653	2,509.676	1.255

Notes:

¹Process recovery included for compounds where data available for the site. 85% recovery¹ during film development via cold traps.

Total Emissions from the Project:

POC emissions = 1.245 tpy (S-1) + 1.270 tpy (S-2) = 2.515 tpy

NPOC emissions = 1.238 ton/yr (S-1) + 1.255 tpy (S-2) = 2.493 tpy

Table 3 summarizes the hourly and annual Toxic Air Contaminant (TAC) emissions resulting from chemicals used at S-2:

Chemical name	TAC contained	Hourly TAC emissions (lbs/hr)	Annual TAC emissions (lbs/yr)
Proprietary Chemical 1	Ethylbenzene	5.82E-03	2.42E+01

¹ The 85% recovery factor was derived by site personnel at the facility performing a mass balance test of material weighed prior to the process, and recovered via the cold trap. A test was performed which indicated that 4667.81g out of a starting volume of 5488.81g of proprietary compounds was recovered thus the 85% recovery. The two cold traps in conjunction will be used to achieve the 85% recovery in total.

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Table 3: Summary of TAC emissions from chemicals used at S-2 (Operating Schedule = 260 days/yr and 16 hrs/day)			
Chemical name	TAC contained	Hourly TAC emissions (lbs/hr)	Annual TAC emissions (lbs/yr)
Isopropyl Alcohol	Isopropyl Alcohol	4.74E-01	1.97E+03

Table 4 compares the combined Toxic Air Contaminant (TAC) emissions associated with the use of solvents and chemicals at S-1 and S-2 to the District’s Toxic Trigger Levels:

**Table 4: Comparison of Combined Hourly and Annual TAC Emissions from S-1 and S-2 to Acute/Chronic TAC trigger levels
(Operating Schedule = 260 days/yr and 16 hrs/day)**

TAC	lbs/hr	lbs/yr	Acute District Toxic Trigger Level (lbs/hr)	Chronic District Toxic Trigger Level (lbs/yr)	Exceeds District’s Toxic Trigger Level? (Yes, No, NA)
Isopropyl alcohol (isopropanol) (CAS 67-63-0)	1.07E+00	4.45E+03	7.1E+00	2.7E+05	No
Ethyl benzene (CAS 100-41-4)	5.82E-03	2.42E+01	NA	3.3E+01	No

III. PLANT CUMULATIVE INCREASE

Carbon, Inc. (Plant No. 23966) is a new facility. Table 5 summarizes the cumulative increase in criteria pollutant emissions that will result at Plant No. 23966 from the operation of S-1 and S-2.

**Table 5:
Plant Cumulative Emissions Increase**

Pollutant	Existing Emissions, Post 4/5/91 (TPY)	New Increase with This Application (TPY)	Cumulative Emissions (TPY)
NO _x	0.0	0.0	0.0
POC	0.0	2.515	2.515
NPOC	0.0	2.493	2.493
CO	0.0	0.0	0.0
PM ₁₀	0.0	0.0	0.0
SO ₂	0.0	0.0	0.0

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IV. HEALTH RISK ASSESSMENT (HRA)

A HRA was not required with this application since none of the toxic trigger levels were exceeded.

V. BEST AVAILABLE CONTROL TECHNOLOGY

In accordance with Regulation 2-2-301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NO_x, CO, SO₂, or PM₁₀.

Per emissions summarized in the “Emissions Calculations” section of this document, BACT is not triggered for any pollutant since the maximum daily emission of each pollutant from each of S-1 and S-2 do not exceed 10 lb/day.

VI. OFFSETS

Offsets are not required since the facility's POC and NO_x emissions are each less than 10 ton/yr per Regulation 2-2-302.

VII. STATEMENT OF COMPLIANCE

S-1 (Wipe Cleaning Operation) is subject to the storage and disposal requirements of Regulation 8-4-312 and the recordkeeping requirements of Regulation 8-16-501 and Regulation 8-4-501. In addition, S-1 is subject to Regulation 8-4-302.1 (≤ 5 TPY/source of volatile organic compounds (VOC) emissions during any calendar year) and the evaporative loss minimization requirements of Regulation 8-4-312. The combined emissions of POC and NPOC from S-1 are ≤ 5 TPY (2.483 TPY).

This wipe cleaning operation (S-1) is not subject to Regulation 8-4-313 (Surface Preparation Standards) since this is a solvent cleaning operation. The solvents are used to remove excess resin/residue which deposits onto the surfaces of components and equipment at the facility. The purpose is more equipment maintenance rather than cleaning for a final product.

S-2 (Composite Window Manufacturing Operation) is subject to the emissions standards in Regulation 8-2-301 (shall not discharge into the atmosphere emissions of more than 15 lbs/day and with a concentration of more than 300 ppm total carbon). As shown in Table 2 the combined daily emission of POC and NPOC from S-2 is 19.413 lbs/day. In order to be cited/issued a Notice of Violation, both the above criteria must be met. In other words, though 19.413 lbs/day is greater than 15 lbs/day, the total carbon concentration should also be greater than 300 ppm for the operation of S-2 to be in violation of Regulation 8-2-301.

The project is exempt from the CEQA review of Regulation 2-1-310 per Regulation 2-1-311. The project is ministerial in nature and the engineering evaluation is done as per the standard procedures set forth in the Permit Handbook Chapters 6.3, Wipe Cleaning Operation and 11.9 Miscellaneous Organic Operations. Additionally, Carbon, Inc. has submitted CEQA Appendix H “Environmental Information Form” in accordance with Regulation 2-1-312.

This facility is located within 1,000 feet from the nearest school (listed below) and therefore is subject to public notification requirements of Regulation 2-1-412. A public notice was prepared and will be sent to the parents or guardians of children enrolled in any school within one-quarter mile of the source and to each address within a radius of 1,000 feet of the source.

Summit Preparatory Charter High School
890 Broadway
Redwood City, CA 94063

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S-2 does not utilize a glass melting furnace where there’s a refractory lined vessel which charges raw materials at high temperatures. Instead the operations at S-2 involve the mixing of a proprietary chemical mixture heated to a homogenous mixture and then poured out to a platter and cured. Based on the definition of “Raw Materials” in NESHAPS Subpart SSSSSS none of the materials used in Carbon Inc.’s operation would qualify as glass manufacturing raw materials. The operation located at Carbon, Inc.’s facility serves the sole purpose of generating Composite windows for its other manufactured products. Hence, Carbon, Inc. is not subject to the requirements of both the following Federal Rules: NSPS 40 CFR 60, Subpart CC “Standards of Performance for Glass Manufacturing Plants” and NESHAPS 40 CFR Part 63 Subpart SSSSSS “National Emissions Standards for Hazardous Air Pollutants for Glass Manufacturing Area Sources”.

PSD is not triggered.

VIII. CONDITIONS

S-1 will be subject to the following draft permit condition:

DRAFT COND# 1

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S-1: Wipe Cleaning Operation

1. The Owner/Operator of S-1 (Wipe Cleaning Operation) shall not exceed the following usage limits during any consecutive twelve-month period:

100% Isopropyl Alcohol	380.0 gallons
100% Acetone	375.0 gallons

(Basis: Cumulative Increase)
2. The Owner/Operator of S-1 may use materials other than the materials specified in Part 1, provided that the Owner/Operator can demonstrate that all of the following are satisfied:
 - a. Total Precursor Organic Compound (POC) emissions do not exceed 2,489.0 pounds in any consecutive twelve-month period (Basis: Cumulative Increase)
 - b. Total Non-Precursor Organic Compound (NPOC) emissions do not exceed 2,475.0 pounds in any consecutive twelve-month period (Basis: Cumulative Increase)
 - c. The use of these materials shall not increase toxic air contaminant emissions above any risk screening trigger level in Table 2-5-1 of Regulation 2-5 (Basis: Cumulative Increase; Toxics)
3. To determine compliance with the above conditions, the Owner/Operator of S-1 shall maintain the following records and provide all of the data necessary to evaluate compliance with the above conditions, including the following information:
 - a. Daily and monthly usage of solvent containing materials used for S-1 Wipe Cleaning Operation.

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- b. If a material other than those specified in Part 1 is used, POC, NPOC and toxic component contents of each material used; and mass emission calculations to demonstrate compliance with Part 2, on a daily and monthly basis.
- c. Daily and monthly usage and/or emission calculations shall be totaled for each consecutive 12-month period.
- d. Demonstration that any toxic air contaminants in new solvents in the cleanup materials in Part 2, do not exceed the acute and chronic trigger levels in Table 2-5-1 of Regulation 2-5 by calculating toxic air contaminant emissions on a lb/hour and lb/year basis, respectively.

All records shall be retained on site for a period of at least two years from the date of entry, and shall be made available to District personnel upon request. These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable District Regulations.

(Basis: Regulation 8-16-501.3)

S-2 will be subject to the following draft permit condition:

DRAFT COND# 2

Plant #23966, Appl. #28899

S-2: Composite Window Manufacturing Operation abated by A-1 and A-2 (Cold Traps)

- 1. The Owner/Operator of S-2 (Composite Window Manufacturing Operation) shall not exceed the following usage limits during any consecutive twelve-month period:

Proprietary Chemical 1	260.0 gallons
Proprietary Chemical 2	35.0 gallons
Frekote Wolo Pint Can Mold Release	5.0 gallons
Proprietary Chemical 3	55.0 gallons
100% Isopropyl Alcohol	300.0 gallons
100% Trichlorosilane	3.0 gallons
100% Acetone	3.0 gallons
AF Amorphous Fluoroplastic Resin AF2400	30.0 gallons
Dow Corning PR-1200 RTV Prime Coat Clear	5.0 gallons
Proprietary Chemical 4	1,050 gallons

(Basis: Cumulative Increase)

- 2. The owner/operator shall abate S-2's emissions by the properly installed, properly maintained, and properly operated A-1 and A-2 (Cold Traps) at all times S-2 operates.
[Basis: Cumulative increase]
- 3. The Owner/Operator of S-2 may use materials other than the materials specified in Part 1, provided that the Owner/Operator can demonstrate that all of the following are satisfied:

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- a. Total Precursor Organic Compound (POC) emissions do not exceed 2,537.7 pounds in any consecutive twelve-month period (Basis: Cumulative Increase)
 - b. Total Non-Precursor Organic Compound (NPOC) emissions do not exceed 2,509.7 pounds in any consecutive twelve-month period (Basis: Cumulative Increase)
 - c. The use of these materials shall not increase toxic air contaminant emissions above any risk screening trigger level in Table 2-5-1 of Regulation 2-5 (Basis: Cumulative Increase; Toxics)
4. To determine compliance with the above conditions, the Owner/Operator of S-2 shall maintain the following records and provide all of the data necessary to evaluate compliance with the above conditions, including the following information:
- a. Quantities of each type of chemical and solvent used at S-2 on a daily and monthly basis.
 - b. Density and POC, NPOC, and toxic component contents of each type of chemical and solvent used at S-2.
 - c. If a material other than those specified in Part 1 is used, POC, NPOC and toxic component contents of each material used; and mass emission calculations to demonstrate compliance with Part 3, on a daily and a monthly basis.
 - d. Daily and monthly usage and/or emission calculations shall be totaled for each consecutive 12-month period.
 - e. Demonstration that any toxic air contaminants in materials in Part 3, do not exceed the acute and chronic trigger levels in Table 2-5-1 of Regulation 2-5 by calculating toxic air contaminant emissions on a lb/hour and lb/year basis, respectively.

All records shall be retained on site for a period of at least two years from the date of entry, and shall be made available to District personnel upon request. These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable District Regulations.
(Basis: Regulation 1-441)

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IX. RECOMMENDATION

The District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct (AC) and/or a Permit to Operate (PO) for the equipment listed below. However, the proposed source will be located within 1,000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct (AC) and/or Permit to Operate (PO) for the following sources:

S-1: Wipe Cleaning Operation
IPA: 380 gallons/year and Acetone: 375 gallons/year

S-2: Composite Window Manufacturing Operation
Custom Made, 1,746 gal/yr, 0.30 gal/hr, with
Electric Oven (Espec, PVH-332)

Abated by

A-1: Cold Trap, Labconco, CentriVap-105, 4 L
and

A-2: Cold Trap, Labconco, CentriVap-105, 4 L

Krishnan Balakrishnan
Air Quality Engineer

November 14, 2017