pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

MEMO

TO James D. Rebarchak 7/31/23
Program Manager
Air Quality Bureau

FROM Dawnette DaCosta 7/25/2023
AQ Engineering Specialist
Air Quality Bureau

THRU James A. Beach, P.E. JAB 7/25/2023
Environmental Engineering Manager
Air Quaility Bureau

DATE **July, 24, 2023**

RE The Boeing Company
Title V Operating Permit No. 23-00009
Ridley Township, Delaware County

Introduction/Facility Description

On November 12, 2022, The Commonwealth of Pennsylvania published the final rule for Additional RACT Requirement for Major Sources of NOx and VOC for the 2015 ozone NAAQS (25 Pa. Code §§129.111 – 129.115) referred to as RACT III. RACT III applies to facilities that are major source of either NOx or VOC as defined by §121.1, that existed prior to August 3rd, 2018. For RACT III purposes a major NOx or VOC facility has the potential to emit greater than 100 tons NOx per year or greater than 50 tons per year of VOC respectively.

The RACT III regulation includes three compliance options: (1) Compliance with presumptive RACT requirements and/or emission limitations for applicable source categories; (2) Facility-wide or system-wide averaging for compliance with presumptive NO_x emission limitations; and (3) RACT requirements determined on a case-by-case basis for sources that either do not have an applicable presumptive requirement or emission limitation or cannot comply with the applicable presumptive RACT requirement.

As an alternative to case-by-case RACT III analysis, pursuant to 25 Pa. Code §129.114(i) (relating to alternative RACT proposal and petition for alternative compliance schedule) an applicant may demonstrate that the alternative RACT compliance requirements incorporated under § 129.99 (relating to alternative RACT proposal and petition for alternative compliance schedule) (RACT II) that are currently in force in the applicable operating permit continue to be RACT under RACT III.

The Boeing facility (SIC Code 3721 Manufacturing –Aircraft) fabricates, repairs, and tests military helicopters and their components. Emission producing activities include aerospace coating and surface preparation, composite manufacturing, production of heat, steam and back-up power. The facility is located at the intersection of Stewart Avenue and Industrial Highway in Ridley Township, Delaware County. The facility is categorized as a Title V facility because it is a major source of Volatile Organic Compound (VOC) and Nitrogen Oxides (NOx) emissions. The current Title V Operating Permit (TVOP) No. 23-00009 expires on March 02, 2026.

The procedures to demonstrate that RACT III equals RACT II are specified in § 129.114(i)(1)(i), 129.114(i)(1)(ii) and 129.114(i)(2). An applicant may submit an analysis, certified by the responsible official (RO), that the RACT II permit requirements remain RACT for RACT III pursuant to §§ 129.114(i)(1)(ii) and 129.114(i)(2). On December 19, 2022 Boeing submitted a Notification of Compliance with RACT III. The RACT III submittal was submitted in accordance with 25 Pa. Code §129.115(a). The submittal included: an alternative case-by-case determination for Source 251 pursuant to analysis in accordance with 25 Pa. Code §129.114(i) and was signed by Jefferey Webb, RO for the facility.

RACT III Analysis for NOx and VOC applicability:

The requirements for RACT III is applicable to Boeing because of the following parameters:

i) Operations at Boeing commenced before August 12th, 2018.

ii) Facility-wide potential to emit (PTE) greater than 100 tons of NOx per year and greater than 50 tons of VOC per year.

The facility has the potential to emit 109.45 tons of NOx per year and 2533.53 tons of VOC per year (*See Table 1 for a list of source and PTE*). Therefore, Boeing is a major VOC and NOx emitting facility as defined for RACT III pursuant to 25 Pa. Code §121.1 and is subject to the NOx and VOC requirements of RACT III.

Table 1 below provides a summary of the facility's potential to emit NOx a and VOC.

Source ID	Source Name	[1]NO_x (tpy)	[1]VOC (tpy)
41	Emergency Generator (3-10)	1.83	0.2
42	(4) Turbine Generators Formerly 040	17.76	0.04
50	NG Emergency Generators (18 Generators)	9.42	1.11
51	CI Emergency Generators & Diesel Fire Pump	6.04	0.6
53	Nebraska 1 Boiler		
54	Cleaver Brooks 4 Boiler	26.94	1.81
55	CB- 5 Boiler (Bldg 4-14)		
56	CB -6 Boiler		
57	CB- 7 Boiler	22.13	2.75
58	Nebraska 2 Boiler		
59	Nebraska 3 Boiler		
60	Sup-3 Boiler		
61	Natural Gas Boilers < 10 MMBtu/hr.	1.15	0.17
110	Paint Stripper (Facility Wide)		0.22
171	Touch & Repair Booth (BLDG 3-06)		
231	Misc Minor Paint Booths (3-25, 3-31)		2.88
201	Gasoline Tank (TK043A)		
202	Gasoline Tank (TK043B)		0.14
213	3-12 Degreaser		0.44
214	Vacuum Degreaser		0.01
216	Cleaning Solvent Emission		210
218	Misc. Cold Degreasers		4.5
228	Frekote Exhaust Booth # 1 (Bldg 3-07)		16
229	Frekote Exhaust Booth # 2 (Bldg 3-07)		0.83
251	Composite Manufacturing (Bldg 3-07)		8.5
301	Bldg 4-04 Detail Paint Booths (2)		6.73
302	Bldg 3-12 Spray Booths		3.6
303	Two (2) Spray Booths (Bldg 3-73)		861
304	Bldg 3-07 Spray Booths		331.2
305	Fugitive Specialty Coating Operations		753.4
307	Tooling Primers & Topcoats		306.6
308	Building 3-25 Spray Booth		1.3
309	Bldg 3-80 Bay 2 Spray Booth		17.2
300A	Bldg 3-80 Bay 3 Spray Booth		
300B	Bldg 3-80 Bay 4 Spray Booth		
311B	Bldg 3-57 V-22 Sections/Aircraft Paint		
311D	Bldg 3-57 V-22 Wash & Sand Booth (Mechanical depainting only)		
N/A	Miscellaneous	24.18	2.30
TOTAL		109.45	2533.53

[1] Potential emission information was collected from the following sources: Notification of Compliance with the Final-form of RACT III (December 19, 2022); Title V Operating Permit Application (June 2000); AP-42 and vendor emission factors for all combustion sources; Plan Approvals 23-0009J and 23-0009K; Request for Determinations approved by DEP.

Summary of RACT Requirement for Each Source

Except for Composite Manufacturing (Source ID 251), the sources at the facility are either exempt from the requirements of RACT III or meets the presumptive RACT requirements, pursuant to 25 Pa. Code Sections 129.111 and 129.112. Presumptive RACT Applicability was addressed with the minor operating permit modification issued March 27, 2023 and accompanying technical memo dated March 13, 2023.

Case by Case Analysis RACT III

Various aircraft parts manufactured at the Boeing facility are made of composite materials (Composite Manufacturing, Source ID 251) consisting of resin pre-impregnated sheets, tapes or fibers. The process begins by cutting the pre-impregnated resin sheets to the size and shape for the components to be manufactured. The parts are then made by layup of the composite material where the material is placed in layers on a "tool" or mold for a given part. Alternatively, several components are made by the three (3) fiber placement machines. Instead of using sheets, resin pre-impregnated strands are placed directly on the component and are layered to achieve the specified shape. Once layup is complete, a vacuum bag is sealed around the part and tool. The part is then sent for curing with the application of heat (maximum temperature is approximately 350°F) and pressure in either the autoclaves, ovens or presses.

Boeing's potential emission calculations for composite manufacturing are based on maximum projected throughput of each material and the maximum annual average VOC content (% by weight) of the material. *Table 2* below the types of materials used in composite manufacturing and potential VOC emission rates.

Table 2: Composite Manufacturing (Source 251) Potential Emissions[1]

Material Type	Maximum VOC Content (lb/gal)	Maximum Annual Average VOC (%)	VOC Emissions (tons/year)
Pre-impregnated material (Prepregs)	0.65	3.0	7.50
Tooling Fill & Fairing	3.50	20.0	0.25
Tooling Resins & Hardeners	1.0	10.0	0.50
Core Stabilizing & Tacking Resins	5.70	10.0	0.13
Engineering Foams	2.50	10.0	0.13
Total Potential Emissions			8.5

[1] As reported in the technical review memo for the *Title V Significant Operating Permit Modification and Alternative RACT Proposal* dated December 22, 2016.

Table 3: Composite Manufacturing (Source ID 251) Actual Emissions[2]

Year[3]	VOC (TPY)
2022	0.95
2021	1.11
2020	1.06
2019	1.04
2018	1.00

VOC RACT III

In accordance with 25 Pa. Code§ 129.114 (c) an alternate RACT proposal is required for sources with the potential to emit greater than 2.7 tons of VOC per year that are not subject to the presumptive RACT requirement. Composite Manufacturing (Source ID 251) is the only VOC source at the Boeing facility with a potential emission rate equal to or greater than 2.7 tons of VOC that is not subject to the presumptive RACT requirements of 25 Pa. Code Section 129.112. As such Source 251 is subject to case-by-case RACT.

A case-by-case determination for Source ID 251 pursuant to 129.96 -129.100 (RACT II) was approved by the department in October 2016. Per the facility there has been no changes to the affected source since the RACT II submittal and determination.

Additionally, Boeing and the Department evaluated and determined that there is no new add-on VOC control technology or technique available for the affected source since the RACT II was promogulated. Therefore, the RACT III evaluation for the affected source which were evaluated through the case-by-case analysis as submitted for RACT II pursuant to §129.114(i)(1).

In its RACT III compliance notification Boeing indicated that they were unable to identify any new add-on control technologies used specifically with composite manufacturing or similar process. DEP reviewed entries in the RACT/Best Available Control Technology (BACT)/Lowest Achievable Emissions Rate (LAER) Clearinghouse (RBLC) for possible new add-on control technology for composite manufacturing process. No new add-on control technology was identified.

Alternative RACT II proposal for Source 251 was conducted pursuant to 25 Pa. Code §129.99. A case-by-case RACT proposal involves conducting a step-by-step top down analysis pursuant to 25 Pa. Code §§129.92 (a) and (b). This involved the use of the RACT/BACT/LAER Clearing house (RBLC), as well as the use of additional information available on the US EPA's website and information garnered from control device vendors. A summary of the RACT II evaluation is provided below.

Previously Identified Controls

Boeing identified the following control technologies commonly used for abatement of VOC emissions, as a part of the RACT II case-by-case evaluation: Thermal Oxidation; Catalytic Oxidation; Carbon Adsorption; and Process Design and Material Selection. Under the RACT II

[2] As reported in the Air Management Information Systems (AIMS)

review, the following three (3) control technology options were determined to be *technically infeasible* due to the following reasons:

- *Thermal Oxidization – low concentration and heat content, variable air flow from autoclave to oxidizer, and operational variability.*
- *Catalytic Oxidation – low concentration and heat content, variable air flow from autoclave to oxidizer, operational variability, fouling of catalytic bed.*
- *Carbon Adsorption – Temperature requirement, possible fire hazards and non-uniformity of emissions.*

Process Design and Material Selection along with Good Operating Practices was determined to be technically feasible in controlling VOC from the affected source.

Economic Feasibility

For the RACT II evaluation Boeing conducted economic feasibility studies on all the add-on control technologies that were identified. For RACT III the economic feasibility was conducted in accordance with §129.114(i)(1)(i) based on their RACT II cost effectiveness. *Table 4* below provides a summary of the cost effectiveness analysis conduct for RACT II.

Table 4: RACT II Cost Analysis

Basis	Control Equipment	VOC Removal Efficiency [a] (%)	Purchased Equipment [b] Cost ($)	Total Installed Capital Cost [c] ($)	Direct Annual Cost [d] ($/yr)	Total Annualized Cost [e] ($/yr)	Cost Effectiveness of VOC Reduction ($/ton)
EPA Manual	Regenerative Thermal Oxidizer (95% Heat Recovery)	98%	537,300	1,020,700	20,900	164,400	59,900
EPA Manual	Recuperative Thermal Oxidizer (70% Heat Recovery)	98%	344,100	653,700	63,500	157,700	57,500
EPA Manual	Fixed Bed Catalytic Oxidizer (70% Heat Recovery)	95%	369,900	702,800	40,800	141,300	53,100
EPA Manual	Fluid Bed Catalytic Oxidizer (70% Heat Recovery)	95%	431,400	819,600	40,700	157,000	59,000
EPA Manual	Carbon Adsorber	95%	170,300	296,000	13,300	72,700	27,300

a Overall system removal efficiency for entire air pollution control system.
b Purchased equipment cost updated to current cost, but excluding instrumentation, sales tax and freight.
c Corrected to uniform and comprehensive cost basis using EPA cost factors.
d Includes operating and maintenance labor and materials, replacement parts and installation, and utilities (water, chemicals, waste/wastewater disposal, and electricity). For labor and utilities costs, assumes 900 APC operating hours per year, controlling entire projected annual emissions per unit.
e Includes capital recovery, overhead, administration, taxes and insurance.

Since the cost effectiveness of VOC reduced is above $12,000 per ton VOC removed for all control technologies identified in Table 4 above, Boeing determined that add-on control technologies available for VOC removal is still not economically feasible.

RACT III equals RACT II

RACT II was determined as previously established VOC limits and along with monitoring, recordkeeping, reporting and good operating practice. Table 5 list of the RACT requirements for Source 251.

Table 5: RACT II = RACT III

Source ID: 251	Composite Manufacturing (Bldg 3-07)
Description of RACT:	Case-by-Case, VOC (RACT II)
	Emissions Restriction Maximum VOC Content for Material used Prepregs: lb VOC/gal 0.65; g VOC/l 78 Tooling Fill & Fairing: 3.50; 420 Tooling Resins & Hardeners: 1.0; 120 Core Stabilizing & Tacking Resins: 5.70; 684 Engineering Foams: 2.50; 300 • An overall limitation of 8.5 tons/year on a 12-month rolling basis The following monitoring, recordkeeping and reporting requirements pursuant to 25 Pa. 129.92 (7). Monitoring and recordkeeping of the amount of composite material used monthly, the VOC content as applied, calculations of VOC emissions monthly and on a 12-month rolling basis. Safety data sheets (SDS) and product specification data will be used to determine the VOC content of each composite material used. Usage will be tracked using the Freezer Inventory Management System (FIMS). VOC content of each material will be stored in Boeing's databases and will be updated upon

	product changes through Boeing's management of change procedures. • Any deviations will be reported with the semi-annual deviation reports pursuant to Section, Condition #018 of the Operating Permit. • Work Practices – good operating and maintenance practices, including (a) good housekeeping procedures (b) employee training detailing good work practices (c) periodic inspection of production activities
Proposed VOC RACT III Conditions	No changes to RACT II 8.5 tons of VOC per year, on a rolling 12-month rolling basis. Continued use of materials compliant with VOC content limit established for RACT II. The following monitoring, recordkeeping and reporting requirements pursuant to 25 Pa. §129.115 Monitoring: Boeing will continue to monitor the amount of composite material used monthly, the VOC content as applied, and calculate VOC emissions monthly and on a 12-month rolling basis. Recordkeeping: Boeing will continue to keep the following records: the amount of composite material used monthly, the VOC content as applied, and the calculations of VOC emissions on a monthly and 12-month rolling basis. Work Practice Requirement: Boeing will continue to operate and maintain all the equipment and materials associated with Composite Manufacturing in a manner consistent with good operating and maintenance (O&M) practices. The practices shall include, but not be limited to the following: (a) good housekeeping procedures for storage, use, and disposal of composite material (b) employee training detailing good work practices (c) periodic inspection of production activities

Boeing has proposed that VOC RACT for Source ID 251 will be satisfied by the emission limitations, monitoring, recordkeeping, and work practice requirements previously approved under RACT II.

NOx RACT III
In accordance with 25 Pa. Code§ 129.114 (b) an alternate RACT proposal is required for sources with the potential to emit greater than 5.0 tons of NOx per year that are not subject to the presumptive RACT requirement. Composite Manufacturing (Source ID 251) is not a source of NOx emission, therefore it is not subject to the RACT requirements for NOx.

Since there were no economically or technically feasible new add-on control technology identified for RACT III, and there have been no changes to the affected source, DEP has agrees that compliance with the standards established for RACT II, as identified above in Table 5 above satisfies RACT III for source 251. Therefore, compliance with the RACT II requirements assures compliance with the requirements for RACT III. The RACT II requirements continue to be the RACT for Boeing, and there will be no change to the permit conditions.

Compliance History
The Department of Environmental Protection (DEP) conducted Full Compliance Evaluation inspection at this facility on June 16, 2022. No violations were observed.

Public Hearing
No public hearings were held.

Regulatory Analysis
The facility is subject to the following federal regulations: NESHAP Subparts GG, T, and DDDDD; and NSPS Subparts Dc, JJJJ, IIII, ZZZZ.

cc: TVOP 23-00009

Delaware County District

The Boeing Company
P.O. Box 16858
Philadelphia, PA 19142-0858

James Rebarchak
Regional Air Program Manager
PA Dept. of Environmental Protection
Southeast Regional Office
2 East Main Street
Norristown, PA 19401-4915

December 19, 2022

Re: Notification of Compliance with the Final-form of RACT III

Dear Mr. Rebarchak,

Enclosed, please find an outline of how Boeing intends to comply with the RACT III requirements.

Boeing will demonstrate that the previous case-by-case determination made under §§ 129.96-129.100 (RACT II) for the existing composite manufacturing operations (Source ID 251) remains RACT for the 2015 8-hour ozone standard. The original case-by-case determination was submitted and approved for this source on October 2016 and no changes to the operation have been made since the submittal.

In addition, you will find a notification form discussing the RACT III rule compliance strategy for the remaining emission units at the Philadelphia Facility, as well as stack test waivers for Source ID 053 and Source ID 042.

Finally, please find supporting documentation for facility-wide paint stripping operations (Title V Source ID 110). Boeing has documented that the potential emissions from facility-wide paint stripping operations are below RACT III applicability thresholds.

Thank you and please reach out to Mohamed Mellaouch at (484) 724-1237 or at Mohamed.Mellaouch@boeing.com if you have any questions.

Sincerely,

Jeffery D. Webb

Jeffery Webb
Senior Director of Vertical Lift

Enclosures:

- Alternative Case-by-Case Determination for Source ID: 251 - § 129.114(i)
- RACT III Notification Form
- Paint Stripping Operation Supporting Documentation
- Stack test waiver for emissions source 042-Turbine Generators
- Stack test waiver for emissions source 053-Nebraska 1 Boiler

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

CHAPTER 129. STANDARDS FOR SOURCES ADDITIONAL RACT REQUIREMENTS FOR MAJOR SOURCES OF NOx AND VOCs FOR THE 2015 OZONE NAAQS

Written notification, 25 Pa. Code §§129.111 and 129.115(a)

25 Pa. Code Sections 129.111 and129.115(a) require that the owner and operator of an air contamination source subject to the final-form RACT III regulations submit a notification describing how you intend to comply with the final-form RACT III requirements, and other information spelled out in subsection 129.115(a). The owner or operator may use this template to notify DEP. Notification must be submitted in writing or electronically to the appropriate Regional Manager located at the appropriate DEP regional office. In addition to the notification required by §§ 129.111 and 129.115(a), you also need to submit an applicable analysis or RACT determination as per § 129.114(a) or (i).

Is the facility major for NOx?	**Yes** ☒ **No** ☐
Is the facility major for VOC?	**Yes** ☒ **No** ☐

FACILITY INFORMATION					
Facility Name	THE BOEING CO				
Permit Number	**23-00009**	**PF ID if known**			
Address Line1	100 Stewart Avenue				
Address Line2					
City	**Ridley Park**	**State**	PA	**Zip**	19078
Municipality	Ridley Township		**County**	Delaware County	

OWNER INFORMATION					
Owner					
Address Line1					
Address Line2					
City		**State**		**Zip**	
Email		Phone			

CONTACT INFORMATION					
Permit Contact Name	Mohamed Mellaouch				
Permit Contact Title	Environmental Engineer				
Address Line	PO BOX 16858, MC P01-29				
City	Philadelphia	**State**	PA	**Zip**	19142
Email	Mohamed.mellaouch@boeing.com			Phone	484-724-1237

Complete Table 1, including all air contamination sources that commenced operation on or before August 3rd, 2018. Air contamination sources determined to be exempt from permitting requirements also must be included. You may find this information in section A and H of your operating permit.

Table 1 - Source Information

Source ID	Source Name	Make	Model	Physical location of a source (i.e, building#, plant#, etc.)	Was this source subject to RACT II?
53	Nebraska 1 Boiler	Cleaver Brooks	NB-300D-50	(BLDG 3-05)	Presumptive RACT for NOx and VOC per 129.97(g)(1)
54	CLEAVER BROOKS 4 BOILER	Cleaver Brooks	CBI-200-000-125	(BLDG 3-05)	Presumptive RACT for NOx and VOC per 129.97(b)(2)
56	CB - 6 BOILER	Cleaver Brooks	CBL-1200	(BLDG 4-14)	Presumptive RACT for NOx and VOC per 129.97(b)(2)
57	CB - 7 BOILER	Cleaver Brooks	CBL-1200	(BLDG 4-14)	Presumptive RACT for NOx and VOC per 129.97(b)(2)
58	NEBRASKA 2 BOILER	Cleaver Brooks	SP-NB-100D-40	(BLDG 3-05)	No (new source)
59	NEBRASKA 3 BOILER	Cleaver Brooks	SP-NB-100D-40	(BLDG 3-05)	No (New source)
60	SUP-3 BOILER	Superior	MS7-X-5000-S200-WBCFGA2	(BLDG 4-14)	No (New Source)
61	NATURAL GAS BOILERS <10 MMBTU/HR	Bryan Boilers (identical)	RV350-S-150-FDG-LX	(BLDG 3-29)	No (New source)
41	EMERGENCY GENERATOR	Caterpillar	G3412 TA130HCR	(BLDG 3-10)	Presumptive RACT for NO_X and VOC per 129.97(c)(8)
42	(4) TURBINE GENERATORS FORMERLY 040	US Turbine (UST) 4000/Allison	501-KBSS	(BLDG 3-52)	Presumptive RACT for NO_X and VOC per 129.97(g)(2)(iii)
50	NG EMERGENCY GENERATORS (18 GENERATORS)	Varies, see Attachment 1	Varies, see Attachment 1	Various Locations	Presumptive RACT for NO_X and VOC per 129.97(c)(8)
51	CI EMERGENCY GENERATORS & DIESEL FIRE PUMP	Varies, see Attachment 1	Varies, see Attachment 1	(BLDG 3-52,3-19)	Presumptive RACT for NO_X and VOC per 129.97(c)(8)
110	PAINT STRIPPER	NA	NA	(FACILITY WIDE)	Exempt - per 129.96(c)
171	TOUCH & REPAIR BOOTH	NA	NA	(BLDG 3-06)	Exempt - Subject to 129.73

Source ID	Source Name	Make	Model	Physical location of a source (i.e, building#, plant#, etc.)	Was this source subject to RACT II?
201	GASOLINE TANK (TK043A)	NA	NA	East of BLDG 3-57	Exempt - Subject to 129.61
202	GASOLINE TANK (TK043B)	NA	NA	East of BLDG 3-57	Exempt - Subject to 129.61
213	3-12 DEGREASER 11-088308	Build-All Corporation	AL-564449-350	BLDG 312	Exempt - Subject to 129.63
214	BLDG 3-12 VACUUM DEGREASER (BCC#30991)	Serec Corporation System	Custom	BLDG 312	No (New source)
216	CLEANING SOLVENT EMISSION	NA	NA	Facility-wide	Exempt - Subject to 129.73(7)
218	MISC COLD DEGREASERS	NA	NA	Multiple locations	Exempt - Subject to 129.63
228	FREKOTE EXHAUST BOOTH # 1	NA	NA	(BLDG 3-07)	Exempt - Subject to 129.73
229	FREKOTE EXHAUST BOOTH #2	NA	NA	(BLDG 3-07)	Exempt - Subject to 129.73
231	MISC MINOR PAINT BOOTHS	NA	NA	(BLDG 3-25, BLDG 3- 31)	Presumptive RACT for VOC per 129.97(c)(2)
251	COMPOSITE MANUFACTURING	NA	NA	(BLDG 3-07)	Case-by-Case RACT for VOC per 129.99
300A	BLDG 3-80 BAY 3 SPRAY BOOTH	NA	NA	BLDG 3-80	Exempt - Subject to 129.73
300B	BLDG 3-80 BAY 4 SPRAY BOOTH	NA	NA	BLDG 3-80	Exempt - Subject to 129.73
301	BLDG 4-04 DETAIL PAINT BOOTHS (2)	NA	NA	BLDG 4-04	Exempt - Subject to 129.73
302	BLDG 3-12 SPRAY BOOTHS	NA	NA	BLDG 3-12	Exempt - Subject to 129.73
303	TWO (2) SPRAY BOOTHS	NA	NA	BLDG 3-73	Exempt - Subject to 129.73
304	BLDG 3-07 SPRAY BOOTHS	NA	NA	BLDG 3-07	Exempt - Subject to 129.73
305	FUGITIVE SPECIALTY COATING OPERATIONS	NA	NA	Paint Booths	Exempt - Subject to 129.73
307	TOOLING PRIMERS & TOPCOATS	NA	NA	Fugitive	Exempt - Subject to 129.73
309	BLDG 3-80 BAY 2 SPRAY BOOTH	NA	NA	BLDG 3-80	Exempt - Subject to 129.73

Source ID	Source Name	Make	Model	Physical location of a source (i.e, building#, plant#, etc.)	Was this source subject to RACT II?
311B	BLDG 3-57 V-22 SECTIONS/ AIRCRAFT PAINT BOOTH	NA	NA	BLDG 3-57	No (New source)
311D	BLDG 3-57 V-22 WASH & SAND BOOTH	NA	NA	BLDG 3-57	No (New source)

Complete Table 2 or 3 if the facility is a major NOx or VOC emitting facility. For the column with the title "How do you intend to comply", compliance options are:

- Presumptive RACT requirement under §129.112 (**PRES**),
- Facility-wide averaging (**FAC**) §129.113,
- System-wide averaging (**SYS**) §129.113, or
- Case by case determination §129.114 (**CbC**).

Please provide the applicable subsection if source will comply with the presumptive requirement under §129.112.

Table 2 – Method of RACT III Compliance, NOx & VOCs

Source ID	Source Name	NOx PTE TPY	VOC PTE TPY	Exempt from RACT III (yes or no)	How do you intend to comply? (PRES, CbC, FAC or SYS)	Specific citation of rule if presumptive option is chosen
53	Nebraska 1 Boiler	26.94 (combined)	1.81 (combined)	No	Presumptive RACT for NOx and VOC	129.112 (g)(1)
54	CLEAVER BROOKS 4 BOILER			No	Presumptive RACT for NOx and VOC	129.112 (b)(1)(ii)
56	CB - 6 BOILER	13.21	1.77	No	Presumptive RACT for NOx and VOC	129.112 (b)(1)(ii)
57	CB - 7 BOILER			No	Presumptive RACT for NOx and VOC	129.112 (b)(1)(ii)
58	NEBRASKA 2 BOILER			No	Presumptive RACT for NOx and VOC	129.112 (b)(1)(ii)
59	NEBRASKA 3 BOILER			No	Presumptive RACT for NOx and VOC	129.112 (b)(1)(ii)
60	SUP-3 BOILER			Yes (started operation on 1/8/2019	---	---
61	NATURAL GAS BOILERS <10 MMBTU/HR	1.15	0.17	No	Presumptive RACT for NOx and VOC	129.112(c)(4)
41	EMERGENCY GENERATOR (3-10)	1.83	0.20	No	Presumptive RACT for NOx and VOC	129.112 (c)(10)
42	(4) TURBINE GENERATORS FORMERLY 040	17.76	0.04	No	Presumptive RACT for NOx and VOC	129.112(g)(2)(iv)
50	NG EMERGENCY GENERATORS (18 GENERATORS)	9.42 (total)	1.11	No	Presumptive RACT for NOx and VOC	129.112 (c)(10)
51	CI EMERGENCY GENERATORS & DIESEL FIRE PUMP	6.04	0.02	No	Presumptive RACT for NOx and VOC	129.112 (c)(10)
110	PAINT STRIPPER (FACILITY WIDE)	---	0.22	Yes	---	per 129.111(c)
171	TOUCH & REPAIR BOOTH (BLDG 3-06)	---	0.44	Yes	---	Subject to 129.73 per 129.111(a)

Source ID	Source Name	NOx PTE TPY	VOC PTE TPY	Exempt from RACT III (yes or no)	How do you intend to comply? (PRES, CbC, FAC or SYS)	Specific citation of rule if presumptive option is chosen
201	GASOLINE TANK (TK043A)	---	0.14	Yes	---	Subject to 129.61 per 129.111(a)
202	GASOLINE TANK (TK043B)	---		Yes	---	Subject to 129.61 per 129.111(a)
213	3-12 DEGREASER	--	0.44	Yes	---	Subject to 129.63 per 129.111(a)
214	VACUUM DEGREASER	---	0.01	Yes	---	Subject to 129.63 per 129.111(a). In addition to the exemption, the permit requires that this source emit less than 2.7 tpy of VOC
216	CLEANING SOLVENT EMISSION	---	181	Yes	---	Subject to 129.73(7) per 129.111(a)
218	MISC COLD DEGREASERS	---	4.5	Yes	---	Subject to 129.73(7) per 129.111(a)
228	FREKOTE EXHAUST BOOTH # 1 (BLDG 3-07)	---	16	Yes	---	Subject to 129.73 per 129.111(a)
229	FREKOTE EXHAUST BOOTH #2 (BLDG 3-07)	---	0.83	Yes	---	Subject to 129.73 per 129.111(a)
231	MISC MINOR PAINT BOOTHS (3-25, 3-31)	---	2.7	Yes	---	129.112(c)(2)
251	COMPOSITE MANUFACTURING (BLDG 3-07)	---	8.50	No	Alternative RACT established for RACT II assures compliance with RACT III	Alternative RACT established for RACT II assures compliance with RACT 3 per 129.114(i)
309	BLDG 3-80 BAY 2 SPRAY BOOTH	---	17.2	Yes	---	Subject to 129.73 per 129.111(a)
300A	BLDG 3-80 BAY 3 SPRAY BOOTH	---		Yes	---	Subject to 129.73 per 129.111(a)
300B	BLDG 3-80 BAY 4 SPRAY BOOTH	---		Yes	---	Subject to 129.73 per 129.111(a)
301	BLDG 4-04 DETAIL PAINT BOOTHS (2)	---	6.73	Yes	---	Subject to 129.73 per 129.111(a)

Source ID	Source Name	NOx PTE TPY	VOC PTE TPY	Exempt from RACT III (yes or no)	How do you intend to comply? (PRES, CbC, FAC or SYS)	Specific citation of rule if presumptive option is chosen
311B	"BLDG 3-57 V-22 SECTIONS/ AIRCRAFT PAINT	---		Yes	---	Subject to 129.73 per 129.111(a)
302	BLDG 3-12 SPRAY BOOTHS	---	3.6	Yes	---	Subject to 129.73 per 129.111(a)
303	TWO (2) SPRAY BOOTHS (BLDG 3-73)	---	861	Yes	---	Subject to 129.73 per 129.111(a)
304	BLDG 3-07 SPRAY BOOTHS	---	331	Yes	---	Subject to 129.73 per 129.111(a)
305	FUGITIVE SPECIALTY COATING OPERATIONS	---	753.4	Yes	---	Subject to 129.73 per 129.111(a)
307	TOOLING PRIMERS & TOPCOATS	---	306.60	Yes	---	Subject to 129.73 per 129.111(a)
308	BUILDING 3-25 SPRAY BOOTH	---	1.3	Yes	---	Subject to 129.73 per 129.111(a)
311D	BLDG 3-57 V-22 WASH & SAND BOOTH (Mechanical depainting only)	---	---	Yes	---	129.111(c)

Attachment-1

Bldg	System/Model	Engine Make	Generator Make
3-01	Onan/45.0EM-15R	Ford	Onan
3-02	Onan/30.0EK-15R31	Ford	Onan
303	Cummins/GTA19	Cummins	Cummins
3-04	Onan/30.0SK-15R/21505A	Chrysler	Onan
3-12	Cummins/GTA855-B	Cummins	Cummins
3-25	Caterpillar/ GTA855-B	Caterpillar	Caterpillar
3-28	Cummins/NPower GFPA	Power Solutions	Newage
3-30	Katolight/N125FRH4	Hercules	Katolight
3-31	Cummins/125GGKB	Cummins	Cummins
3-31B	Kohler/70RZ272	Ford	Kohler
3-32	Onan/12.5JC-18R	Onan	Onan
3-35	Newage/250GFBC	Cummins	Stamford Newage
3-61	Newage/250GFBC	Cummins	Stamford Newage
3-61A	Cummins 100GGHH	Cummins	Newage
3-95	Cummins 60GGHE	Ford	Cummins
3-96	Katolight N70FRG4	Great Lakes/GM/	Katolight
3-20	Cummins/NPower GFEB	Cummins	Cummins
3-57	Cummins/C500N6	Cummins	Cummins

Attachment-2

Bldg	System/Model	Engine Make	Generator Make
352	Clarke/JU6H-UFADX8	John Deere	-
3-52	Katolight/D400FRX4	Detroit Diesel	Katolight
3-19	Wistar/503320	John Deere	Power Tech
3-28B	Cummins/QSL9-G7	Cummins	Cummins

Alternative Case-by-Case RACT determination Under § 129.114(i)

Prepared by: Boeing – Ridley Park

December 23, 2022

The composite manufacturing operations in Building 3-07 consist of multiple operations. The process begins by cutting the pre-impregnated resin sheets to the size and shape for the components to be manufactured. The parts are then made by layup of the composite material where the material is placed in layers on a "tool" or mold for a given part. Once layup is complete, a vacuum bag is sealed around the part and tool. The part is then sent for curing with the application of heat (maximum temperature is approximately 350°F) and pressure in either the autoclaves, ovens or presses.

A block flow diagram for the composite manufacturing process is provided in Appendix A. Specifically, the following operations are included under Source ID 251.

- Cutting operations – multiple stations – vent within the building
- Layup operations – multiple stations – vent within the building
- Fiber placement machines (3) – vent within the building
- Autoclaves (3) – vent out of three types of exhaust points
- Blade presses (6) – vent within the building
- Ovens (2) - vent out of exhaust stacks
- Holmes press (1) – vents within the building

Composite Manufacturing Potential and Actual Emissions

Material Type	**Max VOC Content (lb/gal)**	**Maximum Throughput (lb/yr)**	**Maximum Annual Average VOC (%)**	**VOC Emissions (tpy)**
Resins & Hardeners	1.0	10,000	10.0%	0.50
Tooling Fill/Fairing	3.5	2,500	20.0%	0.25
Engineering Foam	2.5	2,500	10.0%	0.13
Core Stabilizer	5.7	2,500	10.0%	0.13
Prepreg	0.65	500,000	3.0%	7.50
Total Potential Emissions				8.5
2020 AIMS – Actual Emissions				**1.06**
2021 AIMS – Actual Emissions				**1.11**

Composite manufacturing is not covered by 40 CFR 63 Subpart GG (Aerospace NESHAP). In February 2015, EPA proposed updates to the Aerospace NESHAP to address the residual risk and technology review (RTR). These updates were finalized on December 7, 2015. During the RTR review of the Aerospace NESHAP, EPA evaluated whether to regulate composite processing as a source category under the NESHAP. After review, EPA concluded that composite processing did not present unacceptable risks and thus was not eligible for regulation under the rule.

Boeing's research on the composite manufacturing process has not be able to identify any instances of an add-on control device being utilized. Boeing currently uses process design and material selection which minimize the emissions of VOCs from composite manufacturing operations. As a result, it is Boeing's position there are no demonstrated add-on control devices available for this source. This position is supported by the fact that EPA did not identify any available control technologies for this source category in its recent RTR review of the Aerospace NESHAP.

As discussed in the original RACT, cutting, layup and fiber placement operations are expected to have negligible fugitive VOC emissions. A greater potential for VOC emissions generation occurs during the curing process in the autoclaves, ovens, or presses. However, the presses, which vent within the building, produce no adverse odors or worker discomfort. Thus, for the purposes of this RACT Analysis, Boeing has assumed that the most feasible emission sources from the composite manufacturing process to install controls on are the autoclaves.

Summary of Composite Manufacturing Single Autoclave Air Pollution Control Costs

Basis	Control Equipment	VOC Removal Efficiency a (%)	Purchased Equipment Cost b ($)	Total Installed Capital c Cost ($)	Direct Annual Cost d ($/yr)	Total Annualized Cost e ($/yr)	Cost Effectiveness of VOC Reduction ($/ton)
EPA Manual	Regenerative Thermal Oxidizer (95% Heat Recovery)	98%	537,300	1,020,700	20,900	164,400	59,900
EPA Manual	Recuperative Thermal Oxidizer (70% Heat Recovery)	98%	344,100	653,700	63,500	157,700	57,500
EPA Manual	Fixed Bed Catalytic Oxidizer (70% Heat Recovery)	95%	369,900	702,800	40,800	141,300	53,100
EPA Manual	Fluid Bed Catalytic Oxidizer (70% Heat Recovery)	95%	431,400	819,600	40,700	157,000	59,000
EPA Manual	Carbon Adsorber	95%	170,300	296,000	13,300	72,700	27,300

a Overall system removal efficiency for entire air pollution control system.

b Purchased equipment cost updated to current cost, but excluding instrumentation, sales tax and freight.

c Corrected to uniform and comprehensive cost basis using EPA cost factors.

d Includes operating and maintenance labor and materials, replacement parts and installation, and utilities (water, chemicals, waste/wastewater disposal, and electricity). For labor and utilities costs, assumes 900 APC operating hours per year, controlling entire projected annual emissions per unit.

e Includes capital recovery, overhead, administration, taxes and insurance.

Based on the top-down analysis provided above, all add-on VOC control options were determined to be technically or economically infeasible and not "reasonably available" for installation as RACT on the composite

manufacturing process. This position is supported by the fact that EPA did not identify any available control technologies for this source category in its recent RTR review of the Aerospace NESHAP.

The volatile content of the prepregs and other composite materials used at the Philadelphia Facility are very low and are set by military specification. The appropriate emissions "control" for these materials is the inherent product design such that the potential volatile materials react to form the composite product. Through the original RACT and Title V permitting processes, PADEP has already identified emission limitations, monitoring, recordkeeping, and work practice requirements to minimize emissions from this source. Thus, Boeing proposes to use the current operation limits and practices in the facility's Title V permit to demonstrate compliance with RACT III. Section 5 provides proposed RACT III compliance requirements for the source.

The proposed RACT and related monitoring, testing, recordkeeping and reporting are summarized in the table below. These proposed conditions will continue to ensure that emissions are minimized from composite manufacturing operations. Because Boeing is not proposing to change any limits in the Philadelphia Facility's current Title V permit, the facility will continue to be in compliance with all applicable requirements as of the RACT III Rule compliance date of December 31, 2022.

Case-by-Case RACT Summary

Emission Source ID(s):	*251*
Source Description	*Composite Manufacturing*
Description of RACT:	*VOC emissions from composite manufacturing, excluding the adhesives, sealants, and specialty coatings, are limited to 8.5 tpy on a 12-month rolling basis. VOC content, as applied, of the composite processing materials may not exceed the following limits:* • *Prepregs* — *0.65 lbs VOC/gal...78 g VOC/l* • *Tooling Fill & Fairing* — *3.50 lbs VOC/gal...420 g VOC/l* • *Tooling Resin & Hardeners* — *1.0 lbs VOC/gal. 120 g VOC/l* • *Core Stabilizing & Tacking Resin* — *5.70 lbs VOC/gal... 684 g VOC/l* • *Engineering Foams* — *2.50 lbs VOC/gal..300 g VOC/l* *Current operation of source per the requirements of the facility's Title V permit.*
Proposed Monitoring: *Boeing will continue to monitor the amount of composite material used monthly, the VOC content as applied, and calculate VOC emissions monthly and on a 12-month rolling basis.* ***Proposed Testing:*** *N/A* ***Proposed Recordkeeping:*** *Boeing will continue to keep the following records: the amount of composite material used monthly, the VOC content as applied, and the calculations of*	

VOC emissions on a monthly and 12-month rolling basis.

Proposed Reporting: *N/A*

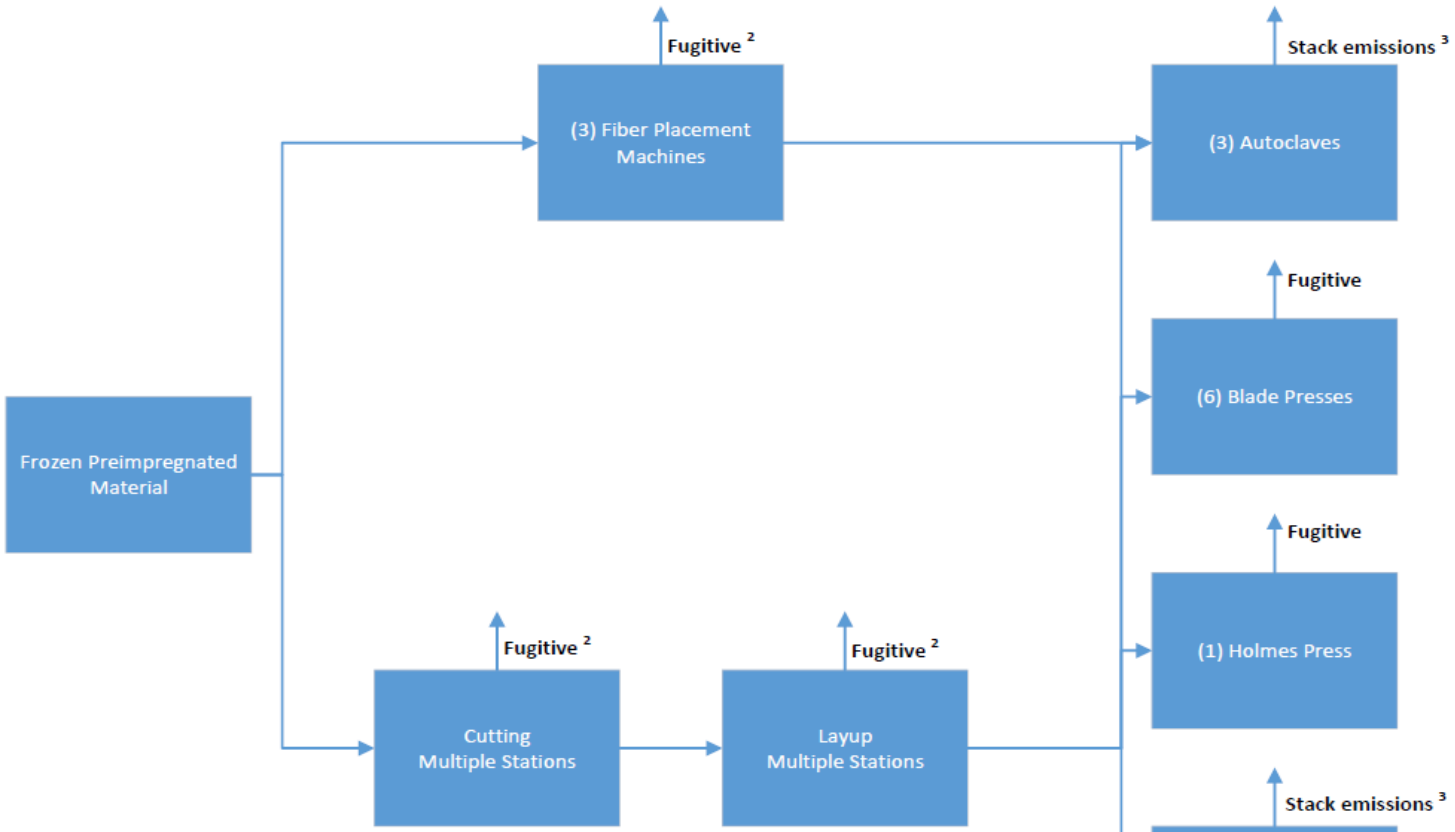
Proposed Work Practice Requirements: *Boeing will continue to operate and maintain all the equipment and materials associated with Composite Manufacturing in a manner consistent with good operating and maintenance (O&M) practices. The practices shall include, but not be limited to the following:*

(a) *good housekeeping procedures for storage, use, and disposal of composite material*

(b) *employee training detailing good work practices*

(c) *periodic inspection of production activities*

APPENDIX A: COMPOSITE MANUFACTURING BLOCK FLOW DIAGRAM (SOURCE ID 251)



1. Handwipe cleaning and specialty coatings are used in composite manufacturing, but emissions are permitted and reported under Source IDs 216 and 305

2. Operations prior to curing (unheated). Emissions are assumed to be neglible.

3. All potential emission sources vent within the building (i.e., fugitive emissions) except for the autoclaves (which each have three types of emissions points) and the ovens.

Paint Stripping Operation Supporting Documentation Exemption (PTE<1 TPY)

Prepared by: Boeing-Ridley Park

December 23, 2022

Paint stripping operations are permitted under Source ID 110 in the Philadelphia Facility's Title V permit. These operations are subject to the depainting requirements in 40 CFR 63 Subpart GG (Aerospace NESHAP) which are included in the facility's Title V permit. Per PADEP's request, Boeing has formally documented the potential VOC emissions for facility-wide paint stripping operations (Source ID 110) as part of this RACT Proposal.

There are two categories of paint stripping operations at the Boeing-Ridley Park. The facility operates a 1,000- gallon (approximately) paint stripping tank where parts to be depainted are processed. The facility also conducts spot stripping of aircraft parts throughout the facility using paint stripper in 5-gallon pails. The paint stripping solvents are primarily made of methylene chloride, which is a hazardous air pollutant (HAP) but is not a VOC. However, some of the paint stripping solvents used at the facility also contain phenol, which is a VOC. Boeing reports actual VOC and methylene chloride emissions from paint stripping activities in annual AIMS reports for the facility. Boeing reported 0.01 tpy VOC emissions from Source ID 110 in 2021 and 0.05 tpy VOC in 2020. The facility reported 0.19 tpy of methylene chloride in 2020 and 0.21 tpy of methylene chloride in 2021 from Source ID 110. Thus, actual VOC emissions from this source are very low.

Nevertheless, Boeing has documented potential emissions from this source. The paint stripping tank is filled by 55-gallon drums of solvent. A full tank contains two (2) drums of methylene chloride and twelve (12) drums of methylene chloride/phenol mixture. Each drum of methylene chloride/phenol mixture contains a maximum of 110 lbs of VOC. Conservatively assuming that the solvent in the tank was replaced completely once per year (12 drums) and four (4) additional drums of methylene chloride/phenol mixture were added to the tank, potential VOC emissions from the tank were determined to be 0.88 tpy. This is an extremely conservative assumption which does not account for disposal as waste of the replaced solvent and layering by product which naturally occurs in the tank. Detailed emission calculations for this source are provided below.

Paint Stripping Tank

Components	VOC (lb/drum)	Maximum Number of Drums per Tank [3]	Maximum Number of Replacement Drums per Year	Maximum Potential VOC Emissions (tons/yr)
Methylene Chloride [1]	0	2	4	0
Methylene Chloride/Phenol Mix [2]	110	12	4	0.88

1. Per 40 CFR 51.100(s), methylene chloride is not a VOC, but is regulated as a HAP.
2. Phenol portion of the methylene chloride/phenol mix is 110 lb/drum.
3. When the contents of the tank are replaced, 2 drums of methylene chloride are added and 12 drums of methylene chloride/phenol mix
4. Occasionally, the tank is refilled with additional replacement drums.
5. Maximum potential VOC emissions assumes all VOC in the tank and replacement drums volatilizes.

This is an extremely conservative assumption which does not account for disposal as waste and layering which naturally occurs in the tank.

Spot Paint Stripping

Product	VOC Content (lb/gal) [1]	Maximum Usage per year (gal/yr)	Maximum Potential VOC Emissions (tons/yr)
Cee-Bee R-256	1.49	150	0.11

1. Per SDS for Cee-Bee R-256 VOC content is 1.49 lb/gal.

Total Paint Stripping PTE

Operations	Maximum Potential VOC Emissions (tons/yr)
Paint Stripping Tank	0.88
Spot Paint Stripping	0.11
Total Paint Stripping Operations	0.99