COMMONWEALTH OF PENNSYLVANIA **MEMO**
Department of Environmental Protection
Southwest Regional Office

TO: Air Quality File TV-04-00033

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DATE: October 30, 2023

SUBJECT: RACT II equals RACT III Review Memo for Sources Subject to §129.114(i)(1)(i)
BVPV Styrenics LLC
Beaver Valley Plant
Potter Township, Beaver County
APS 927112 AUTH 1278515 PF 245153

I. Background:

On December 29, 2022, BVPV Styrenics LLC (BVPV) submitted a Reasonably Available Control Technology III (RACT III) application to the Department of Environmental Protection (Department) for their facility located in Potter Township, Beaver County. BVPV manufacturers thermoplastic resins, expandable polystyrene (EPS) resins, and ARCEL® advance foam resin. Operation of the equipment at BVPV results in the emission of various air contaminants. As a result of the potential levels of volatile organic compounds (VOC) and hazardous air pollutants (HAP) emitted, the facility is a major stationary source as defined in Title I, Part D of the Clean Air Act Amendments. As such, the facility is subject to the Title V permitting requirements adopted at 25 Pa. Code, Chapter 127, Subchapter G. The current Title V Operating Permit (TVOP) TV-04-00033 expires on April 2, 2025.

BVPV is a Title V facility, as defined by 25 Pa Code §121.1, because it has the potential to emit Volatile Organic Compounds (VOC) in excess of the major VOC emitting facility threshold of 50 tons per year (tpy). The current facility-wide potential to emit VOC emissions is 336 tpy. The facility is not classified as a major Nitrogen Oxides (NO_x) emitting facility since the facility-wide potential to emit NO_x emissions is less than 100 tpy. The facility is also subject to the Additional RACT Requirements for Major Sources of NO_x and VOC for the 2015 Ozone NAAQS (RACT III) promulgated on August 9, 2022.

No modifications or changes were made to these sources after October 24, 2016. The US EPA approved the RACT II SIP requirements for this facility in 87 FR 3442 under 52.2064(g)(19) on January 24, 2022, and effective on February 23, 2022. As noted, on December 29, 2022, BVPV submitted a RACT III application to the Department specifying that their RACT III proposal is the same as their RACT II proposal.

II. RACT III:

As part of the Reasonably Available Control Technology (RACT) regulations codified under 25 Pa. Code §129.111—§129.115 (relating to additional RACT requirements for major sources of NO_x and VOCs for the 2015 ozone NAAQS) (RACT III), the Pennsylvania Department of Environmental Protection (Department) has established a method under §129.114(i) (relating to alternative RACT proposal and petition for alternative compliance schedule) for an applicant to demonstrate that the alternative RACT compliance requirements incorporated under §129.99 (relating to alternative RACT proposal and petition for alternative compliance schedule) (RACT II) for a source that commenced operation on or before October 24, 2016, and which remain in force in the applicable operating permit continue to be RACT under RACT III as long as no modifications or changes were made to the source after October 24, 2016. The date of October 24, 2016, is the date specified in §129.99(i)(1) by which written RACT proposals to address the 1997 and 2008 8-hour ozone National Ambient Air Quality Standards (NAAQS) were due to the Department or the appropriate approved local air pollution control agency from the owner or operator of an air contamination source located at a major NO_x emitting facility or a major VOC emitting facility subject to §129.96(a) or (b) (relating to applicability).

The procedures to demonstrate that RACT II is RACT III are specified in §129.114(i)(1)(i), §129.114(i)(1)(ii) and §129.114(i)(2), that is, subsection (i), paragraphs (1) and (2). An applicant may submit an analysis, certified by the responsible official, that the RACT II permit requirements remain RACT for RACT III by following the procedures established under subsection (i), paragraphs (1) and (2).

Paragraph (1) establishes cost effectiveness thresholds of \$7,500 per ton of NO_x emissions reduced and \$12,000 per ton of VOC emissions reduced as ‘‘screening level values’’ to determine the amount of analysis and due diligence that the applicant shall perform if there is no new pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis. Paragraph (1) has two subparagraphs.

Subparagraph (i) under paragraph (1) specifies that the applicant that evaluates and determines that there is no new pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis and that each technically feasible air cleaning device, air pollution control technology or technique evaluated for the alternative RACT requirement or RACT emission limitation approved by the Department (or appropriate approved local air pollution control agency) under §129.99(e) had a cost effectiveness equal to or greater than \$7,500 per ton of NO_x emissions reduced or \$12,000 per ton of VOC emissions reduced shall include the following information in the analysis:

- A statement that explains how the owner or operator determined that there is no new pollutant specific air cleaning device, air pollution control technology or technique available.
- A list of the technically feasible air cleaning devices, air pollution control technologies or techniques previously evaluated under RACT II.
- A summary of the economic feasibility analysis performed for each technically feasible air cleaning device, air pollution control technology or technique in the previous bullet and the cost effectiveness of each technically feasible air cleaning device, air pollution control technology or technique as submitted previously under RACT II.
- A statement that an evaluation of each economic feasibility analysis summarized in the previous bullet demonstrates that the cost effectiveness remains equal to or greater than \$7,500 per ton of NO_x emissions reduced or \$12,000 per ton of VOC emissions reduced.

Subparagraph (ii) under paragraph (1) specifies that the applicant that evaluates and determines that there is no new pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis and that each technically feasible air cleaning device, air pollution control technology or technique evaluated for the alternative RACT requirement or RACT emission limitation approved by the Department (or appropriate approved local air pollution control agency) under §129.99(e) had a cost effectiveness less than $7,500 per ton of NO_x emissions reduced or $12,000 per ton of VOC emissions reduced shall include the following information in the analysis:

- A statement that explains how the owner or operator determined that there is no new pollutant specific air cleaning device, air pollution control technology or technique available.
- A list of the technically feasible air cleaning devices, air pollution control technologies or techniques previously evaluated under RACT II.
- A summary of the economic feasibility analysis performed for each technically feasible air cleaning device, air pollution control technology or technique in the previous bullet and the cost effectiveness of each technically feasible air cleaning device, air pollution control technology or technique as submitted previously under RACT II.
- A statement that an evaluation of each economic feasibility analysis summarized in the previous bullet demonstrates that the cost effectiveness remains less than $7,500 per ton of NO_x emissions reduced or $12,000 per ton of VOC emissions reduced.
- A new economic feasibility analysis for each technically feasible air cleaning device, air pollution control technology or technique.

Paragraph (2) establishes the procedures that the applicant evaluates and determines that there is a new or upgraded pollutant specific air cleaning device, air pollution control technology or technique available at the time of submittal of the analysis shall follow.

- Perform a technical feasibility analysis and an economic feasibility analysis in accordance with §129.92(b) (relating to RACT proposal requirements).
- Submit that analysis to the Department (or appropriate approved local air pollution control agency) for review and approval.

The applicant shall also provide additional information requested by the Department (or appropriate approved local air pollution control agency) that may be necessary for the evaluation of the analysis submitted under §129.114(i).

RACT II = RACT III Air Contamination Sources

The Beaver Valley Plant operates hundreds of air contamination sources. BVPV has identified 61 of those sources that will comply with RACT III requirements under the "RACT II = RACT III" provisions of 25 Pa. Code §129.114(i)(1)(i). The following 61 air contamination sources, as listed in Table A-4 of the RACT III application, are subject to 25 Pa. Code §129.114(i)(1)(i):

Table A-4
RACT III Rule Applicability Summary for Sources Subject to 25 Pa. Code §129.114(i)(1)(i)
BVPV Styrenics LLC – Monaca, PA

TV Major Source Group	Source Name/Description	Source No.	RACT III Equipment ID	VOC RACT III Category
101	D3 EPS #3 Acid Wash Kettle	K-3469	101-10	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS #3 Hold Tank	T-3472	101-01	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS #4 Acid Wash Kettle	K-3467	101-09	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS Airveying Pneumatic Cyclone/Filter Receiver 1260	M-3684	101-06	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS Airveying Pneumatic Cyclone/Filter Receiver 1265	M-3672	101-05	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS Dryer #4	H-3480	101-02	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS No. 4 Bird Centrifuge	M-3477	101-11	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS Packaging Bin 1208	T-3562	101-08	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS Packaging Bin 1218	T-3574	101-07	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS Packaging Net Weigh Hopper	T-3353	101-03	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D3 EPS Sump	N/A	101-12	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS "A" Packaging Line Net Weigher Hopper	T-4381	101-28	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS "B" Packaging Line Net Weigher Hopper	T-4315	101-29	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #1 Acid Wash Kettle	K-4275	101-30	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #1 Bird Centrifuge	M-4290	101-36	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #1 Fluidized Dryer	H-4301	101-38	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #1 Gala Dryer	H-4300	101-39	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #2 Acid Wash Kettle	K-4276	101-31	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #2 Dryer Check Bin #1420	T-4242	101-17	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #2 Dryer Check Bin #1421	T-4243	101-18	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #2 Fluidized Dryer	H-4225	101-40	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.

Table A-4 (continued)
RACT III Rule Applicability Summary for Sources Subject to 25 Pa. Code §129.114(i)(1)(i)
BVPV Styrenics LLC – Monaca, PA

TV Major Source Group	Source Name/Description	Source No.	RACT III Equipment ID	VOC RACT III Category
101	D4 EPS #2 Gala Dryer	H-4223	101-39	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #3 Acid Wash Kettle	K-4201	101-32	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS #4 Acid Wash Kettle	K-4202	101-33	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS 4B10 and 4B11 System Backup	M-4005/M-4251	101-27	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS Line 1 Packaging Bin 1412	T-4340	101-19	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS Line 2 Packaging Bin 1422	T-4281	101-22	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS Pneumatic Transfer Cyclone for 4B10 Airvey System	M-4005	101-25	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS Pneumatic Transfer Cyclone for 4B11 Airvey System	M-4251	101-26	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS Reactor #401	R-4001	101-34	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	D4 EPS Reactor #402	R-4002	101-35	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	Pentane Emission Reduction System - PERS (DFTO)	G-4626	C0112	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	Pentane Emission Reduction system - PERS (RTO/RCO Oxidizer)	G-4625	C0111	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
101	Pentane railcar loading and unloading (normal)- D3 & D4 EPS	N/A	101-46	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
201	Arcel 330 Airvey Cyclone	M-2334	201-09	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
201	Arcel 380 Airvey System Pneumatic Cyclone	M-2021	201-10	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
201	Arcel Carter Day Dryer	H-2022	201-11	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
201	Arcel Carter Day Dryer Maxi Surge Bin	T-2015	201-12	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
201	Arcel Reactor 1 (199)	R-2199	201-07	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
201	Arcel Reactor 2 (201)	R-2201	201-04	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
201	Catalytic Oxidizer (CATOX)	Catalytic Oxidizer (CATOX)	201-22	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
201	D2 Railcar Unloading	N/A	201-24	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.

Table A-4 (continued)
RACT III Rule Applicability Summary for Sources Subject to 25 Pa. Code §129.114(i)(1)(i)
BVPV Styrenics LLC – Monaca, PA

TV Major Source Group	Source Name/Description	Source No.	RACT III Equipment ID	VOC RACT III Category
201	Package Bin Exhaust	T-2781	201-08	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
201	Waste Water Sump	Waste Water Sump	201-23	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 301	R-3301	301-01	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 302	R-3302	301-02	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 303	R-3303	301-03	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 304	R-3304	301-04	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 305	R-3305	301-05	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 306	R-3306	301-06	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 307 (Swing)	R-3307	301-07	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 308 (Swing)	R-3308	301-08	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 309 (Swing)	R-3309	301-09	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 310 (Swing)	R-3310	301-10	Case-by-Case RACT analysis required because the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 311	R-3311	301-11	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Dylene Reactor 312	R-3312	301-12	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Styrene Emissions Reduction (SERS) Control Stack	N/A	S315	Case-by-Case RACT analysis required because potential VOC emissions are > 2.7 tpy and the unit is not subject to 25 Pa. Code §129.112.
301	Wastewater	N/A	301-16	Case-by-Case RACT analysis required for Alternative RACT Proposal.
801	Aeration Lagoon	Aeration lagoon	801-02	Case-by-Case RACT analysis required for Alternative RACT Proposal.
801	North Basin	North basin	801-01	Case-by-Case RACT analysis required for Alternative RACT Proposal.
801	Quiescent Lagoon	Quiescent lagoon	801-03	Case-by-Case RACT analysis required for Alternative RACT Proposal.

Due to the size and complexity of the facility, it is important to note that the RACT Equipment ID described in the RACT applications and tables is a number system implemented solely for the purposes of RACT and do not have any relationship to the regulatory requirements or permits. The Title V Operating Permit identifies larger emission source series that aggregate emission sources under areas (i.e., Source IDs 101, 201, 301, 601, 701, and 801) since the Department's AIMs permit system and grouping tool were not effective for such a large and complex facility.

As shown in Table A-4, BVPV has identified 61 sources that require alternative RACT determinations and is proposing alternative RACT for VOC emissions because they do not fall into a presumptive RACT category under 25 Pa. Code §129.112. In accordance with 25 Pa. Code §129.114(i), an alternative RACT proposal, as required under 25 Pa. Code §129.114(d), is not necessary if the source in question was in operation prior to October 24, 2016, has not been modified or changed since October 24, 2016, and does not fall into one of the presumptive source categories subject to 25 Pa. Code §§129.112(c)(11) or (i)-(k). The 61 sources at the facility that require alternative RACT determinations meet the stated criteria and therefore, BVPV can maintain compliance with the alternative RACT requirements and/or emissions limitations previously established as case-by-case RACT II requirements under 25 Pa. Code §129.99(e).

The RACT II determination/requirements can be found at the following link: [EPA Approved Pennsylvania Source-Specific Requirements | US EPA](https://www.epa.gov/sips-pa/epa-approved-pennsylvania-source-specific-requirements) (https://www.epa.gov/sips-pa/epa-approved-pennsylvania-source-specific-requirements).

As shown below in Table 1, the listed emission sources are equipped with control devices that reduce emissions even further than what would be considered RACT for those sources. For these sources, the RACT II determination was operation of the air contamination sources in conjunction with existing control devices and good air pollution control practices.

A case-by-case RACT analysis involves an assessment of the applicable control technologies capable of reducing emissions of a pollutant and are conducted using a "top-down" approach that considers technical feasibility and economic, environmental, and energy impacts. A case-by-case RACT analysis consists of five steps:

1.) Identification of available control technologies;
2.) Elimination of technically infeasible options;
3.) Ranking of the remaining control technologies by control effectiveness;
4.) Evaluation of the economic, environmental, and energy impacts of technically feasible control technologies; and
5.) Identification of RACT.

A top down analysis is not required for any sources which are complying via RACT II is RACT III (129.114(i)(1)(i)). However, for completeness and clarity, the RACT II top-down analysis for uncontrolled air contamination sources at the facility is presented below in Table 2 to illustrate that the cost effectiveness of the evaluated technologies resulted in a cost greater than $12,000 per ton of VOC emissions removed.

Table 1: Source Specific Summary of RACT II Case by Case Analysis – Controlled Emission Sources

TVOP Source ID No.	Process Emission Source Description	RACT II
Source ID 101 Controlled Emission Units	D3 EPS and D4 EPS Process Equipment	Capture and control of VOC emissions by existing (PERS) Control Devices C111 Thermal Oxidizer (RCO/RTO) G4625 and C112- Backup Direct Fired Thermal Oxidizer (DFTO).
Source ID 201 Controlled Emission Units	D2 Processed Equipment	Capture and control of VOC emissions by existing Control Devices C230 D2 Catalytic Oxidizer (CATOX).
Source ID 301 Controlled Emission Units	D3 Dylene Process Equipment	Capture and control of VOC emissions by existing Control Devices C315 -SERS 12 Unit Reflux Condenser System.

Table 2: Source Specific Summary of RACT II Case by Case Analysis – Uncontrolled Emission Sources

TVOP Source ID No.	Process Emission Source Description	5 Step Top Down Analysis Conducted	Step 1 Identify Available Control Technologies	Step 2 Technical Feasibility	Step 3 Rank Controls	Step 4 Economic Feasibility ($/ton of VOC removed)	Step 5 Identify RACT
Source ID 101 Uncontrolled Emissions Units	These sources are identified in Table A-4 above.	Yes					
101-46	D3 Railcar Unloading	Yes	RTO with 95-99% control efficiency	Yes	1	$22,430	Above RACT benchmark of $12,000.
			Good Operating Practices; Variable control efficiency	Yes	2	$0	Good Operating Practice is RACT.
101-05 101-06 101-07 101-08 101-17 101-18 101-19 101-22	D3 EPS Airveying Pneumatic Cyclone/Filter Receiver 1265 D3 EPS Airveying Pneumatic Cyclone/Filter Receiver 1260 D3 EPS Packaging Bin 1218 D3 EPS Packaging Bin 1208 D4 EPS #1 Dryer Check Bin #1420 D4 EPS #1 Dryer Check Bin #1421 D4 EPS Line 1 Packaging Bin 1412 D4 EPS Line Packaging Bin 1422	Yes	Good Air Pollution Control Practices with variable control efficiency	Yes	3	$0	
			Operational Changes with 50% control efficiency	Yes	2	$0	Operating two of the four D4 EPS Dryer Check Bins at any one time in accordance with good air pollution control practices reduces VOC by 25.8 tpy.
			• Oxidation with 95% control efficiency with new RTO. • Oxidation with 95% control with existing PERS RTO.	Yes	1 1	$13,358 $13,704	Above RACT benchmark of $12,000. Above RACT benchmark of $12,000.
			Adsorption System with Oxidation	No	Infeasible	N/A	N/A
			Condensation	No	Infeasible	N/A	N/A
			Wet Scrubber	No	Infeasible	N/A	N/A
			Biofiltration	No	Infeasible	N/A	N/A

Table 2: Source Specific Summary of RACT II Case by Case Analysis – Uncontrolled Emission Sources (continued)

TVOP Source ID No.	Process Emission Source Description	5 Step Top Down Analysis Conducted	Step 1 Identify Available Control Technologies	Step 2 Technical Feasibility	Step 3 Rank Controls	Step 4 Economic Feasibility ($/ton of VOC removed)	Step 5 Identify RACT
Source ID 201 Uncontrolled Emission Units	These sources are identified in Table 4-6 of the application and below.	Yes					
201-24	D2 Railcar Unloading	Yes	RTO with 95-99% control efficiency	Yes	1	$41,383	Above RACT benchmark of $12,000.
			Good Operating Practices; Variable control efficiency	Yes	2	$0	Good Operating Practice is RACT.
201-11 201-12	Arcel Carter Day Dryer Arcel Carter Day Dryer Maxi Surge Bin	Yes	Good Operating Practices; Variable control efficiency	Yes	2	$0	Good Operating Practice is RACT.
			RTO with 95-99% control efficiency	Yes	1	$20,014	Above RACT benchmark of $12,000.
			Adsorption System with RTO	No	Infeasible	N/A	N/A
			Condensation	No	Infeasible	N/A	N/A
			Wet Scrubber	No	Infeasible	N/A	N/A
			Biofiltration	No	Infeasible	N/A	N/A
Water Treatment and Collection Sources							
101-12 201-23 301-16 801-01 801-02 801-03	D3 EPS Sump Wastewater Sump Wastewater North Basin Aeration Lagoon Quiescent Lagoon	Yes	Collection and Control with an Add-on Control Device	No	Infeasible	N/A	Decentralized locations of the wastewater sources eliminate add on as a feasible technology.
			Good Operating Practices	Yes	N/A	N/A	Good air pollution control practices for VOC emissions associated with wastewater collection and treatment sources.

The emission sources listed in Table 2 are uncontrolled and were evaluated for RACT II using the Five-Step Top Down Analysis. This analysis is summarized in Table 2 and will be briefly discussed here. For a more in-depth discussion of the analysis, please refer to BVPV's, formerly NOVA Chemicals, Inc. (NOVA), *Alternative RACT and Compliance Proposal*, October 2016.

Railcar Unloading

There are two railcar unloading operations at the facility: D3 Railcar Unloading and D2 Railcar Unloading. These operations are currently uncontrolled and located in geographically isolated areas of the facility such that they must be evaluated individually for the possibility of installing a capture and control system. NOVA evaluated the potential of installing a regenerative thermal oxidizer (RTO) which is well suited for controlling exhaust streams with low VOC concentrations (as low as 100 ppmv) and high exhaust volumes. RTO's are capable of achieving VOC removal efficiencies between 95% and 99%.

NOVA determined that installation of two separate RTO's for controlling VOCs from the railcar unloading operations is technically feasible. This option was evaluated economically using guidance from the US EPA's OAPQS Control Cost Manual and other regulatory approved costing methodologies. The estimated average cost of controlling VOC emissions from D3 Railcar Unloading and D2 Railcar Unloading is $22,430 per ton of VOC removed and $41,383 per ton of VOC removed, respectively. Based on the cost of installing and operating each RTO being well above the established RACT benchmark of $12,000 per ton of VOC removed, installation of RTO's for the railcar unloading operations is deemed economically infeasible. As a result, NOVA proposed the use of good operating and air pollution control practices to minimize VOC emissions such as proper employee training and standard operating procedures, periodic inspections and evaluation of procedures, monitoring, and recordkeeping as RACT for these sources. The Department approved this plan for these sources under §129.99(e).

Source ID 101 Uncontrolled Emission Sources

As shown in Table A-4, multiple sources under Source ID 101 – D3 EPS and D4 EPS Process Equipment have VOC emissions greater than 2.7 tpy and are currently uncontrolled. NOVA's evaluation of EPS facilities under RACT II from review of the RBLC and California Air Resource Board (CARB) Statewide Best Available Control Technology (BACT) Clearinghouse found an RTO as the only control option in use for an EPS facility within the last ten years. NOVA identified the following additional VOC control options for evaluation in addition to RTO's and good air pollution control practices:

- Operational Changes
- Oxidation
- Adsorption System with Oxidation
- Condensation
- Wet Scrubber
- Biofiltration

Technically Infeasible Control Options

After evaluation, NOVA determined that the final four control options in the above list were found to be technically infeasible. An adsorption system was eliminated from consideration due to the types of VOCs generated in the Source 101 operations. Pentane and styrene not only would foul the adsorption system but would also result in the fouled adsorbent posing a fire hazard since both chemicals are easily combustible.

Condensation systems typically operate effectively when the VOC concentration is greater than 100 ppmv with gas flow rates less than 2,000 standard cubic feet per minute to remove at least 80% of contaminants. To effectively capture VOC associated with Source ID 101 Uncontrolled Emission Units, the entire air volume of the uncontrolled insulation manufacturing areas would need to be isolated and directed to a condenser. NOVA does use condensation technology to reduce VOC emissions associated with the SERS, however, the SERS is used to control VOCs from emission units with a relatively small collective flowrate and high VOC concentration in the exhaust gas. The Source ID 101 emission units would have a high collective flowrate and a low VOC concentration, greatly reducing the efficiency of a condensation system in this application.

Wet scrubbers are technically feasible for controlling certain types of VOC exhaust streams with high concentrations. In general terms, a wet scrubber (i.e., absorber) can be technically feasible for controlling certain volatile organic compound (VOC) species resulting from processes. Absorption is a physical or chemical phenomenon. Physical absorption is a non-reactive process where the VOC molecules are dissolved in the scrubbing media. However, as an emissions control technique, wet scrubbing is much more commonly employed for controlling inorganic gases than for VOC[1]. In chemical absorption, a reaction occurs when the molecules are absorbed by the scrubbing media. Chemical absorption is most commonly used to control acid gas emissions (e.g., HCl, SO_2)[2]. Caustic solution (NaOH) is the most common scrubbing liquid used for acid-gas control, though sodium carbonate (Na_2CO_3) and calcium hydroxide ($Ca[OH]_2$) can be used[3]. VOC wet scrubbers are typically associated with VOC species that are very soluble and exhibit low Henry's law constants[4]. Examples of VOC that may be amenable to control by aqueous wet scrubbers include methanol, ethanol, phenol, acetic acid, and ethylene oxide[5].

There are inherent issues associated with the use of wet scrubbers as air pollution control devices for the control of VOC emissions:

- VOC absorption is typically associated with product recovery where separation of high concentration VOC streams is required.
- The use of absorption as a primary VOC control technique is limited by several factors including the availability of a suitable solvent and the availability of equilibrium data for the specific organic/solvent mix used.
- Treatment and/or disposal of the recovered scrubbing media is required[6].

The use of a wet scrubber to control VOC emissions associated with the uncontrolled Source ID 101 uncontrolled sources is <u>not</u> technically feasible for the following reasons:

- The sources under consideration are ventilation sources associated with less frequent material handling, transfer, and/or storage operations (versus process sources where VOC-laden chemical activities are undertaken) that exhibit intermittent and variable VOC emissions in the exhaust stream.

[1] Air Pollution Control Technology Fact Sheet, EPA-452/F-03-015, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1008OGN.PDF
[2] Ibid
[3] Ibid
[4] https://heilprocessequipment.com/application/voc-scrubbers
[5] Ibid
[6] Air Pollution Control Technology Fact Sheet, EPA-452/F-03-015, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1008OGN.PDF

- The VOC species comprising the emissions are not soluble in an aqueous scrubbing solution.

- The use of alternative scrubbing solvent (i.e., non-aqueous) would require a separation and recovery process to enable re-use of the solvent and disposal of the collected pollutant.

Finally, a biofiltration system requires a steady loading of VOC to sustain the microbial population and result in an effective performance of the system. The activities comprising Source ID 101 Uncontrolled Emission Units are performed intermittently in batches resulting in a highly variable concentration of VOCs in the evacuated air stream. In addition, this technology has large space requirements and siting a biofiltration unit or units to accommodate the Source ID 101 Uncontrolled Emissions Units is not possible due to the current configuration of the facility. For the reasons discussed above, Adsorption, Condensation, Wet Scrubbing, and Biofiltration technologies were eliminated as technically infeasible control options.

Technically Feasible Control Options

Good air pollution control practices to minimize VOC emissions include proper employee training and standard operating procedures, periodic inspections and evaluations of procedures, monitoring and recordkeeping, and general housekeeping practices such as proper use of materials, proper storage, proper disposal, etc. Utilizing good air pollution control practices is generally a technically and economically feasible control option.

NOVA also completed an evaluation of Source ID 101 operations under RACT II to identify emission units that could be restricted in operating hours in order to minimize VOC emissions. This investigation resulted in a determination that operation of the four (4) D4 EPS Dryer Check Bins (RACT 2 ID's 101-15, 101-16, 101-17, and 101-18) could potentially be changed to reduce potential VOC emissions associated with these units by 50%. Each of the four D4 EPS Dryer Check Bins were contributing 12.91 tpy (51.64 tpy total) of uncontrolled VOC emissions to the facility-wide total. NOVA determined that operating only two of the four units at any one time would be technically feasible and would reduce emissions from the D4 EPS Dryer Check bins by 50% equating 25.82 tpy VOC.

NOVA also evaluated two different options for using regenerative thermal oxidation (RTO) for controlling VOC emissions from the Source ID 101 Uncontrolled Emission Units. The first is the installation of a dedicated new RTO. The estimated average cost of controlling VOC emissions by installing such a system was calculated at $13,358 per ton of VOC removed which is above the established RACT benchmark VOC standard of $12,000 per ton. The second option that was evaluated was the capture and control of a subset of the Source ID 101 Uncontrolled Emission Units by exhausting those to the existing PERS RTO (Control Devices C111 and C112). The existing PERS RTO has approximately 12,000 cfm of available capacity. The subset of Source 101 Uncontrolled Emission Units that are closest in proximity and could be controlled by the PERS RTO are the four D4 Dryer Check bins previously discussed. The 12,000 cfm capacity would be enough to accommodate two of the four D4 Dryer Check Bins. Upon further evaluation of this option, the estimated average cost of controlling VOC emissions was calculated at $13,704 per ton of VOC removed which is above the established RACT benchmark VOC standard of $12,000 per ton. Furthermore, increasing the volume of exhaust ventilated to the existing PERS RTO will lead to higher emissions of NO_x and other products of combustion as fuel usage rates increase to accommodate the additional low VOC concentration exhaust. For these reasons, RACT for Source ID 101 Uncontrolled Emission Units was determined to be operation of only two of the four D4 EPS Dryer Check Bins at any one time in accordance with good air pollution control practices to reduce potential VOC emissions by 25.82 tpy. The Department approved this plan for these sources under §129.99(e).

<u>Source ID 201 Uncontrolled Emission Sources</u>

As shown in Table 4-6, multiple sources under Source ID 201 – D2 Process Equipment have VOC emissions greater than 2.7 tpy and are currently uncontrolled. NOVA's evaluation of EPS facilities from review of the

RBLC and California Air Resource Board (CARB) Statewide Best Available Control Technology (BACT) Clearinghouse found an RTO as the only control option in use for an EPS facility within the last ten years. NOVA identified the following additional VOC control options for evaluation in addition to RTO's and good air pollution control practices:

- Operational Changes
- Oxidation
- Adsorption System with Oxidation
- Condensation
- Wet Scrubber
- Biofiltration

For a discussion of technically infeasible and feasible control options, please see the information above for Source ID 101 Uncontrolled Emissions Sources. After evaluation, NOVA determined that the only two technically feasible control options were available: Good air pollution control practices and installation of an RTO. The estimated cost of controlling VOC emissions by installing an RTO for control of Source ID 201 Uncontrolled Emission Units is approximately $20,104 per ton of VOC removed which is above the established RACT benchmark VOC standard of $12,000 per ton. For these reasons, RACT for Source ID 201 Uncontrolled Emission Units was determined to be operation of the units in accordance with good air pollution control practices. The Department approved this plan for these sources under §129.99(e).

<u>Wastewater Collection and Treatment</u>

Given the decentralized location of the various wastewater collection and treatment sources across the facility and the large size of mostly open collection ponds and basins, NOVA concluded that there is no technically feasible control strategy capable of effectively capturing and reducing trace volatiles in the wastewater. Furthermore, the low miscibility of pentane and styrene in the wastewater would render an attempt at capture and control of any trace volatiles present infeasible. Construction of such a system would also require the need to discontinue treatment operations during a lengthy construction period and an exorbitant cost. For these reasons, the collection and control of VOC emissions from wastewater collection and treatment sources is considered to be technically infeasible. As a result, NOVA proposed the use of good operating and air pollution control practices to reduce VOC emissions from wastewater collection and treatment sources. The Department approved this plan for these sources under §129.99(e).

In accordance with 25 Pa. Code §129.114(i)(1)(i), an evaluation of each economic feasibility analysis summarized in the above tables demonstrates that the cost effectiveness for control remains equal to or greater than $12,000 per ton of VOC emissions reduced.

III. RACT III analyses performed under §129(i)(1)(i)(A) and §129.114(j)(1):

BVPV conducted an analysis of the US EPA RACT/Best Available Control Technology (BACT)/Lowest Achievable Emissions Rate (LAER) Clearinghouse (RBLC), air pollution technology fact sheets, and air pollution technical reports to determine if any new air cleaning devices, air pollution control technologies, or techniques could be applied to the existing air contamination sources. BACT and LAER are determined on a case-by-case basis, usually by State or local permitting agencies. EPA established the RBLC to provide a central data base of air pollution technology information (including past RACT, BACT, and LAER decisions contained in NSR permits) to promote the sharing of information among permitting agencies and to aid in future case-by-case determinations.

A summary of the RBLC search results is provided in Attachment B of the RACT III application. No additional air cleaning devices, air pollution control technologies, or techniques other than the aforementioned were discovered and the current emissions controls for the RACT III affected units are consistent with recent and historical BACT determinations. The Department reviewed BVPV's analysis of the RBLC and found the search to be thorough and exhaustive. The Department agrees that there are no new control technologies or significant changes to the technical capability of the existing technologies currently in use at BVPV.

Department's Independent Analysis

The Department has reviewed source information, control technologies or measures, and the respective cost-analysis for each technology or measures evaluated for BVPV. Based on the review, examination of information, the Department's continuous review of permit applications since the applicability date of RACT II which have proposed various control methods, along with Department permitting staff participating in recent technical presentations by several vendors and manufacturers of pollution control technology, and engineering judgment, the Department concludes that there are no new or updated control technologies available that are applicable to controlling the nature of the sources and pollutants found at the BVPV Styrenics Beaver Valley Plant and determines that RACT II requirements for the 61 air contamination sources at the BVPV listed in the Table A-4 assure compliance with requirement for RACT III for the § 129.111 - § 129.115.

IV. Conclusion:

The Department has analyzed the applicant's proposal for considering RACT II requirements as RACT III and also performed an independent analysis. Based on the information provided by the applicant of the facility and independently verified by the Department, the Department has determined that the RACT II requirements satisfy the RACT III requirements.

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