Reasonably Achievable Control Technology Study
for
PPG Industries Ohio, Inc.
Cleveland, OH

Submitted to:

Ohio Environmental Protection Agency
Division of Air Pollution Control
P.O. Box 1049
Columbus, Ohio 43216-1049

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1. Introduction

PPG Industries, Inc. (PPG) – Cleveland (the "Facility") is an automotive coatings manufacturing plant located in Cleveland, Ohio. The plant produces a full spectrum of coating products for automotive original equipment manufacturers, including electrocoat, clearcoat, topcoat, waterborne and solvent-based products. The operations at PPG Cleveland consist of over 650 pieces of equipment for the paint manufacturing processes which involves only physical blending and mixing, with no chemical reactions or resin manufacturing. The paint laboratory operations at the facility consist of over 300 pieces of equipment. The Facility is a major source for VOC emissions and operates under Title V Permit #P0127362 issued by Ohio Environmental Protection Agency (OEPA) on April 16, 2020.

PPG Cleveland has an existing, source-specific reasonably available control technology (RACT) determination codified in Ohio Administrative Code (OAC) 3745-21-09 (MM). The Facility is located in Cuyahoga County, which is part of the Cleveland, OH moderate nonattainment designation area with respect to the 2015 National Ambient Air Quality Standard (NAAQS) for ozone according to 40 CFR § 81.336. Ohio EPA has adopted a requirement in OAC 3745-21-11 for facilities in nonattainment areas that have existing source-specific RACT to submit an updated RACT study within one year after the effective date of the rule. On March 27, 2022, OAC 3745-21-11 became effective, requiring detailed RACT studies for non-control technique guideline (CTG) sources located in ozone non-attainment areas. The PPG Cleveland facility is hereby submitting this RACT study within one year of the effective date of the rule.

Coating manufacturing operations at the Facility are subject to the requirements of 40 CFR Part 63, Subpart HHHHH – National Emission Standards for Hazardous Air Pollutants: Miscellaneous Coating Manufacturing (the "MCM NESHAP"). Collectively, these operations are treated as part of an existing affected source under this regulation. EPA recently conducted a residual risk and technology review (RTR) for the MCM NESHAP.[1] Based on the final amendments published in the *Federal Register* on August 14, 2020, EPA determined the risks from MCM to be acceptable and provide an ample margin of safety to protect human health, and the technology assessment for MCM did not identify any technological developments to reduce emissions of organic HAPs.[2] The maximum achievable control technology (MACT) standards outlined in the MCM NESHAP are based on emissions levels currently achieved by the best controlled and lowest emitting sources in the industry; the MACT floor levels were not revised in the recent MCM NESHAP rulemaking.[3]

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[1] 85 *Fed. Reg.* 49724 (Aug. 14, 2020).

[2] On June 7, 2022 EPA proposed to amend the MCM NESHAP to include inorganic HAP standards for process vessels: https://www.govinfo.gov/content/pkg/FR-2022-06-07/pdf/2022-12180.pdf.

[3] The changes in the August 14, 2020 rulemaking included elimination of the SSM exemption, periodic (5-yr) performance tests for facility using add-on controls, and electronic submittal of compliance reports and performance tests.

1.1 VOC RACT

PPG requested that RTP Environmental Associates, Inc. ("RTP") prepare this detailed engineering RACT Study ("Study") for the Facility in accordance with OAC rule 3745-21-11(B). This report includes a case-by-case VOC RACT analysis for the paint laboratory operations, identified as process K201 in the current permit; paint manufacturing operations, identified as P201 in the current permit; and, the water-based paint production equipment, identified as P202 in the current permit. This submittal incorporates and addresses the requirements of OAC Rule 3745-21-11. The VOC sources at the Facility that are subject to RACT requirements in OAC rule 3745-21-09 (MM) are also subject to stringent control requirements for VOC emissions pursuant to 40 CFR Part 63, Subpart HHHHH, *National Emission Standards for Hazardous Air Pollutants: Miscellaneous Coating Manufacturing*.[4]

Section 2 of this report contains a Facility description, including all of the information required by OAC 3745-21-11(B)(1)-(7), including the actual VOC emissions of sources at the PPG Cleveland Facility.

Section 3 of this report presents a description of available control technologies and the information required by OAC 3745-21-11(B)(8)-(18), as appropriate.

[4] The requirements of these NESHAP rules are generally more stringent than RACT: § 112(d) of the federal CAA requires that the limits in the NESHAP reflect the "maximum degree of reduction" in emissions that the EPA Administrator determines is achievable and establishes a minimum floor equal to the average level of control achieved by the best-performing 12 percent of facilities in the category, whereas RACT requires only that level of control that is "reasonably available." Accordingly, the results of EPA's recent analyses are useful for purposes of identifying and evaluating cost effectiveness of available VOC control techniques and determining achievable emission limits, recognizing that EPA's recent analysis is aimed at achieving the "maximum degree of reduction" in emissions which is beyond what is required by RACT.

2. Site Description and Emissions Information

2.1 Site Description

The Facility is unusual among coatings manufacturing plants in that, rather than trying to control air pollutant emissions from individual pieces of equipment, the plant utilizes extensive capture systems and a large regenerative thermal oxidizer (RTO) system to control the VOC emissions from entire buildings or groups of buildings. As a result, PPG Cleveland controls the VOC emissions from all operations found within the controlled buildings, even the equipment that normally would not need to be controlled. Appendix A contains *OEPA's Guidance Concerning the Innovative Facility-Wide Air Permit for PPG Cleveland* [5] which has a thorough description of the unique and innovative PPG Cleveland air permit. Additionally, the Facility is providing the following information according to OAC 3745-21-11(B)(1) through (B)(7).

(1) The complete facility name, Ohio EPA air program facility identification number, and address:

Facility Name:	PPG Industries Ohio, Inc.
Ohio EPA Air Program Facility ID:	1318000101
Address:	3800 West 143rd Street Cleveland, OH 44111

(2) The name, title, address and telephone number of the owner or operator's representative within the company who is the contact person for this facility regarding the engineering study and affected sources:

Name:	Miguel Islas
Title:	Plant Manager
Address:	3800 West 143rd St., Cleveland, OH 44111
Phone Number:	216-671-7340

(3) The name, title, address and telephone number of the official who is responsible for approval of the engineering study.

Name:	Jeff Eagleton
Title:	Process Engineer Manager
Address:	3800 West 143rd St., Cleveland, OH 44111
Phone Number:	216-671-7340

(4) The standard industrial classification code and source classification code numbers which are applicable to the facility's operations:

SIC:
2851 — Manufacturing/Chemicals And Allied Products/Paints, Varnishes, Lacquers,

[5] Issued by OEPA Division of Air Pollution Control on December 21, 2017.

Enamels, and Allied Products

SCC:
30101499 — Industrial Processes/Chemical Manufacturing/Paint Manufacture/Other Not Classified
30190001 — Industrial Processes/Chemical Manufacturing/Fuel Fired Equipment/Process Heater: Distillate Oil (No. 2)
30190003 — Industrial Processes/Chemical Manufacturing/Fuel Fired Equipment/Process Heater: Natural Gas
30190013 — Industrial Processes/Chemical Manufacturing/Fuel Fired Equipment/Incinerator: Natural Gas

(5) The following general information for each affected source:

K201 – Paint Laboratory Operations

- Current Ohio EPA application number: A0060580
- Company identification and Ohio EPA emissions unit identification number: K201
- Source description: Paint laboratory operation controlled by a water curtain or dry filtration system located upstream of four rotary concentrator wheels and a RTO.
- Month and year installed: First equipment installed in 1947. The emissions unit includes approximately 260 pieces of equipment installed over many years. Table 2 in the Facility Title V permit lists the equipment included as part of Emissions Unit K201.
- Normal operating schedule: 24 hours per day, 7 days per week, 52 weeks per year
- Annual production rates for each of the three full calendar years preceding the effective date of this rule.
  - 2021: 782 tons
  - 2020: 749 tons
  - 2019: 1,027 tons
- Average and maximum daily production rates for each of the three full calendar years preceding the effective date of this rule.[6]
  - 2021: annual average 2.1 tons/day; highest monthly average 2.6 tons/day
  - 2020: annual average 2.1 tons/day; highest monthly average 2.9 tons/day
  - 2019: annual average 2.8 tons/day; highest monthly average 3.2 tons/day
- The type of control equipment employed and the date installed: The Facility operates a comprehensive and expansive emissions control system that collects process vapors from paint laboratory buildings using both local and building-level exhaust systems. These vapors are routed to four rotary concentrator wheels and a centralized regenerative thermal oxidizer (RTO); installed 2005. All of the Facility's VOC process vapors are routed to the RTO and as a result, PPG Cleveland controls VOC emissions from all operations found within these buildings, including the equipment for which individual controls are not required.

P201 – Paint Manufacturing Operations

[6] Daily production records are not available for the requested period of three calendar years, so maximum daily production rates are unknown. In the absence of daily records, PPG has provided monthly data, and we have shown above the highest monthly average production rate in each of the three calendar years.

- Current Ohio EPA application number: A0060580
- Company identification and Ohio EPA emissions unit identification number: P201
- Source description: Paint manufacturing operations
- Month and year installed: First equipment installed in 1947. The emissions unit includes approximately 660 pieces of equipment installed over many years. Table 3 in the Facility Title V permit lists the equipment included as part of Emissions Unit P201.
- Normal operating schedule: 24 hours per day, 7 days per week, 52 weeks per year
- Annual production rates for each of the three full calendar years preceding the effective date of this rule.
  - 2021: 38,304 tons
  - 2020: 36,689 tons
  - 2019: 50,336 tons
- Average and maximum daily production rates for each of the three full calendar years preceding the effective date of this rule.[7]
  - 2021: annual average 104.9 tons/day; highest monthly average 126.0 tons/day
  - 2020: annual average 100.5 tons/day; highest monthly average 142.1 tons/day
  - 2019: annual average 137.9 tons/day; highest monthly average 159.0 tons/day
- The type of control equipment employed and the date installed: Paint manufacturing operations are controlled by a comprehensive and expansive emissions control system that collects process vapors from buildings that comprise the manufacturing operations using both local and building-level exhaust systems. These vapors are then routed to four rotary concentrator wheels and a centralized RTO. The system captures emissions (primarily VOCs) from individual pieces of equipment and routes them to the RTO; it also captures VOC emissions from entire buildings or groups of buildings and routes them to the RTO. Therefore, although PPG Cleveland's operations are spread out among tens of buildings, all of PPG Cleveland's VOC process vapors are routed to the RTO. As a result, PPG Cleveland controls VOC emissions from all operations found within the paint manufacturing buildings, including the equipment for which individual controls are not required. The RTO was installed in 2005.

P202 – Dedicated water-based paint production equipment

- Current Ohio EPA application number: P0127362
- Company identification and Ohio EPA emissions unit identification number: P202
- Source description: Water-based paint production equipment
- Month and year installed: First equipment installed in 1965. The emissions unit includes approximately 75 pieces of equipment installed over many years. Table 4 in the Facility Title V permit lists the equipment included as part of Emissions Unit K201.
- Normal operating schedule : 24 hours per day, 7 days per week, 52 weeks per year

[7] Daily production records are not available for the requested period of three calendar years, so maximum daily production rates are unknown. In the absence of daily records, PPG has provided monthly data, and we have shown above the highest monthly average production rate in each of the three calendar years.

- Annual production rates for each of the three full calendar years preceding the effective date of this rule.
  - 2021: 8,223 tons
  - 2020: 8,501 tons
  - 2019: 9,889 tons
- Average and maximum daily production rates for each of the three full calendar years preceding the effective date of this rule.[8]
  - 2021: annual average 22.5 tons/day; highest monthly average 29.0 tons/day
  - 2020: annual average 23.3 tons/day; highest monthly average 36.7 tons/day
  - 2019: annual average 27.1 tons/day; highest monthly average 43.6 tons/day
- The type of control equipment employed and the date installed: N/A

(6) A plot plan which shows the general layout of the facility and the affected sources: Included as Appendix B.

2.2 VOC Emissions

As required by OAC 3745-21-11(B)(7), Table 2-1, Table 2-2 and Table 2-3 include the average daily, maximum daily, and annual VOC emissions for the three calendar years preceding the effective date of the rule. The emission rates included in the tables below are based on emissions as reported in the PPG annual emissions reports submitted to OEPA.

Table 2-1. K201 (Paint Laboratory) VOC Emissions

Year	Avg. Daily VOC (lb/day)	Max Daily VOC (lb/day)	Annual VOC (tpy)
2019	77.9	77.9	14.2
2020	77.6	77.6	14.2
2021	102.5	102.5	18.7

Table 2-2. P201 (Paint Manufacturing) VOC Emissions

Year	Avg. Daily VOC (lb/day)	Max Daily VOC (lb/day)	Annual VOC (tpy)
2019	122.0	122.0	22.3
2020	90.8	90.8	16.6
2021	105.9	105.9	19.3

Table 2-3. P202 (Water-Based Paint Production) VOC Emissions

Year	Avg. Daily VOC (lb/day)	Max Daily VOC (lb/day)	Annual VOC (tpy)
2019	3.3	3.3	0.6

[8] Daily production records are not available for the requested period of three calendar years, so maximum daily production rates are unknown. In the absence of daily records, PPG has provided monthly data, and we have shown above the highest monthly average production rate in each of the three calendar years.

Year	Avg. Daily VOC (lb/day)	Max Daily VOC (lb/day)	Annual VOC (tpy)
2020	4.8	4.8	0.9
2021	6.0	6.0	1.1

General composition of the VOCs

The Facility produces a full spectrum of coating products for automotive original equipment manufacturers, including electrocoat, clearcoat, topcoat, waterborne and solvent-based products. The composition of the VOC emissions from the Facility is dependent on the compositions of these coating products.[9]

The coatings produced at the Facility vary widely in composition, including VOC composition. The following categories of compounds are typical and representative ingredients:

- Organic esters such as n-butyl acetate (CAS# 123-86-4), pentyl propionate (CAS# 624-54-4), and 2-ethylhexyl acrylate (CAS# 103-11-7)
- Ketones such as n-amyl methyl ketone (2-heptanone) (CAS# 110-43-0)
- Alkyl alcohols such as isobutanol (2-methyl-1-propanol) (CAS# 78-83-1)
- Petroleum fractions such as heavy naphtha (ligroine) (CAS# 8032-32-4)

Formulation of each coating material

The paint laboratory, emissions unit K201, contains spray booths that utilize PPG automotive coatings. The coatings used in the spray booths have VOC composition consistent with the summary provided above.

Typical characteristics of the automotive coatings produced at the Facility are provided below:

- Relative density: 0.9 – 1.1
- Density (lb/gal): 7.5 – 9.2
- Volatility: 54% - 74% (v/v); 45% - 68% (w/w)
- Percent solids: 32-55%

Composition of clean-up solvents

The following composition and density are typical of the cleaning solvents used at PPG Cleveland:

- n-butyl acetate (CAS# 123-86-4): ≥20 - ≤50%
- xylene (CAS# 1330-20-7): ≥20 - ≤23%
- butan-1-ol (CAS# 71-36-3): ≥10 - ≤14%
- butanone (CAS# 78-93-3): ≥5 - ≤10%
- ethanol (CAS# 64-17-5): ≥5 - ≤10%
- ethylbenzene (CAS# 100-41-4): ≥1 - ≤4.2%
- light aromatic solvent naphtha (petroleum) (CAS# 64742-95-6): ≥1 - ≤3.5%;
- 1,2,4-trimethylbenzene (CAS# 95-63-6): ≤1.9%
- toluene (CAS# 108-88-3): <1%

[9] US EPA, "Control Techniques Guidelines for Automobile and Light-Duty Truck Assembly Coatings," EPA-453/R-08-006, September 2008, https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100DYXI.TXT

- Density (lbs/gal): 7.01
- Relative density: 0.84

Amount used in 2022: 4,368 tons (1,246,303 gallons)
Amount per day in 2022: 23,936 lbs (3,415 gallons)

Efficiency of Control Equipment and documentation of emissions testing
According to Operating Permit number P0127362 and as codified in OAC 3745-21-09(MM)(3), PPG is required to vent VOC emissions from K201, the paint laboratory, to a control system that achieves a minimum control efficiency of 90.0 percent by weight or a maximum outlet VOC concentration of twenty parts per million by volume dry basis (ppmvd). The system includes four rotary concentrator wheels and an RTO. PPG is required to conduct compliance stack tests every five years, and the most recent test was conducted on October 11, 2018. A summary of the stack test results is included in Appendix C. The full compliance stack test is on file with OEPA.

According to Operating Permit number P0127362 and as codified in OAC 3745-21-09(MM)(2), PPG is required to vent VOC emissions from P201, referred to as paint manufacturing operations, to a control system that achieves a minimum control efficiency of 98.0 percent by weight or a maximum outlet VOC concentration of twenty ppmvd. The system includes both local and building-level capture systems, four rotary concentrator wheels, and an RTO. PPG is required to conduct compliance stack tests every five years, and the most recent test was conducted on October 11, 2018. A summary of the stack test results is included in Appendix C. The full compliance stack test is on file with OEPA.

Emissions unit P202 is dedicated water-based paint production. The emissions unit is not required to have control equipment and emissions testing is not required. This source includes paint manufacturing equipment that utilizes water-based paints as specified in OAC 3745-21-09(MM)(4).

3. VOC RACT Analysis

This section presents the RACT analyses for the paint laboratory operations (K201), paint manufacturing operations (P201), and the dedicated water based paint production equipment (P202).

3.1 RACT General Approach

OAC 3745-21-11(B) prescribes certain information to be included in the RACT analysis for each emissions unit. The prescribed information can be generally summarized as follows:

- Evaluate technical feasibility of certain add-on control technologies and process changes as VOC control measures
- Characterize VOC control efficiencies and emission reductions of technically feasible measures
- Characterize advantages and disadvantages, including economic costs and cost effectiveness, of technically feasible control measures
- Recommend RACT determination

3.2 VOC Control Technologies and Techniques

3.2.1 Add-On VOC Control Technologies

Subparagraphs (a)-(e) of OAC 3745-21-11(B)(8) require that the RACT study include a detailed discussion of the technical feasibility of the following types of add-on control measures:

(a) Carbon adsorber
(b) Thermal incinerator
(c) Catalytic incinerator
(d) Condenser
(e) Scrubber

A description of each of these control measures is provided below and the sections that follow discuss the technical feasibility of the control technologies for each emissions unit at the Facility.

<u>Carbon Adsorption</u>
Adsorption is mass transfer of a molecule from the gas or liquid phase to a solid surface. The molecule (adsorbate) is held on the solid phase (adsorbent) surface by either physical or chemical bonding. Adsorption technology by itself can achieve VOC removal efficiencies as high as 95 to 98 percent.[10] However, the VOC removed from the vent stream is not converted or destroyed, but merely "stored" in the adsorbent material; thus, adsorption technology requires that the adsorbent

[10] USEPA Technical Bulletin, "Choosing an Adsorption System for VOC: Carbon, Zeolite, or Polymers?," EPA-456/F-99-004. May 1999. Available at www3.epa.gov/ttn/catc/dir1/fadsorb.pdf (last accessed Jan. 11, 2023).

material be frequently replaced or regenerated. If the material is regenerated on-site, the VOC removed from the original vent stream is present in a new vent stream from the desorption process.

Alternatively, the adsorbent material can be shipped off-site and replaced, effectively converting the VOC removed from the original vent stream into a solid waste. This configuration is typically employed only for vent streams containing small amounts of VOC, where on-site regeneration is less economical than shipping and off-site regeneration of spent adsorbent material.

At PPG Cleveland, adsorption technology is employed in conjunction with an RTO to remove VOC from gas streams with relatively high exhaust flow rates and relatively low VOC concentration. In this configuration, rotary adsorption units with integrated regeneration (i.e., rotary concentrators) are used to generate a more concentrated VOC stream which can be more effectively treated in an RTO. The rotary adsorption units with integrated regeneration work by first adsorbing the VOC from the paint manufacturing operations emissions stream on the surface of an adsorbent material. This vent stream, now containing less than two percent of the original VOC loading, is then exhausted to atmosphere. When the adsorbent surface reaches its adsorption capacity, it is regenerated by raising the temperature via steam or heated air. This desorption process yields a high-concentration VOC stream which is routed to an RTO for destruction of the VOC.

Thermal Incineration

Thermal oxidation, or thermal incineration, is the process of oxidizing combustible materials by raising their temperature above the auto-ignition point in the presence of oxygen and maintaining it at high temperature for sufficient time to complete combustion to carbon dioxide and water. Time, temperature, turbulence (for mixing), and the amount of oxygen affect the rate and efficiency of the combustion process. These factors provide the basic design parameters for VOC oxidation systems. For safety considerations, the maximum concentration of the VOC in the waste gas must be substantially below the lower flammable level (lower explosive limit, or LEL) of the specific compound being controlled. As a rule, a safety factor of four (i.e., 25% of the LEL) is used, although some direct-flame oxidizers are able to operate safely above this level. The waste gas may be diluted with ambient air, if necessary, to lower the concentration.

The required level of VOC control of the waste gas that must be achieved in the time that it spends in the thermal combustion chamber dictates the reactor temperature. The shorter the residence time, the higher the reactor temperature must be. Most thermal oxidation units are designed to provide no more than one second of residence time to the waste gas with typical temperatures of 1,200ºF to 2,000ºF. Once the unit is designed and built, the residence time is not easily changed. The required reaction temperature, therefore, becomes a function of the particular gaseous species and the desired level of control.

There are three types of thermal oxidation systems: direct flame, recuperative, and regenerative. They are differentiated by the equipment used for heat recovery.

A direct-flame thermal oxidizer, also known as an afterburner, is comprised of a combustion chamber and does not include any heat recovery of the exhaust air by a heat exchanger.

A recuperative oxidizer is comprised of the combustion chamber, the waste gas preheater (heat exchanger), and, if low-pressure steam or hot water can be used on site, a secondary energy recovery heat exchanger. Considerable fuel savings may be realized by recovering the heat energy from the exhaust gas and preheating the incoming waste gas. Recuperative thermal oxidizers can recover up to 70% of the waste heat from the exhaust gases.

A regenerative oxidizer uses a high-density media such as a ceramic-packed bed still hot from a previous cycle to preheat an incoming VOC-laden waste gas stream. The preheated, partially oxidized gases then enter the combustion chamber, where they are heated by combustion of auxiliary fuel (natural gas) to a final oxidation temperature typically between 1,400ºF to 1,500ºF, and they are kept at this temperature to achieve maximum destruction. Temperatures of up to 2,000ºF may be achieved, if required, for very high destruction levels of certain VOCs. The purified, hot gases exit the combustion chamber and are directed to one or more different ceramic-packed beds cooled in an earlier cycle. Heat from the purified gases is absorbed by these beds before the gases are exhausted to the atmosphere. The reheated packed bed then begins a new cycle by heating a new incoming waste gas stream.

Regenerative thermal oxidizers offer several advantages over other types of oxidizers. They generally have lower fuel requirements because of higher energy recovery (up to 95%). They can provide better destruction efficiency because of their higher temperature capability, and they are less susceptible to problems with halogenated compounds. On the other hand, they cost more to purchase and operate, have a larger footprint, and require higher maintenance because they have more moving parts than either recuperative or direct-flame oxidizers.

Thermal oxidation is one of the most proven methods for destroying VOCs. In general, thermal oxidizers are not well-suited to exhaust streams with highly variable flow rates because of the reduced residence time and poor mixing resulting from high flow rates that decrease the completeness of combustion. This causes the combustion chamber temperature to fall, decreasing the destruction efficiency.

<u>Catalytic Incinerator</u>

Catalytic oxidizers, or catalytic incinerators, operate very similarly to thermal oxidizers. The primary difference is that the gas, after passing through the flame area, passes through a catalyst bed. The catalyst has the effect of increasing the oxidation reaction rate, enabling conversion at lower reaction temperatures than in thermal oxidizers. Catalysts, therefore, also allow for smaller oxidizer size. Catalysts permit the oxidizing reaction to occur at a lower temperature than is required for thermal ignition. Waste gas typically is heated by auxiliary burners to approximately 600ºF to 800ºF before entering the catalyst bed. The maximum design temperature of the catalyst exhaust is 1,000ºF to 1,250ºF.

Catalysts usually used for VOC abatement include metal oxides or precious metals such as platinum and palladium, which generally have a longer service life and are more resistant to poisoning and fouling than less expensive base metal catalysts. The potential for catalyst poisoning exists if the exhaust stream contains sulfur, silicon, phosphorus, arsenic, or heavy metals.

Particulate matter can rapidly coat the catalyst so that the catalytically active sites are prevented from aiding in the oxidation of pollutants. This effect of particulate matter on the catalyst, called blinding, will deactivate the catalyst over time. Because all the active surface of the catalyst is contained essentially in relatively small pores, the amount of particulate matter need not be large to blind the catalyst. There are no general guidelines about the concentration and size of particles that can be tolerated by catalysts, because the pore size and volume of catalysts vary widely. This information is likely to be available from the catalyst manufacturers.

Catalytic oxidizers can be used to reduce emissions from many VOC sources. They offer many advantages for the appropriate application. They operate at lower temperatures and require less fuel than thermal oxidizers. They require a smaller footprint and little or no insulation. However, selection of a catalytic oxidizer should be considered carefully, since the sensitivity of catalytic oxidizers to inlet stream concentrations, flow conditions, and catalyst deactivation limits their applicability for many industrial processes.

<u>Condenser</u>

Condensation is a separation technique in which one or more volatile components of a vapor mixture are separated through saturation from the gas phase followed by a phase change. The phase change from gas to liquid can be achieved in two ways: (1) by increasing the system pressure at a given temperature (compression condensation), or (2) by lowering the temperature at a constant pressure (refrigerated condensation). Most commercial condensers are refrigerated condensers.

In a two-component system where one of the components is non-condensable (e.g., air), condensation occurs at the dew point (saturation) when the partial pressure of the volatile compound is equal to its vapor pressure. For more volatile compounds (i.e., compounds with lower normal boiling points), a larger amount of the compound remains as vapor at a given temperature; hence, to remove or recover the compound, a lower temperature would be required for saturation and condensation. For such cases, refrigeration can be used to obtain the lower temperatures needed to achieve acceptable removal efficiencies.

The basic equipment in a refrigerated condenser system includes a condenser, refrigeration unit(s), and auxiliary equipment (e.g., precooler, recovery/storage tank, pump/blower, and piping).

For many VOC recovery needs, a refrigeration unit generates the low-temperature medium required for heat transfer. In refrigerated condenser systems, two kinds of refrigerants are used – primary and secondary. Primary refrigerants such as ammonia and chlorofluorocarbons are those that undergo a phase change from liquid to gas after absorbing heat. Secondary refrigerants or coolants, such as brine solutions, act only as heat carriers and remain in the liquid phase.

For applications requiring low temperatures (below about -30ºF or -34ºC), multistage refrigeration systems are frequently used. Alternatively, cryogenic condensation using liquid nitrogen as the refrigerant is emerging as a safe and effective control system.

Condensers are widely used as raw material and/or product recovery devices. They may be used to recover VOC upstream of other control devices, or they may be used alone for controlling vent streams containing high VOC concentrations. They can handle both intermittent and continuous flow rates. They are especially suited for low-flow (less than 100 scfm), high-concentration (greater than 2,500 ppmv) streams.

Condensers can be used to remove non-halogenated and halogenated VOC without the need for expensive auxiliary equipment. If the vent stream contains water vapor or if the VOC has a high freezing point (e.g., benzene), ice or frozen hydrocarbons may form on the condenser tubes or plates. This will reduce the heat transfer efficiency of the condenser and thereby reduce the removal efficiency. Formation of ice also will increase the pressure drop across the condenser. In such cases, a precooler may be used to remove the moisture before the vent stream enters the condenser. This precooler would cool the vent stream to approximately 35ºF to 40ºF (1.7ºC to 4.4ºC), effectively removing the moisture from the vent stream.

Depending on the type of condenser used, disposal of the spent coolant can be a problem. If cross-media impacts are a concern, surface condensers would be preferable to direct contact condensers.

A recovery tank for temporary storage of condensed VOC before its reuse, reprocessing, or transfer to a large storage tank may be necessary in some cases.

Scrubber

Absorption (scrubbing) is the selective transfer of one or more components of a gas mixture into a liquid solvent. Physical absorption depends on properties of both the gas stream and liquid solvent, such as density and viscosity, as well as specific characteristics of the pollutants in the gas and the liquid streams (e.g., diffusivity, equilibrium solubility). These properties are temperature dependent, and lower temperatures generally favor absorption of gases by the solvent. Absorption also is enhanced by greater contacting surface, higher liquid-gas ratios, and higher concentrations in the gas stream. Chemical absorption occurs when the gaseous component reacts chemically with the absorbing liquid. This process may be limited by the rate of reaction, although the rate-limiting step is usually the physical absorption rate and not the chemical reaction rate. An example of chemical absorption is the scrubbing of organic amines by an acidic solution such as dilute hydrochloric acid.

Absorption is a commonly used unit operation in chemical processing. It is used as a recovery technique for raw materials and/or products in separation and purification of gaseous streams containing high concentrations of organics, especially water-soluble compounds such as methanol, ethanol, isopropanol, butanol, acetone, and formaldehyde. It is widely used to abate VOC emissions occurring in natural gas purification and coke by-product recovery. However, it is more commonly used for controlling inorganic gases such as HCl than for VOC.

The use of absorption as the primary control technique for organic vapors is subject to several limiting factors. One factor is the availability of a suitable solvent. The VOC must be soluble in the absorbing liquid. Some common solvents that may be useful for VOC include water, mineral oils, or other nonvolatile petroleum oils. Another factor that affects the suitability of absorption for organic emissions control is the availability of vapor/liquid equilibrium data for the specific organic/solvent system in question. Such data are necessary for the design of absorber systems; however, they are not readily available for uncommon organic compounds.

Another consideration in the use of absorption is the treatment or disposal of the material removed from the absorber. In most cases, the scrubbing liquid containing the VOC is regenerated in an operation known as stripping, in which the VOC is desorbed from the absorbent liquid, typically at elevated temperatures and/or under vacuum. The VOC then is recovered as a liquid by a condenser. The stripping process may create water (or liquid) disposal problems. In many cases, absorption requires a wastewater treatment system to handle the contaminants.

3.2.2 Process Changes as VOC Control Techniques

OAC 3745-21-11(B)(11) requires that the RACT study include a detailed discussion of replacing the source in order to minimize or eliminate the VOC emissions. PPG Cleveland is a paint manufacturing facility integral to the automotive industry. While basic in tenet, paint manufacturing operations are necessary to make paint, and source shutdown in order to eliminate VOC emissions is not a practicable option, nor is it an appropriate basis for RACT.

Subparagraph (f) of OAC 3745-21-11(B)(8) requires that the RACT study include a detailed discussion of other alternative controls that may be applicable to the affected source. Based on RTP's review of literature and other available information, including EPA's *Control of VOC Emissions from Ink and Paint Manufacturing*[11] and *Control Techniques for Volatile Compound Emissions from Stationary Sources*,[12] additional potentially applicable control techniques for emissions that would be fugitive in the absence of a building or local area capture system include the following:

(A) Equipment or Process Modifications
   a. Tank lids
   b. Modified milling equipment
   c. Storage tank conservation vents
(B) Equipment Cleaning
   a. Rubber wipers
   b. High pressure spray heads
   c. Teflon-lined tanks
   d. Plastic pigs
   e. Automatic tub washers
(C) Improved Operating Practices
   a. Dedicated process lines/equipment
   b. Use of covers during tank operation
   c. Splash/spill prevention
   d. Closed container storage of wastes
   e. Employee awareness
(D) Recycling Techniques

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[11] US EPA, "Control of VOC Emissions form Ink and Paint Manufacturing Processes," EPA-450/3-92-013, April 1992, https://www3.epa.gov/ttn/ctg_act/199204_voc_epa453_3-92-013_ink_paint_manufacture.pdf

[12] "US EPA, Control Techniques for Volatile Compound Emissions from Stationary Sources" EPA 453/R-92-018, December 1992, https://www3.epa.gov/airquality/ctg_act/199212_voc_epa453_r-92-018_control_emissions_stationary.pdf

a. Re-use solvent in subsequent batches
b. Countercurrent rinsing

(E) Product reformulation

a. Low VOC coatings
b. Powder coatings
c. Waterborne paints
d. Radiation-curable paints and inks
e. High solids paints and inks

(F) Leak Detection and Repair Program

A description of each of these technologies follows.

(A) Equipment or Process Modifications

a. Tank lids are the most common equipment modification for reducing VOC emissions from coatings manufacturing operations. Lids that completely cover a mill, tank, or vat can reduce VOC emissions during preassembly, premix, grinding, milling, and product finishing operations. The cover should remain closed, except when production, sampling, maintenance, or inspection procedures require access. The cover should be maintained in good condition, such that it maintains contact with the rim of the opening for at least 90 percent of the circumference of the rim. Any openings in the lid should be no larger than necessary to provide safe clearance for the mixer shaft.
b. Modified Milling Equipment- In some situations, older milling equipment can be replaced with newer, more efficient closed systems such as horizontal media mills. However, the type of milling equipment used in a process is highly dependent upon adhesives and coatings product characteristics such as viscosity, color, gloss, type of raw materials, and processing time.
c. Fixed-roof storage tanks are commonly equipped with a conservation vent that allows them to operate at a slight internal pressure or vacuum to prevent the release of vapors during very small changes in temperature, pressure, or liquid level. For storage tanks that are not directly vented to the control system, the pressure and vacuum settings could be adjusted to decrease emissions, within the safe operating parameters of the tank design. Alternately, the storage tank can be vented to a control device.

(B) Equipment Cleaning

Since equipment cleaning requires the use of solvents, it is a source of VOC emissions. VOC emissions may be reduced during equipment cleaning either by eliminating the need for equipment cleaning or by reducing the frequency of cleaning. Equipment cleaning modifications include the following:

a. Rubber wipers, which can be used to scrape the sides of the tank to reduce the amount of clinging adhesives and coatings that must be cleaned out;
b. High-pressure spray heads, which can be used to clean tanks more efficiently;
c. Teflon-lined and stainless steel-lined tanks, which can be used to minimize clinging coatings;
d. Plastic pigs, which can be used to push clinging adhesives and coatings through pipes, increasing product yield and reducing the need for cleaning solvent; and

e. Automatic tub washers, which can be used to clean tanks under vacuum conditions.

(C) Improved Operating Practices

a. Equipment dedication eliminates cleaning between each product batch. Scheduling compatible batches or batches from light to dark colors also reduces the need for equipment cleaning. Production scheduling and dedicating equipment may be impossible, however, in small paint and ink facilities that operate on a batch schedule in order to meet customer demands. In some cases, facilities operate on a same-day shipment schedule.
b. Covers should be used during tank operation. Tank lids are the most common method for reducing VOC emissions from mills, tanks, and vats used in coatings manufacturing. Proper use of tank lids to minimize VOC emissions requires that the lid remain closed except when production, sampling, maintenance, or inspection procedures require access.
c. Splash/Spill Prevention - Take steps to reduce and prevent splashes and spills during the transfer of material to different containers. Any spilled liquid or dry material should be cleaned as expeditiously as possible, but not later than the end of the daily work shift. In addition, submerged loading or bottom loading of storage tanks, which results in lower vapor generation than splash loading, should be employed.
d. Closed Container Storage - Waste coatings and solvent should be collected and stored in closed containers. The closed containers may contain a device that would allow pressure relief but would not allow liquid solvent to drain from the container prior to disposal.
e. Employee Awareness - Permanent signs for the coatings manufacturing equipment should be installed to describe required work and operating practices. The signs should be placed in a prominent location and be kept visible and legible at all times. In addition, training programs may be held to teach employees the importance of operating practices such as the use of covers and lids, splash/spill prevention, and closed container storage of wastes.

(D) Recycling Techniques

a. Re-use of Solvents - Recycling techniques for coatings manufacturing operations include the use of spent cleaning solvent for production. The wash solvent may be used in a subsequent compatible batch.
b. Counter-Current Rinsing - In counter-current rinsing sequences, recycled solvent is used in the initial cleaning sequence, and the final equipment cleaning is completed with clean solvent. The wash solvent may be used in a subsequent batch or used as a pre-rinse for a subsequent cleaning sequence.

(E) Product Reformulation

a. Low VOC Coatings - Product reformulation is the manufacture and use of adhesives and coatings products with lower VOC content than conventional coatings. Reformulated adhesives and coatings products include powder coatings, waterborne adhesives and coatings, radiation-curable adhesives and coatings, and high-solids adhesives and coatings.

b. Powder coatings are essentially 100 percent solids in makeup. They are available in several resin formulations such as: acrylics, polyurethane, epoxy, polyester, nylon, and epoxy/polyester hybrids.
c. Waterborne Paints – Waterborne adhesives and coatings contain water as the major solvent and contain five to 20 percent organic co-solvent to aid in viscosity control, wetting, and pigment dispersion. They have much lower VOC contents than conventional coatings with the same solids content.
d. Radiation-Curable Paints – Radiation curable adhesives and coatings are formulated to cure at room temperature with the assistance of a radiation source, either an ultraviolet (UV) light or an accelerated electron beam (EB). Radiation-curable coatings typically have higher solids contents than that of conventional coatings.
e. High Solids Paints - High-solids adhesives and coatings contain greater than 60 percent solids by volume, whereas conventional coatings contain less than 30 percent solids by volume. The higher solids content helps to lower VOC emissions.

(F) Leak Detection and Repair Program (LDAR)
A leak detection and repair program requires periodic examination of equipment in VOC/HAP service and repair as needed. There are multiple methods that can be used to detect leaks including the option to check for leaks by visual, auditory, and olfactory cues, or by using instrumentation.

3.3 Paint Laboratory Operations (K201) RACT Analysis

A VOC RACT analysis was conducted for the paint laboratory operations emissions unit (K201) according to the requirements of OAC 3745-21-11 as presented in the following section.

3.3.1 Technical Feasibility

RTP reviewed the RBLC, EPA's *Control of VOC Emissions from Ink and Paint Manufacturing*[13], *Control Techniques for Volatile Compound Emissions from Stationary Sources*[14], and EPA's Risk and Technology Review docket materials for the MCM NESHAP,[15] and VOC emissions from the paint laboratory operations can be controlled using equipment or process modifications, product reformulation, or capture and control systems, such as those outlined in Section 3.2. Emissions unit K201 is currently controlled using a capture and control system which consists of a water system or dry filtration system (for particulate matter control) followed by four rotary concentrator wheels and an RTO for VOC control. According to previous Facility RACT requirements contained in OAC 3745-21-09 (MM)(3), the paint laboratory is required to achieve a minimum control efficiency of 90% by weight or a maximum outlet VOC concentration of 20 ppmvd. While many of the control

[13] US EPA, "Control of VOC Emissions form Ink and Paint Manufacturing Processes", EPA-450/3-92-013, April 1992, https://www3.epa.gov/ttn/ctg_act/199204_voc_epa453_3-92-013_ink_paint_manufacture.pdf
[14] "US EPA, Control Techniques for Volatile Compound Emissions from Stationary Sources" EPA 453/R-92-018, December 1992, https://www3.epa.gov/airquality/ctg_act/199212_voc_epa453_r-92-018_control_emissions_stationary.pdf
[15] www.regulations.gov/docket/EPA-HQ-OAR-2018-0747.

technologies outlined in Section 3.2 are technically feasible, there are no RACT control technologies that can consistently achieve emission reductions greater than the current RTO.

It is technically feasible for an RTO to achieve a higher control efficiency than 90%; however, due to the layout of approximately 260 pieces of equipment in nine paint laboratory buildings, it is not technically feasible to achieve a higher capture efficiency. The entire building exhaust is routed to the RTO as opposed to controlling individual pollutant-emitting pieces of equipment. This approach has the impact of controlling more emissions than would be required by OAC rules because even pollutant-emitting activities that normally would not need controls are effectively controlled.

Product reformulation to produce low-VOC or water-based coatings is technologically feasible, but the mandated production or phase-in of reformulated products is technologically infeasible. The coatings manufactured at PPG are largely dictated by the customers' needs. PPG has sustainability goals which include investing in new technologies and innovation to expand sustainable product portfolio, reaching 40 percent of sales from sustainable advantage products by 2025.

3.3.2 Evaluation of Control Options

There are no control options which are technically feasible and will achieve greater control than the existing concentrators and RTO. Therefore, there are no cost-effectiveness estimates included in this section.

3.3.3 Selection of RACT

The RACT for control of VOC from the paint laboratory operation (Process K201) shall be continued compliance with the requirements contained in TVOP #P0127362 and OAC 3745-21-09 (MM).

3.4 Paint Manufacturing Operations (P201) RACT Analysis

A VOC RACT analysis was conducted for the paint manufacturing operations emissions unit (P201) according to the requirements of OAC 3745-21-11 as presented in the following section.

3.4.1 Technical Feasibility

RTP reviewed the RBLC[16], EPA's *Control of VOC Emissions from Ink and Paint Manufacturing*[17], *Control Techniques for Volatile Compound Emissions from Stationary Sources*[18], and EPA's Risk and Technology Review docket materials for the MCM NESHAP[19] and VOC emissions from the

[16] RBLC download included in Appendix D.
[17] US EPA, "Control of VOC Emissions form Ink and Paint Manufacturing Processes", EPA-450/3-92-013, April 1992, https://www3.epa.gov/ttn/ctg_act/199204_voc_epa453_3-92-013_ink_paint_manufacture.pdf
[18] "US EPA, Control Techniques for Volatile Compound Emissions from Stationary Sources" EPA 453/R-92-018, December 1992, https://www3.epa.gov/airquality/ctg_act/199212_voc_epa453_r-92-018_control_emissions_stationary.pdf
[19] www.regulations.gov/docket/EPA-HQ-OAR-2018-0747.

paint manufacturing operations can be controlled using equipment or process modifications, product reformulation, or capture and control systems, such as those outlined in Section 3.2. Emissions unit P201 is currently controlled using a capture and control system which consists of four rotary concentrator wheels and an RTO for VOC control. According to existing RACT requirements contained in OAC 3745-21-09 (MM)(2), VOC emissions from the paint manufacturing operations shall be vented either directly or by means of a building or local exhaust to a control system which shall maintain compliance with any of the following:

- A minimum control efficiency of 98.0 percent by weight for the VOC emissions;
- A maximum outlet VOC concentration of twenty ppm by volume (dry basis); or
- A minimum incineration temperature of one thousand five hundred degrees Fahrenheit.

While many of the control technologies outlined in Section 3.2 are technically feasible there are no RACT control technologies that can consistently achieve emission reductions greater than the current RTO. Additionally, the requirements of the MCM NESHAP are highly effective and reflect a maximum degree of reduction for process P201.[20]

Product reformulation to produce low-VOC or water-based coatings is technologically feasible, but the mandated production or phase-in of reformulated products is technologically infeasible. The coatings manufactured at PPG are largely dictated by the customers' needs. PPG has sustainability goals which include investing in new technologies and innovation to expand sustainable product portfolio, reaching 40 percent of sales from sustainable advantage products by 2025.

As noted previously, process K201 is subject to the requirements of the MCM NESHAP. This includes that each stationary mixer and stationary process vessel be equipped with a tightly fitting vented cover or lid must be closed at all times when the vessel contains HAP, except for material additions and sampling. The MCM NESHAP also requires that PPG implement an LDAR program, performing monthly leak inspections of all equipment in organic HAP service and repairing leaks within 15 days of detection.

While not a new emission reduction technique, the option of upgrading the LDAR program is technically feasible and is discussed in Section 3.4.2 below.

3.4.2 Evaluation of Control Options

There are no control options which are technically feasible and will achieve greater control than the existing concentrators and RTO. Therefore, there are no cost-effectiveness estimates included in this section.

[20] The requirements of these NESHAP rules are generally more stringent than RACT: § 112(d) of the federal CAA requires that the limits in the NESHAP reflect the "maximum degree of reduction" in emissions that the EPA Administrator determines is achievable and establishes a minimum floor equal to the average level of control achieved by the best-performing 12 percent of facilities in the category, whereas RACT requires only that level of control that is "reasonably available." Accordingly, the results of EPA's recent analyses are useful for purposes of identifying and evaluating cost effectiveness of available VOC control techniques and determining achievable emission limits.

There are no new technologies or techniques for reduction of VOC emissions from process P201 not already required, and there is only one identified upgrade of a control technique. PPG currently controls VOC emissions from equipment leaks using a sensory LDAR program. This is the program established by EPA as MACT in the initial MCM NESHAP. In that rulemaking in 2003, EPA identified an instrumental LDAR program as a technically feasible and potentially more effective control technique, evaluated the costs of such a program and the possible incremental reductions in emissions, and determined that the instrumental LDAR program was insufficiently cost-effective to be justifiable as MACT for this source category. [21]

In 2020, EPA performed the statutorily mandated technology review for the MCM NESHAP.[22] EPA again evaluated an instrumental LDAR program as a potentially more effective control technique, determined it is not cost effective, and reaffirmed the sensory LDAR program as MACT.[23]

Based on its review of the cost effectiveness information available in EPA's MCM NESHAP rulemaking dockets, RTP determined that an instrumental LDAR program is not cost-effective as RACT for the Paint Plant at the Facility. Even using assumptions made by EPA in the rulemaking for the Uniform Standards NESHAP, subparts TT and UU of 40 CFR part 63, EPA calculated the cost effectiveness of instrumental LDAR to be $54,000 per ton of organic HAP emission reduction, on average for the facilities covered by the MCM NESHAP technology review, with a range of $20,000 to $97,000 per ton for individual facilities.[24,25] After escalating EPA's data to current dollars and adjusting for HAP:VOC ratio, the cost effectiveness is $37,000 per ton of VOC reduction for the source category as a whole and $14,000 per ton of VOC reduction for the facilities at which the control option is the most cost-effective.[26] Instrumental LDAR at the PPG Cleveland facility would be significantly less cost-effective (i.e., would have a much higher $/ton cost effectiveness value) because nearly all of the VOC emissions from the paint manufacturing operations at the Facility are already collected by both local and building-level exhaust systems and are routed to the rotary concentrator wheels and the RTO; only a small percentage of the total emissions are fugitive.

3.4.3 Selection of RACT

The RACT for control of VOC from the paint manufacturing operations (Process P201) shall be continued compliance with the requirements contained in TVOP #P0127362 and OAC 3745-21-09 (MM).

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[21] 68 *Fed. Reg.* 69163, 69178 (Dec. 11, 2003).
[22] 85 *Fed. Reg.* 49724 (Aug. 14, 2020).
[23] *Ibid* at 49732.
[24] Memorandum from A. Carey, EPA, to Docket No. EPA-HQ-OAR-2018-0747, Aug. 21, 2019, at Table 6.11. Available at https://downloads.regulations.gov/EPA-HQ-OAR-2018-0747-0033/content.pdf. These cost values are in 2018 dollars.
[25] These values are conservatively low for this application, as the achievable incremental emission reductions from MCM NESHAP facilities are less than those from the chemical plants that are the basis for the Uniform Standards NESHAP rulemaking; cost and emission reduction data submitted to EPA by commenters during the MCM NESHAP rulemaking indicate the expected average cost effectiveness is approximately $240,000 per ton of organic HAP emission reduction. See, e.g., https://downloads.regulations.gov/EPA-HQ-OAR-2018-0747-0009/content.pdf.
[26] This calculation assumes a HAP:VOC ratio of 50% and uses the Chemical Engineering Plant Cost Index values of 603.1 for December 2018 and 829.8 for July 2022.

3.5 Dedicated Water-Based Paint Production Equipment (P202) RACT Analysis

Dedicated water-based paint production equipment, emissions unit P202, is defined in OAC 3745-21-09(MM)(4) as:

- Equipment dedicated solely to the production of water-based paint materials
- The VOC content of the water-based paint material is less than or equal to 12% VOC by weight

Equipment that falls in this category is not required to be routed to the RTO because the VOC content is low or zero.

3.5.1 Evaluation of Control Options

As described in Table 2-3, typical annual VOC emissions from emissions unit P202 are approximately one ton per year.

The water-based paint production equipment is located primarily in building 22. Emissions from building 22 are not routed to the concentrator and RTO. Even with the conservative assumption that the adsorption concentrator wheels and the RTO have sufficient capacity for the significant increase in airflow that would result from installing and tying in capture and collection systems in building 22, controlling emissions from P202 would not be cost-effective. Even assuming 100 percent control efficiency, any capture system having an annualized cost in excess of $5,000 per year would be economically unreasonable. The cost of routing building 22 emissions to the RTO would greatly exceed this value as would the implementation of any of the other identified control options.

3.5.2 Selection of RACT

There is no proposed RACT for water-based paint production. PPG proposes to keep complying with OAC 3745-21-09(MM)(4).

Appendix A – Guidance Concerning the Innovative Facility-Wide Air Permit for PPG Cleveland

Division of Air Pollution Control
December 20, 2017

Guidance Concerning the Innovative Facility-wide Air Permit for PPG Cleveland

The purpose of this guidance document is to provide information to Ohio EPA, Cleveland Division of Air Quality staff, PPG Cleveland environmental staff and other interested parties concerning a unique air permit developed and issued to PPG Cleveland.

Background

The PPG company owns an automotive coatings manufacturing plant called PPG Industries, Inc. – Cleveland (hereafter PPG Cleveland) which is located in Cleveland, Ohio (Facility ID: 1318000101). The plant produces a full spectrum of coating products for automotive original equipment manufacturers, including electrocoat, clearcoat, topcoat, waterborne and solvent-based products. The operations at PPG Cleveland consist of over 650 pieces of equipment for the paint manufacturing processes (which involves only physical blending and mixing, with no chemical reactions or resin manufacturing). The paint laboratory operations at the facility consist of over 300 pieces of equipment.

The plant is somewhat unique in that, rather than trying to control air pollutant emissions (primarily VOC emissions from paint fumes) from individual pieces of equipment, the plant currently utilizes a control system (mainly a regenerative thermal oxidizer (RTO)) that controls the VOC emissions from entire buildings or groups of buildings. As a result, PPG Cleveland controls the VOC emissions from all operations found within the controlled buildings, even the equipment that normally would not need to be controlled.

Ohio EPA rules and regulations require companies to obtain air permits for new or modified sources of air pollution. Typically, this means obtaining a permit for any piece of equipment that will emit an air contaminant. There can be much detail work involved in applying for and obtaining air permits both on the permittee's side and on the Ohio EPA's side. This work is important to make sure that the permittee, Ohio EPA staff and other interested parties know the air pollution obligations that need to be met.

For companies like PPG Cleveland, this work can be significant because, in a typical year, there can be many additions, replacements, or changes to the equipment used for the paint manufacturing and laboratory operations at the facility. Under Ohio EPA's typical permitting processes, this can, and has, resulted in a continual stream of permit applications and permits that need to be processed, with essentially no environmental impact due to the high degree of control by the RTO.

In approximately the year 2000, Ohio EPA and PPG Cleveland decided to meet to see if an alternative approach could be developed that would be just as protective of the environment but reduce the overall paperwork burden associated with obtaining permits. Significant effort was expended discussing the various options and deciding on the best approach. Because of this effort, in 2003, a modified Permit-to-Install (PTI) was issued which contained unique requirements designed to more efficiently account for the multiple equipment changes that occur at PPG Cleveland. This PTI was issued January 21, 2003 and identified as permit number 13-03881. It has since been modified several times but the overall approach developed in 2003 has not changed.

Guidance Concerning the Innovative Facility-wide Air Permit for PPG Cleveland

Organization/Design of the Permit

The 2003 PTI is unique in a number of ways. First, the Facility-Wide section contains facility-wide emission limits (rolling, twelve-month summations) for criteria pollutants along with facility wide restrictions on the use of natural gas and fuel oil. Ohio EPA would normally not establish facility-wide restrictions, opting instead to establish restrictions on groups of emissions units. However, the facility-wide approach does generally follow the approach used for Plantwide Applicability Limits (PALs) that can currently be established under OAC rule 3745-31-32. At the time the PTI was processed, the PAL rules had not yet been promulgated. The facility-wide emission restrictions function to establish a modification threshold for the entire facility; that is, if future modifications require the facility-wide limit to be increased, it will be clear that the change will count as a modification under the rules. It also functions to show that the 2003 PTI was restricted as a synthetic minor to avoid major New Source Review (NSR) requirements.

Second, rather than establishing permit language for each pollutant-emitting piece of equipment found at the facility, the 2003 PTI established grouped permit language depending upon the overall organization of the processes and control systems found at PPG Cleveland. This resulted in the following current grouped emissions unit descriptions:

- **K201** - Paint laboratory operation, controlled by a water curtain or dry filtration system located upstream of four rotary concentrator wheels and a regenerative thermal oxidizer (RTO).

- **P201** - Paint manufacturing operations, controlled by four rotary concentrator wheels and a regenerative thermal oxidizer (RTO), 2 stand-alone primary dust collectors (600-DC-1 baghouse and 52-DC-1 baghouse), and three dust collectors: 9-DC-1 baghouse, 19-DC-1 baghouse, and 21-DC-1 baghouse. P201 is located upstream of the four rotary concentrator wheels and an RTO.

- **P202** - Dedicated water based paint production equipment as defined in OAC rule 3745-21-09(MM)(4).

  The original PTI 13-03881 also included emissions unit B007 which was a 28 mmBtu/hr boiler that is now permanently shut down.

  Emissions units K201 and P201 are vented to the same regenerative thermal oxidizer which controls the VOC emissions for these emissions units.

The permit terms for the 28 mmBtu/hr boiler follows the standard convention in that the terms are written for a single emissions unit. However, for the paint manufacturing sources of emissions found at the plant, the pollutant-emitting pieces of equipment were organized into logical groupings to establish grouped emissions units. For instance, emissions unit K201, Paint Laboratory Operations, contains all of the pollutant-emitting pieces of equipment found in the paint laboratory buildings that are controlled by the regenerative thermal oxidizer (RTO)[1]. In this case, the entire building exhaust is routed to the RTO as opposed to trying to control individual pollutant-emitting pieces of equipment. This approach has the impact of controlling more emissions than required by the rule because even pollutant-emitting activities that normally would not need controls are controlled.

[1] Note that emissions units K201 and P201 were previously controlled by the two REECO incinerators which were replaced through the 2006 PTI with a single regenerative thermal oxidizer. The replacement of the incinerators did not change the overall approach of the permit discussed in this guidance document.

Guidance Concerning the Innovative Facility-wide Air Permit for PPG Cleveland

To properly account for the fact that the Paint Laboratory Operations emissions unit K201 contains multiple, and changing, pollutant-emitting equipment, the permit contains a table (Table 2) that contains a listing of all of the equipment contained in the Paint Laboratory Operations. This listing is intended to ensure that all pollutant-emitting equipment is properly covered by the grouped emissions unit and to allow permit writers, inspectors and company personnel the ability to verify that the equipment properly fits the grouped classification.

The same grouping approach is used for the Paint Manufacturing Operations group (emissions unit P201), and the Dedicated Water Based Paint Production Equipment group (emissions unit P202). Each of these groups also have lists of the equipment that require an annual update of the list.

When developing the permit, both Ohio EPA and PPG Cleveland recognized that business needs required rapid changes to the paint manufacturing equipment contained within the facility. Prior to the 2003 PTI, the normal process used to obtain permits had failed because neither PPG Cleveland nor Ohio EPA could keep up with the rapid changes needed. To address this issue, the 2003 PTI allowed for rapid changes to the equipment contained within the facility without first waiting for a PTI to be processed. Instead, the permit sets up a system whereby PPG Cleveland maintains a listing of all of the changes and then provides an updated list of equipment at the end of each calendar year. This approach allows rapid changes to the equipment within the facility, recognizes that the VOC emissions will be controlled by the RTO, and allows Ohio EPA and Cleveland Division of Air Quality staff to review the equipment to ensure the new equipment fits the grouping of equipment as established in the PTI.

Processing New or Modified Equipment Contained Within the Grouped Limits

Under normal permit processes, when a company plans to either install a new emissions unit or modify an existing emissions unit, they are obligated to first apply for and then obtain an installation permit (PTI). This process is designed to ensure that each emissions unit will comply with the applicable air pollution control requirements. Because this permit is unique in that individual pieces of equipment are combined into larger, grouped emissions units, the permit utilizes unique methods/processes to ensure compliance. Under this permit, when PPG Cleveland decides to either install a new piece of equipment or modify an existing piece of equipment contained within one of the grouped emissions units, PPG Cleveland must meet certain obligations. These are discussed next.

PPG Cleveland Permitting Obligations

Under the current PTI and Title V operating permit, PPG Cleveland has the following obligations:

- PPG Cleveland must keep track of all installed, modified, relocated and/or removed, equipment within the facility.

- PPG Cleveland must confirm that the installed or modified equipment changes will not result in non-compliance with the grouped emission limits. For instance, for the Paint Laboratory Operations group (K201), PPG Cleveland must confirm that even with the changes, they can still comply with the *145.0 tons VOC per year as a rolling, twelve-month summation for K201 and P201 combined* limit contained in the permit. If the proposed change will require the need to increase the allowable emission limit, then PPG Cleveland will need to contact the Cleveland DAQ and discuss the need to submit a PTI application for the new or modified pieces of equipment. If it is necessary to issue a PTI for the proposed change, then PPG will need to submit the corresponding Title V modification application as well.

- PPG Cleveland must confirm that the installed or modified equipment changes will not result in non-compliance with any other requirement contained in the permit terms. This information must be maintained by PPG Cleveland but does not need to be submitted to Ohio EPA prior to initiating the change. If the proposed change will result in non-compliance with any permit requirement, then PPG Cleveland will need to contact the Cleveland DAQ and discuss the need to submit a PTI application for the new or modified pieces of equipment. If it is necessary to issue a PTI for the proposed change, then PPG will need to submit the corresponding Title V modification application as well.

- PPG Cleveland must confirm that the new or modified equipment will comply with other applicable state or federal rules. For instance, if PPG Cleveland were to install a degreaser within the K201 building, they would have to confirm that the degreaser complies with the equipment requirements contained in Ohio Administrative Code (OAC) paragraph 3745-21-09(O) and/or the MACT Subpart T requirements, if applicable. If the proposed change will result in non-compliance with either the state or federal rules, then PPG Cleveland will need to contact the Cleveland DAQ and discuss how the piece of equipment can be installed and conform to the appropriate requirements. If it is necessary to issue a PTI for the proposed change as a result of increased emissions, then PPG will need to submit the corresponding Title V modification application as well.

- PPG Cleveland must confirm that the new or modified equipment will not result in some kind of conflict within the permit. For instance, if the modified equipment resulted in PPG Cleveland no longer being able to meet the record keeping requirements in the existing permit, then a conflict would exist. If there is some kind of conflict, then PPG Cleveland should discuss the conflict with the Cleveland Division of Air Quality (Cleveland DAQ) to decide if a change to the permit (both the PTI and Title V) is needed immediately, or if the change(s) can be addressed when the Title V operating permit is renewed. If a PTI is needed, then PPG Cleveland will need to submit the PTI application as well as the corresponding Title V permit modification application.

- PPG Cleveland must confirm that the new or modified equipment will not result in applicability of the major New Source Review (NSR) requirements contained in OAC rules 3745-31-10 through 27. If the proposed change will result in major NSR applicability, then PPG Cleveland will need to contact the Cleveland DAQ and discuss the need to submit a PTI application for the new or modified pieces of equipment. If it is necessary to issue a PTI for the proposed change, then PPG will need to submit the corresponding Title V modification application as well.

- PPG Cleveland must submit updated *Emissions Unit Tables 2, 3 and 4* annually following the requirements of Part II – Facility Specific Terms and Condition, term B.2.f)(4) of both the PTI and Title V permit. The updated Emissions Unit Tables shall be submitted as an annual compliance report through the eBusiness Center: Air Services.

- PPG Cleveland must discuss with the Cleveland DAQ any identified non-compliance issues associated with the new or modified equipment prior to installation or modification of the equipment.

- When the Title V permit needs to be renewed, PPG Cleveland must submit an updated Title V renewal application that includes updated *Emission Unit Tables 2, 3 and 4*.

- PPG Cleveland is not required to submit a PTI application for each new or modified piece of equipment as the changes occur unless one or more of the situations noted above are being triggered.

Guidance Concerning the Innovative Facility-wide Air Permit for PPG Cleveland

Ohio EPA Permitting Obligations

Because the permit process that PPG Cleveland must follow for new or modified equipment under the grouped emissions units contained in this permit is unique, Ohio EPA and Cleveland DAQ have some different processes they must follow. These include:

- When PPG Cleveland submits the updated *Emissions Unit Tables 2, 3 and 4* through Air Services as an annual compliance report on an annual basis, Ohio EPA and Cleveland DAQ will review the list of the changes. During this review, the following will be evaluated:
  - Confirm that, based on the information submitted, that the combined emissions unit will still comply with the permit requirements.
  - Confirm that it is likely that major NSR has not been tripped.
  - Confirm compliance with any other air pollution rule.
  - If Ohio EPA and/or Cleveland DAQ have any concerns of the above, then they should contact PPG Cleveland to discuss their concerns.
  - Ohio EPA will maintain the updated *Emissions Unit Tables 2, 3 and 4* in STARS2 so that any inspector can understand what equipment has been installed, removed, or relocated within the facility during an inspection.
- When PPG Cleveland submits their application to renew their Title V permit, Ohio EPA and Cleveland DAQ shall conduct their normal review. As part of this review, Ohio EPA and Cleveland DAQ shall update the *Emissions Unit Tables 2, 3 and 4* within the Title V permit based on the updated tables that are submitted with the Title V renewal application.
- Ohio EPA and Cleveland DAQ will only need to review a PTI application when PPG Cleveland installs or modifies equipment contained within the grouped emissions units that triggers one or more of the situations noted above under the "PPG Cleveland Permitting Obligations". Depending on the change that is being proposed, the PTI will be processed as a new installation, Chapter 31 modification, or Administrative Modification. The Title V permit will then be modified accordingly as well.

Note that by taking this approach, the tables in the PTI will only be updated if there is a need to process a PTI as noted above. The tables in the Title V permit will only be updated at the time of renewal unless there is a need to process a PTI which would then require a Title V modification. Otherwise, the tables are only adjusted outside of the permit with each annual update without the need for a permit modification.

Caveats

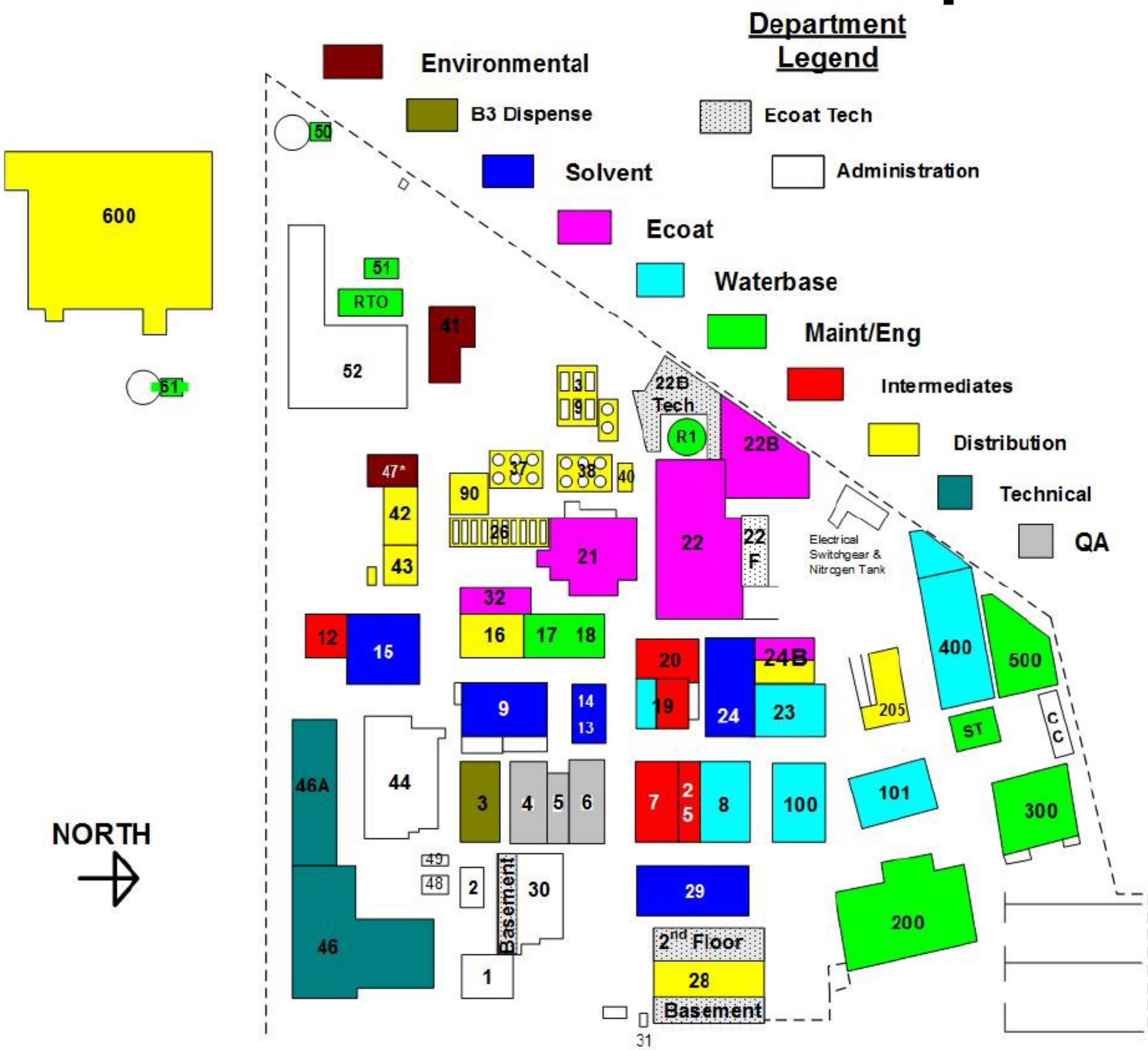
This guidance document concerns the PPG Cleveland installation permit number 13-03881 and its revisions as well as the Title V operating permit. As a guidance document, it does not have the force of rule or law. Ohio EPA retains the right to revise or revoke it at any time.

Contact

For more information, contact Michael Hopkins at ***Michael.Hopkins@epa.ohio.gov*** or (614) 644-3611.

Appendix B – Facility Plot Plan

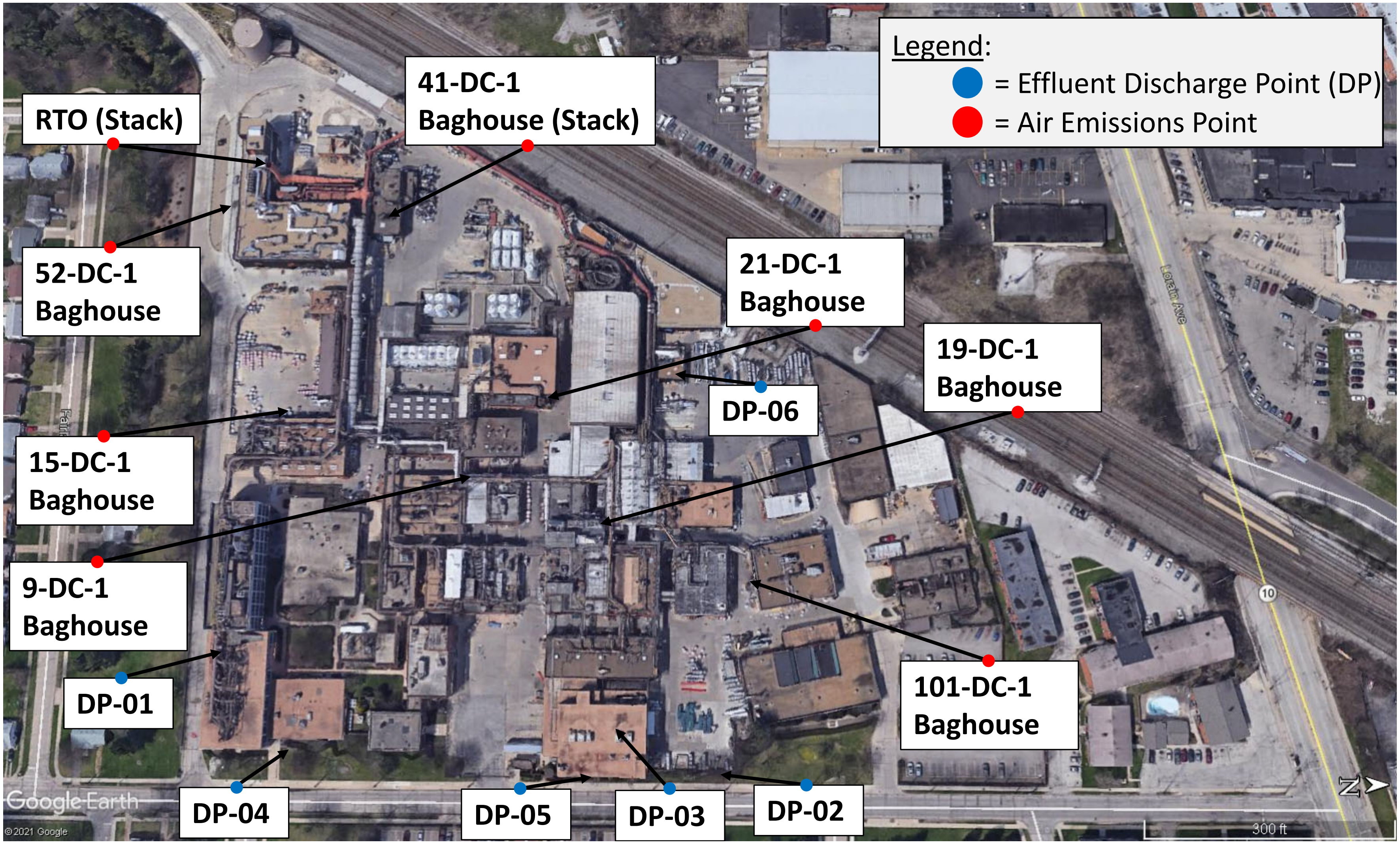
Cleveland Plant Site Map



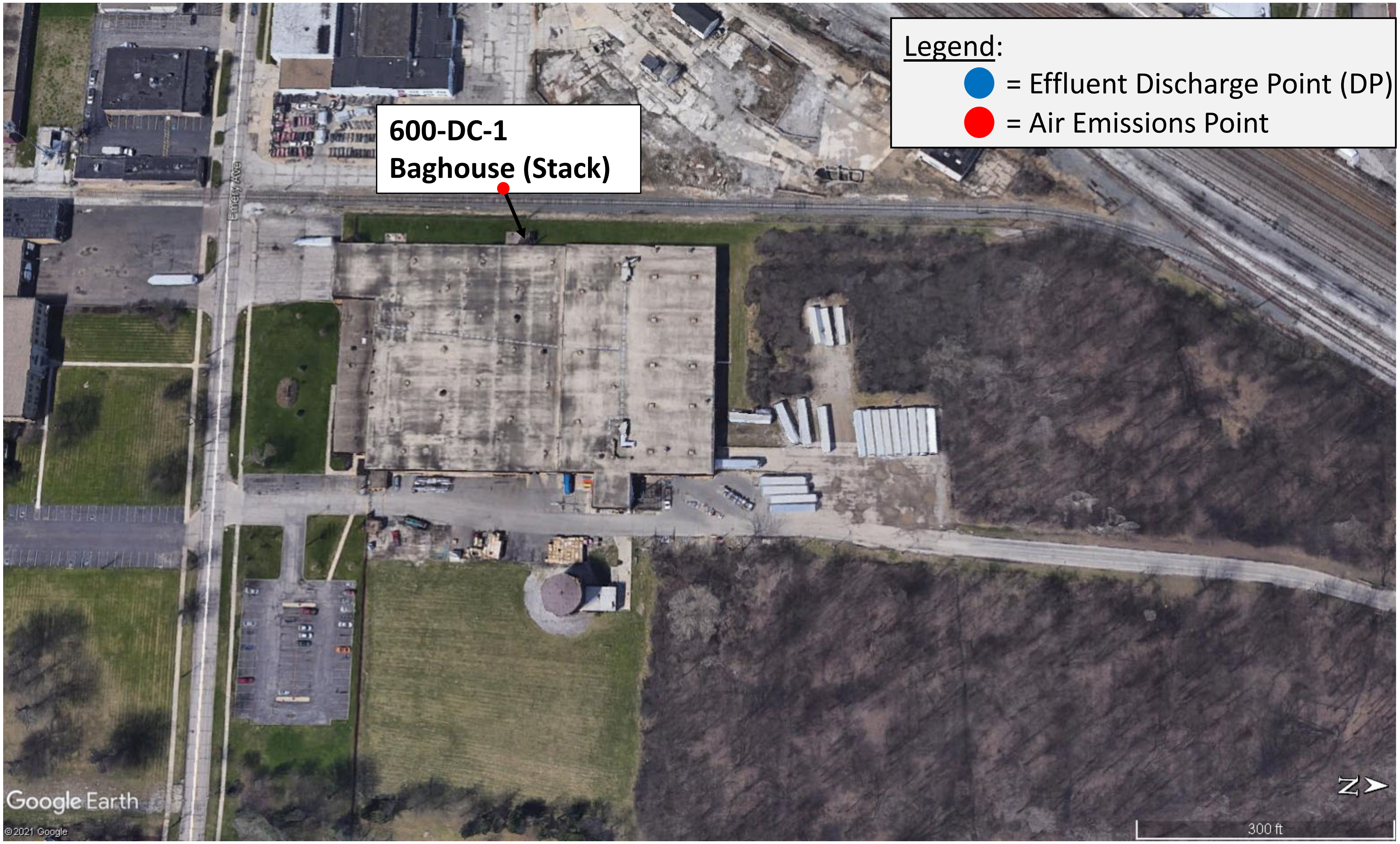
Building Legend

1	Administrative Offices
2	Process Engineering Offices
3	LEAD
4	Quality Assurance Lab
5	Quality Assurance Lab
6	Quality Assurance Lab
7	Grinding
8	Blending
9	Thin and Tint
9A	Women's Locker Room
9B	Solvent Factory Offices
12	Portable Cleaning
13	Tint and Adjust
14	Tint and Adjust
15	Preassembly and Blending
16	Resin Storage
17	Air Compressors
18	Boilers
19	Premixing
20	Pigment Storage
21	E-Coat Grinding
22	E-Coat Blending and Lab
22B	E-Coat Storage and UFRO
22C	E-Coat Tankwagon Loading
22F	E-Coat Lab
23	Dispense
24	Blending
25	Grinding
26	Tank Farm
28	Distribution Docks / Resin Storage
29	Blending
30	Admin. Offices / E-Coat Lab
31	Fire Pump House
32	Resin Storage
37	Tank Farm
38	Tank Farm
39	Tank Farm
40	Pump House
41	Waste Treatment
42	Hot Room
43	Hot Room
44	Employee Services
45	Gas Meter Building
46	Technical Lab and Offices
46A	Technical Lab and Offices
47	Solvent Recovery
48	CEI Transformers
49	Electrical Switchgear
50	North Water Tank / Pump House
51	Building 52 Utilities
52	Large Batch Blending
61	South Water Tank / Pump House
90	Tankwagon Unloading Station
100	Waterbase Manufacturing
101	Waterbase Primer Manufacturing
200	Maintenance and MRO Storage
205	Water/EHS Offices and Dock
300	TowMotor Shop / Env. Services
400	Water QA Park / MT tote Storage
500	Maint. / Plant Eng. Offices
600	RM Warehouse
CC	Conference Center
ST	Salt Tent

PPG Cleveland (3800 W. 143rd St., Cleveland, OH 44111)
Air Emissions & Discharge Points



PPG Cleveland (Building 600 – Emery Ave.)
Emission & Discharge Points



Appendix C – Most Recent Stack Test Summary
(full report on file with OEPA)

			EPA TEST METHODS UTILIZED				
			M1/M2 (Pre Flows)	M1/M2 (Post Flows)	M4 (%H_2O)	M18 (CH_4)	M25A (TGO)
Date	Run No.	Sampling Location	Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)
10/11/2018	1	K201 RTO Inlet Duct	7:43 - 8:48 6	9:58 - 10:13 5	8:32 - 9:32 60	8:32 - 9:32 60	8:32 - 9:32 60
10/11/2018	2	K201 RTO Inlet Duct	9:58 - 10:13 5	11:36 - 12:13 6	10:20 - 11:20 60	10:20 - 11:20 60	10:20 - 11:20 60
10/11/2018	3	K201 RTO Inlet Duct	11:36 - 12:13 6	13:07 - 13:15 4	11:55 - 12:55 60	11:55 - 12:55 60	11:55 - 12:55 60
10/11/2018	1	P201 RTO Inlet Duct	7:42 - 8:11 7	9:55 - 10:24 5	8:32 - 9:32 60	8:32 - 9:32 60	8:32 - 9:32 60
10/11/2018	2	P201 RTO Inlet Duct	9:55 - 10:24 5	11:32 - 12:01 5	10:20 - 11:20 60	10:20 - 11:20 60	10:20 - 11:20 60
10/11/2018	3	P201 RTO Inlet Duct	11:32 - 12:01 5	13:03 - 13:25 5	11:55 - 12:55 60	11:55 - 12:55 60	11:55 - 12:55 60

TABLE 2.1.1 - SAMPLING MATRIX

			EPA TEST METHODS UTILIZED			
			M1/M2 (Pre Flows)	M1/M2 (Post Flows)	M3 (Dry Mol. Wt.)	M4 (%H_2O)
Date	**Run No.**	**Sampling Location**	**Sampling Time / Duration (min)**	**Sampling Time / Duration (min)**	**Sampling Time / Duration (min)**	**Sampling Time / Duration (min)**
10/11/2018	1	K201/P201 RTO Exhaust Stack	8:17 - 8:29 12	9:43 - 9:51 8	8:32 - 9:32 60	8:32 - 9:32 60
10/11/2018	2	K201/P201 RTO Exhaust Stack	9:43 - 9:51 8	11:30 - 11:37 7	10:20 - 11:20 60	10:20 - 11:20 60
10/11/2018	3	K201/P201 RTO Exhaust Stack	11:30 - 11:37 7	13:02 - 13:10 8	11:55 - 12:55 60	11:55 - 12:55 60

			EPA TEST METHODS UTILIZED		
			M18 (CH_4)	M25A (TGO)	M9 (VEs)
Date	**Run No.**	**Sampling Location**	**Sampling Time / Duration (min)**	**Sampling Time / Duration (min)**	**Sampling Time / Duration (min)**
10/11/2018	1	K201/P201 RTO Exhaust Stack	8:32 - 9:32 60	8:32 - 9:32 60	8:32 - 9:32 60
10/11/2018	2	K201/P201 RTO Exhaust Stack	10:20 - 11:20 60	10:20 - 11:20 60	10:20 - 11:20 60
10/11/2018	3	K201/P201 RTO Exhaust Stack	11:55 - 12:55 60	11:55 - 12:55 60	11:55 - 12:55 60

All times are Eastern Daylight Time.

TABLE 2.1.2 - SAMPLING MATRIX

	K201 RTO Inlet Duct				P201 RTO Inlet Duct			
	Run 1	**Run 2**	**Run 3**	**Average**	**Run 1**	**Run 2**	**Run 3**	**Average**
Volatile Organic Compound Emissions (as propane) (lb/hr)	52.9	57.4	45.2	51.8	42.1	29.9	27.7	33.3
Methane Corrected Total Gaseous Organic Concentration (as propane) (ppmvd)	45.0	49.7	39.4	44.7	113	79.0	73.9	88.6
Methane Concentration (as propane) (ppmvd)	2.73	2.61	2.59	2.65	1.36	1.43	1.43	1.40
Total Gaseous Organic Concentration (as propane) (ppmvd)	47.8	52.3	42.0	47.4	114	80.4	75.4	90.0
Duct Gas Average Flow Rate (scfm)	174,064	170,839	169,608	171,504	55,172	56,026	55,316	55,505
Duct Gas Average Flow Rate (dscfm)	170,986	168,028	167,253	168,756	54,311	55,212	54,628	54,717
Duct Gas Average Velocity (fpm)	4,576	4,486	4,447	4,503	1,768	1,790	1,764	1,774
Duct Gas Average Static Pressure (in-H2O)	-2.50	-2.50	-2.50	-2.50	-1.50	-1.50	-1.50	-1.50
Duct Gas Average Temperature (°F)	74.0	73.4	73.3	73.6	73.8	72.1	72.1	72.7
Duct Gas Percent by Volume Moisture (%H2O)	1.77	1.65	1.39	1.60	1.56	1.45	1.24	1.42
Measured Duct Inner Diameter (in)*	85.7 X 86.0				77.7 X 77.6			

* The K201 RTO Inlet Duct and P201 RTO Inlet Duct were elliptical in shape.

TABLE 2.2.1 - EMISSION RESULTS

	K201/P201 Combined RTO Inlet Ducts				K201/P201 RTO Exhaust Stack			
	Run 1	**Run 2**	**Run 3**	**Average**	**Run 1**	**Run 2**	**Run 3**	**Average**
VOC Destruction Efficiency (%)	-	-	-	-	94.6	94.8	94.6	94.6
Volatile Organic Compound Emissions (as propane) (lb/hr)	95.0	87.3	73.0	85.1	5.17	4.57	3.95	4.56
Methane Corrected Total Gaseous Organic Concentration (as propane) (ppmvd)	-	-	-	-	3.35	2.95	2.52	2.94
Methane Concentration (as propane) (ppmvd)	-	-	-	-	2.11	2.09	1.97	2.06
Total Gaseous Organic Concentration (as propane) (ppmvd)	-	-	-	-	5.46	5.04	4.49	5.00
Maximum Six-Minute Average of Visible Emissions (%-opacity)	-	-	-	-	0.0	0.0	0.0	0.0
Stack Gas Average Flow Rate (acfm)	-	-	-	-	247,313	247,336	248,776	247,808
Stack Gas Average Flow Rate (scfm)	-	-	-	-	228,584	228,823	230,579	229,329
Duct/Stack Gas Average Flow Rate (dscfm)	225,297	223,240	221,881	223,473	224,738	225,290	227,783	225,937
Stack Gas Average Velocity (fpm)	-	-	-	-	3,284	3,285	3,304	3,291
Stack Gas Average Static Pressure (in-H_2O)	-	-	-	-	-0.57	-0.55	-0.50	-0.54
Stack Gas Average Temperature (°F)	-	-	-	-	89.2	88.7	88.5	88.8
Stack Gas Percent by Volume Moisture (%H_2O)	-	-	-	-	1.68	1.54	1.21	1.48
Measured Stack Inner Diameter (in)*	-				117.6 X 117.4			
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	-	-	-	-	0.00	0.00	0.00	0.00
Percent by Volume Oxygen in Stack Gas (%-dry)	-	-	-	-	19.83	20.00	20.00	19.94
Percent by Volume Nitrogen in Stack Gas (%-dry)	-	-	-	-	80.17	80.00	80.00	80.06

* The K201/P201 RTO Exhaust Stack was elliptical in shape.

TABLE 2.2.2 - EMISSION RESULTS

Appendix D – RBLC Download

COMPREHENSIVE REPORT
Report Date:03/24/2023

Facility Information

RBLC ID:	IN-0348 (final)	**Date Determination Last Updated:**	08/16/2022
Corporate/Company Name:	PPG INDUSTRIES, INC.	**Permit Number:**	021-45156-00061
Facility Name:	PPG INDUSTRIES, INC.	**Permit Date:**	05/06/2022 (actual)
Facility Contact:	JASON NOWAK (248) 408-8354	**FRS Number:**	110040629291
Facility Description:		**SIC Code:**	2851
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	325510
Permit URL:	https://permits.air.idem.in.gov/45156f.pdf		
EPA Region:	5	**COUNTRY:**	USA
Facility County:	CLAY		
Facility State:	IN		
Facility ZIP Code:	47834		
Permit Issued By:	INDIANA DEPT OF ENV MGMT, OFC OF AIR (Agency Name) MR. MATT STUCKEY(Agency Contact) (317) 233-0203 mstuckey@idem.in.gov		
Permit Notes:	BACT was reopened to add Tank washing unit.		

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	1.1100 (Tons/Year)
Nitrogen Oxides (NOx)	2.5300 (Tons/Year)
Particulate Matter (PM)	156.8000 (Tons/Year)
Sulfur Oxides (SOx)	0.0100 (Tons/Year)
Volatile Organic Compounds (VOC)	99.1300 (Tons/Year)

Process/Pollutant Information

PROCESS NAME:	Large, small, and bulk batch lines, spray fill line, big blue, tank washing unit
Process Type:	49.009 (Paint/Coating/Adhesives Manufacturing)
Primary Fuel:	
Throughput:	0
Process Notes:	

POLLUTANT NAME:	Volatile Organic Compounds (VOC)
CAS Number:	VOC
Test Method:	Unspecified
Pollutant Group(s):	(Volatile Organic Compounds (VOC))
Emission Limit 1:	0.0004 LB VOC/ LB VOC USED
Emission Limit 2:	0.0200 LB VOC/ LB VOC USED
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:	OTHER CASE-BY-CASE
Other Applicable Requirements:	
Control Method:	(A) Thermal oxidizer (RTO)
Est. % Efficiency:	98.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	The VOC emissions from the Large Batch Line, Small Batch Line, Bulk Batch Line, Spray Fill Line, Tank Washing Unit, and Big Blue emission units shall be controlled by a thermal oxidizer. The overall control efficiency, including capture and destruction efficiency, shall be at least 98%. The emissions from the Large Batch Line, Small Batch Line, Bulk Batch Line, Spray Fill Line, and Big Blue emission units shall not exceed 0.0004 pound of VOC per pound of VOC used. The emissions from the Tank Washing Unit shall not exceed 0.02 pound of VOC per pound of VOC used.

Facility Information

RBLC ID:	IN-0322 (final)	**Date Determination**	
		Last Updated:	05/26/2021
Corporate/Company Name:	PPG INDUSTRIES, INC.	**Permit Number:**	021-42620-00061
Facility Name:	PPG INDUSTRIES, INC.	**Permit Date:**	07/02/2020 (actual)
Facility Contact:	JUSTIN HADDON 812-442-5080	**FRS Number:**	Not Found
Facility Description:	Industrial Coatings Manufacturing facility	**SIC Code:**	2851
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	325510
Permit URL:	https://permits.air.idem.in.gov/42620f.pdf		
EPA Region:	5	**COUNTRY:**	USA
Facility County:	CLAY		
Facility State:	IN		

Facility ZIP Code: 47834

Permit Issued By: INDIANA DEPT OF ENV MGMT, OFC OF AIR (Agency Name)
MR. MATT STUCKEY(Agency Contact) (317) 233-0203 mstuckey@idem.in.gov

Other Agency Contact Info: Permit Writer: Tamara Havics 317-232-8219 THavics@IDEM.IN.GOV
Section Chief: Ghassan Shalabi 317-233-7622 GShalabi@IDEM.IN.GOV

Permit Notes:

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	0.8700 (Tons/Year)
Nitrogen Oxides (NOx)	1.0300 (Tons/Year)
Particulate Matter (PM)	44.7800 (Tons/Year)
Sulfur Oxides (SOx)	0.0100 (Tons/Year)
Volatile Organic Compounds (VOC)	393.9500 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: Large, small, and bulk batch lines, spray fill line, big blue

Process Type: 49.009 (Paint/Coating/Adhesives Manufacturing)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 98.0000 % OVERALL CONTROL
Emission Limit 2: 0.0004 LB / LB OF VOC USED
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements:
Control Method: (A) thermal oxidizer
Est. % Efficiency: 98.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown

Pollutant/Compliance Notes: State BACT

Facility Information

RBLC ID:	WV-0030 (final)	**Date Determination Last Updated:**	02/20/2019
Corporate/Company Name:	ROXUL USA, INC.	**Permit Number:**	R14-0037
Facility Name:	RAN FACILITY	**Permit Date:**	04/30/2018 (actual)
Facility Contact:	METTE DREJSTEL 9999999999 METTE.DREJSTEL@ROCKWOOL.COM	**FRS Number:**	Not Found
Facility Description:	Mineral wool manufacturing facility. Only the larger emission sources placed in the RBLC. See permit for individual BACT on many smaller n/g fired units, material handling emission sources, fugitive, emission sources, etc.	**SIC Code:**	3296
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	327993
Permit URL:	https://dep.wv.gov/daq/Documents/April 2018 Permits and Evals/037-00108_PERM_R14-0037.pdf		
EPA Region:	3	**COUNTRY:**	USA
Facility County:	JEFFERSON		
Facility State:	WV		
Facility ZIP Code:	25340		
Permit Issued By:	WEST VIRGINIA DEPT. OF ENVRIONMENTAL PROTECTION; DIV. OF AIR QUALITY (Agency Name) MR. JOE KESSLER, PE(Agency Contact) (304)926-0499X1219 Joseph.r.kessler@wv.gov		
Other Agency Contact Info:	Permit Engineer: Joe Kessler, PE West Virginia Division of Air Quality 601-57th St., SE Charleston, WV 25304 Phone: (304) 926-0499 x1219 Joseph.r.kessler@wv.gov		
Permit Notes:			

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	WV	Dolly Sods	100km - 50km
CLASS1	VA	James River Face	100km - 50km
CLASS1	WV	Otter Creek	100km - 50km
CLASS1	VA	Shenandoah NP	< 100 km

Facility-wide	**Pollutant Name:**	**Facility-wide Emissions Increase:**

Emissions:	Carbon Monoxide	71.4000 (Tons/Year)
	Nitrogen Oxides (NOx)	238.9600 (Tons/Year)
	Particulate Matter (PM)	250.8700 (Tons/Year)
	Sulfur Oxides (SOx)	147.4500 (Tons/Year)
	Volatile Organic Compounds (VOC)	471.4100 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: Melting Furnace

Process Type: 90.022 (Mineral Wool Manufacturing)

Primary Fuel: coal

Throughput: 0

Process Notes: Melting furnace uses natural gas to warm up baghouses to prevent condensation. Once to temperature, coal is primary fuel. Pet coke may be used in lieu of coal if coal not available. Single emission limit regardless of fuel burned. Throughput is claimed confidential.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 37.3700 LB/HR 30-DAY ROLLING

Emission Limit 2: 163.6700 TONS/YEAR 12-MONTH ROLLING

Standard Emission: 37.3700 LB/HR 30-DAY ROLLING

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A

Control Method: (B) Integrated SNCR, Oxy-Fired Burners

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Will utilize NOx CEMs.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM

Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 7.4700 LB/HR
Emission Limit 2: 32.7300 TONS/YEAR
Standard Emission: 7.4700 LB/HR
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (A) Baghouse
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 8.2200 LB/HR
Emission Limit 2: 36.0100 TONS/YEAR
Standard Emission: 8.2200 LB/HR
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (A) Baghouse
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM