

**ACTIVE**CATEGORY Type: **COATING - POWDER**

BACT Category: Minor Source BACT

BACT Determination Number	382	BACT Determination Date:	02/09/2026
<b>Equipment Information</b>			
Permit Number:	26840		
Equipment Description:	POWDER COATING		
Unit Size/Rating Capacity:	ALL		
Equipment Location:	PACIFIC POWDER COATING 8638 23RD AVE, SACRAMENTO, CA 95826		
<b>BACT Determination Information</b>			
District Contact:	Matt Baldwin	Phone No.:	(279) 207-1119
		Email:	mbaldwin@airquality.org
<b>ROCs</b>	Standard	< 1.5% VOC by weight (APC device if emissions $\geq$ 21,800 lb/year)	
	Technology Description	Low-VOC Coating (< 1.5% VOC by weight) and Natural gas fired curing oven. If the total uncontrolled VOC emissions from the emissions unit are $\geq$ 21,800 pounds per year, a VOC control system must be installed with at least 98.5% overall system efficiency (capture and destruction).	
	Basis	Achieved in Practice	
<b>NOx</b>	Standard	30 ppmvd @ 3% O <sub>2</sub>	
	Technology Description	Low-NOx burner on curing oven	
	Basis	Achieved in Practice	
<b>SOx</b>	Standard	Natural gas fired curing oven	
	Technology Description	Natural gas fired curing oven	
	Basis	Achieved in Practice	
<b>PM10</b>	Standard	$\geq$ 99% efficiency	
	Technology Description	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters	
	Basis	Achieved in Practice	
<b>PM2.5</b>	Standard	$\geq$ 99% efficiency	
	Technology Description	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters	
	Basis	Achieved in Practice	
<b>CO</b>	Standard	Natural gas fired curing oven	
	Technology Description	Natural gas fired curing oven	
	Basis	Achieved in Practice	

<b>LEAD</b>	Standard	No Standard
	Technology Description	
	Basis	
Comments:		

Printed:

02/10/2026



## BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

	<b>DETERMINATION NO.:</b> <u>382</u>
	<b>DATE:</b> <u>12/23/2025</u>
	<b>ENGINEER:</b> <u>Matt Baldwin</u>
<b>Category / General Equip Description:</b>	<u>Powder Coating</u>
<b>BACT Category:</b>	<u>Minor Source BACT / Non-major modification at a Major Source</u>
<b>Equipment Size / Rating:</b>	<u>All</u>
<b>Previous BACT Det. No.:</b>	<u>290</u>

This Best Available Control Technology (BACT) determination category was determined under a modification to Permit to Operate 26840 (Pacific Powder Coating). The applicant proposed to increase proposed daily, quarterly, and annual powder usage.

This BACT determination will update determination #290 for Powder Coating.

Powder coating involves the application of a thin layer of dry powder to a metal part. The metal part is electrically charged to attract the particles to the metal parts, which are spray-applied in a booth. The metal parts are then transferred to a curing oven, wherein the powder melts and bonds to the metal part as a hard, protective coating.

Unlike conventional coatings, powder coatings do not require a carrier solvent, and are thus inherently low-VOC. Therefore, the District treats powder coatings differently than liquid coatings when reviewing BACT.

Because an electrostatic charge is used to attract the coating to the substrate, most powder coatings are used to coat metal parts and products and are subject to District rules that regulate the coating of metal parts and products. Powder coatings may also be applied to plastic, wood, and other materials using a modified process that doesn't involve electrostatic spray equipment but rather dipping the product in a fluidized bed of powder or pre-heating the item, spraying it with powder such that it begins to melt, and then further curing it in an oven. So, when being applied to other substrates, the applicable District rule changes to match the substrate. Due to this nuance, the scope of this determination will be limited to metal parts and products and will focus only on those achieved in practice BACT determinations that included powder coatings.

## BACT / T-BACT ANALYSIS

### A. ACHIEVED IN PRACTICE (Rule 202, §205.1a):

The following control technologies are currently employed as BACT/T-BACT for powder coating by the following agencies and air pollution control and air quality management districts:

#### US EPA

#### BACT

Source: [EPA RACT/BACT/LAER Clearinghouse](#)

Powder Coating Operation (A)	
VOC	N/A – No BACT determinations found
NOx	N/A – No BACT determinations found
SOx	N/A – No BACT determinations found
PM10	N/A – No BACT determinations found
PM2.5	90% efficiency
CO	N/A – No BACT determinations found

(A) See Appendix A.

The RBLC clearinghouse includes two entries (MI-0449 & MI-0444) which limit the VOC content of coatings to 0.05 pounds per gallon of applied coating solids based on a calendar day avg. This emission limit is based on LAER and designed to show compliance with new source performance standards for automobile and light duty truck surface coating operations when conducted at an assembly plant (40 CFR Part 60, Subpart MM).

The standard expressed in gallons of applied coating solids is intended to encompass the entire primer-surfacer coating operation and the entire topcoat operation. Additionally, the coating line is treated as a single entity and includes all spray booths, flash-off areas and bake ovens where primer-surfacers, topcoats and related materials are applied, dried, and cured, except for the final off-line repair. Facilities that are required to comply with these standards typically have thermal oxidizers to capture and control VOC emissions from the entire coating line.

Powder coating in Sacramento County typically consists of powder coating of miscellaneous metal parts and not entire automobiles in conjunction with other coating operations. Thus, operations subject to Subpart MM are outside the scope of this BACT determination, and this VOC limit doesn't apply.

#### T-BACT

There are no T-BACT standards published in the clearinghouse for this category.

#### RULE REQUIREMENTS:

There are no NSPS or NESHAP requirements for powder coating. 40 CFR Part 63, Subpart HHHHHH – NESHAP for Paint Stripping and Miscellaneous Surface Coating Operations exempts powder coating (See definition of "Spray-applied coating operation," 40 CFR §63.11180).

### **US EPA (continued)**

Although EPA has not promulgated a rule covering powder coating, they published Control Techniques Guidelines for Miscellaneous Metal Parts and Plastic Parts Coatings (EPA-453/R-08-003) that identify Reasonably Available Control Measures and Reasonably Available Control Technology. These guidelines establish achieved in practice control measures that are used by state and local agencies when developing rules for their State Implementation Plans and are used by U.S. EPA when approving those rules.

The guidelines identify several jurisdictions that have adopted a VOC limit of 0.5 kg/L (0.4 lb/gal) when using powder coatings.

### **California Air Resources Board (CARB)**

#### **BACT**

Source: [CARB BACT Clearinghouse](#)

The Air Resource Board is required to maintain a technology clearinghouse that identifies BACT. Their BACT Determination Tool includes two published BACT determination for powder coating.

Agency	Description	Date	District ID
South Coast	Oven – non-food	5/13/2003	385818
South Coast	Spray Booth	3/18/2014	322432

The South Coast determinations will be discussed later in this document.

The BACT Guidelines Tool compiles guidelines from various agencies. The following guidelines were deemed applicable to the scope of this determination and will be discussed later in this document.

Agency	District ID	Date	Title
San Joaquin	4.3.7	5/1/2020	Powder Coating Operation with Curing Oven
South Coast	N/A	10/20/2000	Powder Coating Booth, All Throughput

San Joaquin Valley APCD guideline 4.10.6 is not applicable to the scope of this determination, since it the stripping of coatings. Additionally, this guideline has been rescinded by the Air District.

#### **T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

#### **RULE REQUIREMENTS**

There are no statewide air pollution control regulations for this source category.

**Sacramento Metropolitan AQMD**

**BACT**

Source: [SMAQMD BACT Determination No. 290](#)  
 (Adopted 11/30/2021)

<b>Powder Coating of Miscellaneous Metal Parts</b>	
<b>VOC</b>	Low-VOC Coating (< 1.5% VOC by weight) and Natural gas fired curing oven
<b>NOx</b>	30 ppmvd @ 3% O <sub>2</sub>
<b>SOx</b>	Natural gas fired curing oven
<b>PM10</b>	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency)
<b>PM2.5</b>	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency)
<b>CO</b>	Natural gas fired curing oven

**T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

**RULE REQUIREMENTS**

[Rule 451 – Surface Coating of Miscellaneous Metal Parts and Products \(Adopted 10/28/2010\)](#)

SMAQMD Rule 451 limits VOC emissions from the coating of miscellaneous metal parts and products by placing VOC content limits on surface coatings and allowing only specified application methods.

No person shall apply any coating to a **miscellaneous metal parts and product**, which has a VOC content exceeding the applicable limits below:

<b>Coating Category (A) (SMAQMD Rule 451 Definition)</b>	<b>Maximum Allowable VOC Content Excluding Water and Exempt Components grams-VOC/liter (lb-VOC/gal)</b>	
	<b>Air Dried</b>	<b>Baked</b>
All Other Coatings	340 (2.8)	275 (2.3)

(A) Powder coatings are inherently low-VOC and are expected to meet the most restrictive category listed above.

VOC content of coatings used for **metal furniture** shall not exceed the following limits:

<b>Coating Category (A) (SMAQMD Rule 451 Definition)</b>	<b>Maximum Allowable VOC Content Excluding Water and Exempt Components grams-VOC/liter (lb-VOC/gal)</b>	
	<b>Air Dried</b>	<b>Baked</b>
All Other Coatings	275 (2.3)	275 (2.3)

**Sacramento Metropolitan AQMD (continued)**

(A) Powder coatings are inherently low-VOC and are expected to meet the most restrictive category listed above.

Other categories (SMAQMD Rule 451 Definition)	Maximum Allowable VOC Content As Applied grams-VOC/liter (lb-VOC/gal)
Coating Removers (strippers)	200 (1.7)
Surface Preparation & Cleanup Material	25 (0.21)

One of the following methods shall be used when applying miscellaneous metal part or product coatings to any miscellaneous metal parts and products:

- A. Roll Coater
- B. Dip coat
- C. Electrostatic spray
- D. Flow Coat
- E. High-volume low-pressure (HVLP) spray
- F. Low-volume low-pressure (LVLP) spray
- G. Hand application method, such as brush or roller
- H. Any other method which has been approved in writing by the Air Pollution Control Officer and the U.S. EPA

**South Coast AQMD**

**BACT**

Source: [SCAQMD LAER/BACT Determinations \(Part B\)](#)  
 (Date: 02/05/2021)

Powder Coating Operation	
VOC	Low Solvent Coatings (rule), Product Substitution (B)
NOx	30 ppmvd @ 3% O <sub>2</sub> (C)
SOx	N/A – No BACT determinations found
PM10	Cyclone and dust collector (B)
PM2.5	N/A – No BACT determinations found
CO	N/A – No BACT determinations found

- (A) BACT determination 322432. The determination assumes a presumptive 1% VOC content for emissions calculations, because the products have not been tested for VOC release using AQMD Method 316C
- (B) BACT determination 385818. This determination includes a 780 lb/month facility-wide limit that was not included above, since this limit includes numerous other VOC-emitting equipment, including other powder coating booths, traditional spray booths, and solvent usage.

**South Coast AQMD (continued)**

**BACT**

Source: [SCAQMD BACT Guidelines \(Part D\) for Non-Major Polluting Facilities](#), pages 43 & 101

<b>Powder Coating Booth &amp; Dryers and Ovens: Other – Direct and Indirect</b>	
<b>VOC</b>	N/A – No BACT determinations found
<b>NOx</b>	<b><u>Dryers and Ovens: Other – Direct and Indirect</u></b> 30 ppmvd corrected to 3% O2 (04-10-98)
<b>SOx</b>	<b><u>Dryers and Ovens: Other – Direct and Indirect</u></b> Natural Gas (10-20-2000)
<b>PM10</b>	<b><u>Powder Coating Booth</u></b> < 37 lb/day throughput: Pocket or Bag-Type Filters (10-20-2000) ≥ 37 lb/day throughput: 1. Baghouse (≥ 99% efficiency), or 2. Cartridge Filters (≥ 99% efficiency) (1988), or 3. HEPA Filters (≥ 99.97% efficiency) (2-5-2021)  <b><u>Dryers and Ovens: Other – Direct and Indirect</u></b> Natural Gas (10-20-2000)
<b>PM2.5</b>	N/A – No BACT determinations found
<b>CO</b>	N/A – No BACT determinations found

**T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

**RULE REQUIREMENTS**

[Reg. XI, Rule 1107 – Coating of Metal Parts and Products \(Last amended 01/06/2023\)](#)

This rule limits emissions of VOCs from coating of metal parts and products.

A person shall not apply to metal parts and products subject to the provisions of this rule any coatings, including any VOC-containing materials added to the original coating supplied by the manufacturer, which contain VOCs in excess of the limits specified below:

<b>Coating Category (A) (SMAQMD Rule 451 Definition)</b>	<b>Maximum Allowable VOC Content Excluding Water and Exempt Components grams-VOC/liter (lb-VOC/gal)</b>	
	<b>Air Dried</b>	<b>Baked</b>
General One-Component	275 (2.3)	275 (2.3)

(A) Powder coatings are inherently low-VOC and are expected to meet the most restrictive category listed above.

**South Coast AQMD (continued)**

**VOC content for coating removers (strippers):**

- A person shall not use VOC-containing materials which have a VOC content of more than 200 grams per liter of material for stripping any coating governed by this rule.

**VOC content surface preparation and cleanup materials:**

- Solvent cleaning of application equipment, parts, products, tools, machinery, equipment, general work areas, and the storage and disposal of VOC-containing materials used in cleaning operations shall be carried out pursuant to Rule 1171 – Solvent Cleaning Operations

A person or facility shall not apply coatings to metal parts and products subject to the provisions of this rule unless the coating is applied with properly operating equipment, according to the equipment manufacturer's operating procedures, and by the use of one of the following methods:

- Electrostatic application
- Flow coat
- Dip coat
- Roll coat
- High-volume, low-pressure (HVLP) spray
- Hand Application Methods
- Other coating application methods as are demonstrated to the Executive Officer to be capable of achieving a transfer efficiency equivalent or better to HVLP spray, and for which written approval of the Executive officer has been obtained

[Reg. XI, Rule 1171 – Solvent Cleaning Operations \(Last amended 06/06/2025\)](#)

This rule applies to all persons who use solvent materials in solvent cleaning operations during the production, repair, maintenance, or servicing of parts, products, tools, machinery, equipment, or general work areas; all persons who store and dispose of these materials used in solvent cleaning operations; and all solvent suppliers who supply, sell, or offer for sale solvent cleaning materials for use in solvent cleaning operations.

Solvent Cleaning Activity	VOC limits	
	g/L	lb/gal
(A) Product cleaning during manufacturing process or surface preparation for coating, adhesive, or ink application		
(i) General	25	0.21
(ii) Electrical apparatus components & electronic components	100	0.83
(A) Printed circuit boards	800	6.7
(iii) Medical Devices & pharmaceuticals	800	6.7
(B) Repair and Maintenance Cleaning		
(i) General	25	0.21
(ii) Electrical apparatus components & electronic components	100	0.83
(A) Electronic or electrical cables	400	3.4

**South Coast AQMD (continued)**

Solvent Cleaning Activity	VOC limits	
	g/L	lb/gal
(iii) Medical Devices & pharmaceuticals		
(A) Tools, equipment, & machinery	800	6.7
(B) General work surfaces	600	5.0
(C) Cleaning of coatings or adhesives application equipment		
(i) General	25	0.21
(ii) Thin or sheet metal laminating equipment	950	8.0
(D) Cleaning of ink application equipment		
(i) General	25	0.21
(ii) Flexographic printing	25	0.21
(iii) Gravure printing		
(A) Publication	100	0.83
(B) Packaging	25	0.21
(iv) Lithographic (offset) or letterpress printing		
(A) Roller wash, blanket wash, & on-press components	100	0.83
(B) Removable press components	25	0.21
(v) Screen printing	100	0.83
(vi) Energy curable printing		
(A) Ink application equipment (except screen printing)	100	0.83
(B) Lamps and reflectors	800	6.7
(vii) Specialty flexographic printing	100	0.83
(E) Cleaning of polyester resin application equipment	25	0.21

[Reg. XI, Rule 1147 – NOx Reductions from Miscellaneous Sources \(Last amended 05/06/2022\)](#)

This rule applies to ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, soil and water remediation units and other combustion equipment with nitrogen oxide emissions that require a District permit and are not specifically required to comply with a nitrogen oxide emission limit by other District Regulation XI rules.

**South Coast AQMD (continued)**

<b>Gaseous Fuel-Fired Equipment:</b>			
<b>Oven, Dehydrator, Dryer, Heater, Kiln, Crematory, Incinerator, Calciner, Cooker, Roaster, Furnace, or Heated Storage Tank</b>			
<b>Equipment Type</b>	<b>Process Temperature</b>	<b>Emission Limits ppmv @ 3% O<sub>2</sub>, dry or pound/MMBtu heat input</b>	
		<b>NO<sub>x</sub> Limit</b>	<b>CO Limit</b>
In Use Equipment	< 1,200°F	30 ppm or 0.036 lb/MMBtu	1,000 ppmv
	≥ 1200°F	60 ppm or 0.073 lb/MMBtu	
New Equipment	< 1,200°F	20 ppmv or 0.024 lb/MMBtu	1,000 ppmv
	≥ 1200°F	30 ppmv or 0.036 lb/MMBtu	

**San Joaquin Valley APCD**

**BACT**

Source: [SJVAPCD BACT Guideline 4.3.7 \(05/01/2020\)](#)

<b>Powder Coating Operation with Curing Oven</b>	
<b>VOC</b>	Low-VOC Coating (< 1.5% VOC by Weight) and Natural gas fired curing oven (A)
<b>NO<sub>x</sub></b>	Natural gas fired curing oven
<b>SO<sub>x</sub></b>	Natural gas fired curing oven
<b>PM10</b>	Enclosed booth with 99% control efficiency, and natural gas fired curing oven
<b>PM2.5</b>	N/A – No BACT determinations found
<b>CO</b>	Natural gas fired curing oven

**T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

**RULE REQUIREMENTS:**

[Rule 4603 – Surface Coating of Miscellaneous Metal Parts and Products, Plastic Parts and Products, and Pleasure Crafts \(Last amended 09/07/2009\)](#)

An operator shall not apply coatings to metal parts and products subject to the provisions of this rule unless the coating is applied with properly operating equipment, according to proper operating procedures, and by the use of one of the following methods:

1. Electrostatic application
2. Electrodeposition
3. High-Volume, Low-Pressure (HVLP) spray
  - a. HVLP spray equipment shall be operated in accordance with manufacturer's recommendations.

**San Joaquin Valley APCD (continued)**

- b. For HVLP spray guns manufactured prior to January 1, 1996, the end user shall demonstrate that the gun meets HVLP spray equipment standards. Satisfactory proof will be either in the form of manufacturer's published technical material or by a demonstration using a certified air pressure tip gauge, measuring the air atomizing pressure dynamically at the center of the air cap and at the air horns.
- 4. Flow coating
- 5. Roll coating
- 6. Dip coating
- 7. Brush coating
- 8. Continuous coating; or
- 9. Other coating application methods which are demonstrated to the APCO to be capable of achieving at least 65% transfer efficiency as determined in accordance with Section 6.3.8. Prior written approval from the APCO shall be obtained for each alternative method used.

**General Coating Limits**

Except as otherwise provided by this rule, no operator shall apply to any metal part or product any coating with a VOC content in excess of the following limits, expressed as grams of VOC per liter (or pounds per gallon) of coating, less water and exempt compounds, as applied.

- Air-Dried Coating: 340 grams/liter (2.8 pounds/gallon).
- Baked Coating: 275 grams/liter (2.3 pounds/gallon).

VOC content limit for dip coating of steel joists (SIC 3441), air-dried.

- 340 grams of VOC/liter (2.8 pounds of VOC/gallon) for coatings with a viscosity, as applied, of more than 45.6 centistokes at 78°F or an average dry-film thickness of greater than 2.0 mils.
- 400 grams of VOC/liter (3.32 pounds of VOC/gallon) for coatings with a viscosity, as applied, of less than or equal to 45.6 centistokes at 78°F and an average dry-film thickness of less than or equal to 2.0 mils.

**Solvent Cleaning**

VOC content limits for organic solvents used in cleaning operations, limits are expressed as grams of VOC/liter (or pounds of VOC/gallon) of material:

Type of Solvent Cleaning Operation	VOC Content Limit
Product cleaning during manufacturing process or surface preparation for coating application	25 (0.21)
Repair and maintenance cleaning	25 (0.21)
Cleaning of coating application equipment	25 (0.21)

**San Diego County APCD**

**BACT**

Source: [NSR Requirements for BACT](#)

There are no BACT standards published in the clearinghouse for this category.

**T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

**RULE REQUIREMENTS**

[Regulation IV, Rule 67.3 – Metal Parts and Products Coating Operations \(Revised 04/09/2003\)](#)

Section (b)(1)(ii) exempts powder coating operations which use less than 0.5 gallons per day of any surface or cleaning material containing volatile organic compounds. For operations using 0.5 gallons per day or more, the operation must comply with the following:

- No coatings shall be applied unless one of the following coating application methods is used:
- Electrostatic spray application
- Flow coat application
- Dip coat application
- High-volume low-pressure (HVLP) spray application
- Roll coat
- Hand application methods
- Other coating application methods that are demonstrated to have a transfer efficiency a least equal to one of the above application methods, and which are used in such a manner that the parameters under which they were tested are permanent features of the method. Such coating application methods shall be features in writing prior to use by the Air Pollution Control Officer.

**General Coating Limits**

Except as otherwise provided by this rule, no operator shall apply to any metal part or product any coating with a VOC content in excess of the following limits, expressed as grams of VOC per liter (or pounds per gallon) of coating, less water and exempt compounds, as applied.

- Air-Dried Coating: 340 grams/liter (2.8 pounds/gallon).
- Baked Coating: 275 grams/liter (2.3 pounds/gallon).

**Surface Preparation and Cleanup Solvents**

A person shall not use VOC containing materials for surface preparation or cleanup unless:

- The material contains 200 grams or less of VOC per liter of material; or
- The material has an initial boiling point of 190°C (374°F) or greater; or
- The material has a total VOC vapor pressure of 2 mm Hg or less, at 20°C (68°F)

**Cleaning of Application Equipment**

A person shall not use VOC containing materials for the cleaning of application equipment used in operations subject to this rule unless:

- The material contains 200 grams or less of VOC per liter of material; or
- The material has an initial boiling point of 190°C (374°F) or greater; or
- The material has a total VOC vapor pressure of 2 mm Hg or less, at 20°C (68°F); or

**San Diego APCD (continued)**

- The cleaning material is flushed or rinsed through the application equipment in a contained manner that will minimize evaporation into the atmosphere; or
- The application equipment or equipment parts are cleaned in a container which is open only when being accessed for adding, cleaning, or removing application equipment or when cleaning material is being added, provided the cleaned equipment or equipment parts are drained to the container until dripping ceases; or
- A system is used that totally encloses the component parts being cleaned during the washing, rinsing, and draining processes; or
- Other application equipment cleaning methods that are demonstrated to be as effective as any of the equipment described above in minimizing the emissions of VOC to the atmosphere, provided that the device has been tested and approved prior to use by the Air Pollution Control Officer.

A person shall not use VOC containing materials for the cleaning of coating application equipment used in operations subject to this rule unless:

- The cleaning material contains 25 grams or less of VOC per liter of material; or
- The cleaning material is flushed or rinsed through the application equipment in a contained manner that will minimize evaporation into the atmosphere; or
- The application equipment or equipment parts are cleaned in a container which is open only when being accessed for adding, cleaning, or removing application equipment or when cleaning material is being added, provided the cleaned equipment or equipment parts are drained to the container until dripping ceases; or
- A system is used that totally encloses the component parts being cleaned during the washing, rinsing, and draining processes.

**Bay Area AQMD**

**BACT**

Source: [BAAQMD BACT/TBACT Workbook](#)

There are no BACT standards published in the clearinghouse for this category.

**T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

**RULE REQUIREMENTS**

[Reg. 8, Rule 19 – Surface Preparation and Coating of Miscellaneous Metal Parts and Products \(last amended 10/16/2002\)](#)

Any person who utilizes spray application equipment to apply coatings to miscellaneous metal parts or products shall use one or more of the following application methods, unless emissions to the atmosphere are controlled by an approved emission control system with an overall abatement efficiency of at least 85%:

- A. High Volume Low Pressure (HVLP) Spray, operated in accordance with the manufacturer's recommendations; or
- B. Electrostatic spray, operated in accordance with the manufacturer's recommendations; or
- C. Detailing Gun; or

**Bay Area AQMD (continued)**

- D. Any other coating spray application that achieves an equivalent transfer efficiency compared to the spray application methods listed above. Prior written approval from the APCO shall be obtained for each alternative method used.

No person shall apply to any miscellaneous metal part or product, any specialty coating with a VOC content in excess of the limits set forth below; expressed as grams VOC per liter (pounds VOC per gallon) of coating or grams VOC per liter (lbs VOC per gal) of coating applied, excluding water, unless emissions to the atmosphere are controlled to an equivalent level by air pollution abatement equipment with an abatement device efficiency of at least 85% that meets the requirements of Regulation 2, Rule 1.

Coating Category (A) (BAAQMD Rule 19 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Components grams-VOC/liter (lb-VOC/gal)	
	Air Dried	Baked
General One-Component	340 (2.8)	275 (2.3)

(A) Powder coatings are inherently low-VOC and are expected to meet the most restrictive category listed above.

**Solvent Evaporative Loss Minimization:**

Unless emissions to the atmosphere are controlled by an approved emission control system with an overall abatement efficiency of at least 85%, any person using organic solvent for surface preparation and cleanup or any person mixing, using or disposing of coating containing organic solvent:

- A. Shall use closed containers for the storage or disposal of cloth or paper used for solvent surface preparation and clean up.
- B. The person shall not use organic solvent for the cleanup of spray equipment, including paint lines with VOC content in excess of 50 g/l (0.42 lb/gal) unless either
  - i. The solvent is pressurized through the spray equipment with atomizing air off or dispensed from a small non-atomizing container, and collected and stored in a closed container until recycled or properly disposed of offsite, or
  - ii. A spray gun washer subject to and in compliance with the requirements of Regulation 8, Rule 16 is used.
- C. Shall close containers of coating, catalyst, or solvent when not in use.

**Surface Preparation Standards:**

No person shall use a solvent with a VOC content that exceeds 50 g/l (0.42 lbs/gal), as applied, for surface preparation in any operation subject to this Rule unless emissions to the atmosphere are controlled to an equivalent level by an approved emission control system with an overall abatement efficient of at least 85%.

**Summary of Achieved in Practice Control Technologies**

The following control technologies have been identified and are ranked based on stringency:

<b>SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES</b>	
<b>Pollutant</b>	<b>Standard</b>
<b>VOC</b>	1. Low-VOC Coating (< 1.5% VOC by Weight) and Natural gas fired curing oven [SJVAPCD, SMAQMD] 2. Low Solvent Coatings [SCAQMD] 3. 0.5 kg/L (0.4 lb/gal) [US EPA] 4. Compliance with District Rules [SJVAPCD, BAAQMD, SDAPCD]
<b>NOx</b>	1. 30 ppmvd @ 3% O <sub>2</sub> [SMAQMD, SCAQMD, EPA, ARB] 2. Natural gas fired curing oven [SJVAPCD]
<b>SOx</b>	Natural gas fired curing oven [SMAQMD, SJVAPCD]
<b>PM10</b>	1. Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency) [SMAQMD, SCAQMD, SJVAPCD] 2. Pocket or Bag-Type Filters for < 37 lbs/day throughput [SCAQMD] 3. Cyclone and Dust Collector [SCAQMD]
<b>PM2.5</b>	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency) [SMAQMD]
<b>CO</b>	Natural gas fired curing oven [SMAQMD, SJVAPCD]
<b>T-BACT</b>	No standard

The following control technologies have been identified as the most stringent, achieved in practice control technologies:

<b>BEST CONTROL TECHNOLOGIES ACHIEVED</b>		
<b>Pollutant</b>	<b>Standard</b>	<b>Source</b>
VOC	Low-VOC Coating (< 1.5% VOC by weight) and Natural gas fired curing oven	SMAQMD, SJVAPCD
NOx	30 ppmvd @ 3% O <sub>2</sub>	SMAQMD, SJVAPCD
SOx	Natural gas fired curing oven	SMAQMD, SJVAPCD
PM10	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency)	SMAQMD, SCAQMD, SJVAPCD
PM2.5	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency)	SMAQMD
CO	Natural gas fired curing oven	SMAQMD, SJVAPCD
T-BACT	No standard	

**B. TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (RULE 202, §205.1.b.)**

**Technologically Feasible Alternatives:**

Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

The table below shows the technologically feasible alternatives identified as capable of reducing emissions beyond the levels determined to be “Achieved in Practice” as per Rule 202, §205.1. a.

<b>Pollutant</b>	<b>Technologically Feasible Alternatives</b>	<b>Source</b>
<b>VOC</b>	1) Thermal or catalytic incineration 2) Carbon Adsorption	SJVAPCD
<b>NOx</b>	No other technologically feasible option identified	
<b>SOx</b>	No other technologically feasible option identified	
<b>PM10</b>	No other technologically feasible option identified	
<b>PM2.5</b>	No other technologically feasible option identified	
<b>CO</b>	No other technologically feasible option identified	

The SJVAPCD’s BACT Document 4.3.7 identified the above add-on control technology as a technologically feasible alternative to low VOC content coatings (< 1.5% by weight).

Although powder coatings are applied electrostatically to a part and do not use a carrier solvent, some specialty urethane powders are formulated with internally blocked polyurethane cross-linkers. These cross-linking agents cleave off during curing and are emitted as VOC.

Because powder coatings are cured at high temperatures (≥ 350 °F), and carbon adsorption is not effective at high inlet temperatures, carbon adsorption has been eliminated as a technologically feasible alternative for powder coating operations.

Thermal or catalytic oxidization is being considered as technologically feasible although very little data is available quantifying the makeup of VOCs emitted during the curing process (outgassing). PPG Powder Coatings<sup>1</sup> attributes outgassing to contaminants or primer coatings underneath the powder coating in addition to potential volatiles in the powder ingredients. In lieu of this data, cost effectiveness values were based on assumptions used for the metal coatings BACT 336 and 337 using a standard carrier solvent.

**Cost Effective Determination:**

After identifying the technologically feasible control options, a cost analysis is performed to take into consideration economic impacts for all technologically feasible controls identified.

<sup>1</sup> PPG Industrial Coatings – *What is outgassing?*, <https://assets-eu-01.kc-usercontent.com/cce44467-0106-013b-6c0b-26132a361492/00e64700-0ef7-4a6f-9fcc-37f8b7811cb6/PPG-IC-WHAT-IS-OUTGASSING.pdf>

Maximum Cost per Ton of Air Pollutants Controlled

A control technology is considered cost-effective if the cost of controlling one ton of that air pollutant is less than the limits specified below:

Pollutant	Maximum Cost (\$/ton) <sup>(A)</sup>
NOx	36,800
VOC	27,100
CO	300
SOx	18,300
PM10 / PM2.5	11,400

(A) Cost effectiveness thresholds effective as of July 1, 2025.

Cost Effectiveness Analysis Summary:

The cost analysis was processed in accordance with the EPA OAQPS Air Pollution Control Cost Manual (sixth Edition) with the following assumptions:

- The sales tax rate was based on the SMAQMD standard rate of 8.5% as approved by the district on 10/17/16.
- The electricity rate (13.8 cents/kWh) was based on the commercial rates as approved by the SMAQMD on 10/17/16.
- The natural gas rate (\$8.04 per 1,000 cubic feet) was based on the commercial rates as approved by the SMAQMD on 10/17/16
- The life of the equipment was based on the EPA cost manual recommendation.
- The interest rate was based on the previous 6-month average interest rate on United States Treasury Securities (based on the life of the equipment) and addition of two percentage points and rounding up to the next higher integer rate.
- The labor (Occupation Code 51-8099: Plant and System Operators) rate was based on data from the Bureau of Labor Statistics.

Other Basic assumptions:

- The curing oven is assumed to be the enclosure with a collection efficiency of 100%, venting through a general ventilation system to a control device capable of achieving a 98.5% control efficiency. Therefore, the control device will have an over-all collection/control efficiency of 98.5%.
- Cost calculations and assumptions are based on the EPA Air Pollution Control Cost Manual.

Thermal Oxidizer:

Waste Gas Flow Rate	=	20,000 acfm (EPA Recommended Value)
Equipment Life	=	20 years
Total Capital Investment	=	\$1,673,129
Direct Annual Cost	=	\$72,093 per year
Indirect Annual Cost	=	\$223,176 per year
Total Annual Cost	=	\$295,270 per year

VOC Removed = 10.9 tons per year  
 Cost of VOC Removal = \$27,100 per ton reduced

A detailed calculation of the cost effectiveness for VOC removal with a thermal oxidizer is shown in Appendix D. Uncontrolled VOC emissions of 21,800 lb/year or greater is the cost-effective threshold for control equipment using thermal oxidation control technology.

**Conclusion:** As shown in the above, an uncontrolled VOC emission level of 21,800 lb per year or greater must be reached for a thermal oxidizer to be considered cost effective.

Thus, the emissions level for which add-on controls are considered cost effective is 21,800 lb per year for VOC.

**C. SELECTION OF T-BACT:**

Based on the review of SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, SBCAPCD, ARB, and EPA BACT Clearinghouses and cost effectiveness determinations, BACT for VOC, NOx, SOx, PM10, PM2.5, and CO will be the following:

<b>BACT DETERMINATION #382 FOR POWDER COATING OF MISCELLANEOUS METAL PARTS</b>		
<b>Pollutant</b>	<b>Standard</b>	<b>Source</b>
<b>VOC</b>	Low-VOC Coating (< 1.5% VOC by weight) and Natural gas fired curing oven. If the total uncontrolled VOC emissions from the emissions unit are ≥ 21,800 pounds per year, a VOC control system must be installed with at least 98.5% overall system efficiency (capture and destruction).	SMAQMD, SJVAPCD
<b>NOx</b>	30 ppmvd @ 3% O <sub>2</sub>	SMAQMD, SCAQMD
<b>SOx</b>	Natural gas fired curing oven	SMAQMD, SJVAPCD
<b>PM10</b>	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency)	SMAQMD, SCAQMD, SJVAPCD
<b>PM2.5</b>	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency)	SMAQMD
<b>CO</b>	Natural gas fired curing oven	SMAQMD, SJVAPCD

**D. SELECTION OF T-BACT:**

As previously established under BACT Determination No. 290, T-BACT will be determined on a case-by-case basis:

<b>T-BACT FOR POWDER COATING OF MISCELLANEOUS METAL PARTS</b>		
<b>Pollutant</b>	<b>Standard</b>	<b>Source</b>
<b>T-BACT (toxics)</b>	Case by Case basis	N/A

APPROVED BY: Steve Mosunic DATE: 2/9/2026

# Appendix A

## Review of BACT Determinations Published by EPA

RBLC #	Permit Date	Process Code	Equipment	Pollutant	Standard	Case-By-Case Basis
MI-0449	06/23/2021	41.002	POWDER PRIME COATING PROCESS	VOC	0.0500 LB/GALACS, CALENDAR DAY AVG. (gallon of applied coating solids)	LAER
MI-0444	8/26/2019	41.002	POWDER PRIME COATING PROCESS	VOC	0.0500 LB/GACS LB/GAL APPL.COATING SOLIDS; DAILY AVG	LAER
MI-0428	11/02/2017	41.002	POWDER COAT OVEN AND RTO EMISSIONS	PM2.5	90% EFFICIENCY / 1.6800 LB/HR	BACT-PSD
MI-0422	10/20/2016	41.002	POWDER COAT OVEN AND RTO EMISSIONS	PM2.5	90% EFFICIENCY / 1.5600 LB/HR	BACT-PSD

The RBLC database was searched powder coating for the period between 1/1/2014 and 10/01/2024 using the following process codes:

- 13.310 – Natural Gas (includes propane and liquified petroleum gas)
- 41.002 – Automobile and Trucks Surface Coating (OEM)
- 41.013 – Miscellaneous Metal Parts and Products Surface Coating

# Appendix B

## BACT Determinations Published by CARB


List

Limits Table

Limits Graph

### BACT Limit Table

Agency  
All

Unit Type   
All


Unit Detail  
All

Process   
Paint, Ink, Coatings,...

Pollutant  
All




Primary Fuel  
All

Date Range  
All values

Clear Filters 

Search   
Contains "Powder Coating"

Go to Control List 

Agency	Unit Type	District ID	Date	Pollutant	Limit	Limit Unit	Controls	
South Coast	Oven - Non-food	385818	5/13/03	NOX	30	ppmvd at 3% O2	Low NOx Burner (LNB)	
				VOC	780	lb/month	Good Combustion Practice (Unspecified)	
Spray Boo..		322432	3/18/04	VOC	-999	n/a	Low Solvent Coatings (rule), Product Substitution	

A value of -999 indicates no numerical limit is required to be met, rather a specific control configuration or management practice is required.

# Appendix B

## BACT Determinations Published by CARB

### BACT Guideline List

Data Last Updated 3/18/2022

Agency  
All

Date Filter  
All values

Emitting Unit  
All

Emitting Unit Detail  
All

Emitting Process  
All

Search (Title, Agency, ID, Emitting Unit type and keywords, Emitting Process type and keywords)  
Contains "powder coating"

Agency	District ID	Date	Title	
San	4.3.7	5/1/2020	Powder Coating Operation with Curing Oven	●
Joaquin	4.10.6	11/19/2001	Metal Parts, Open-top, Powder Coating Stripping Tank	●
South C..	n/a	10/20/2000	Powder Coating Booth, All Throughput	●

# Appendix C

## BACT Determinations Published by Air District Clearinghouses

**EXPIRED**

SMAQMD BACT CLEARINGHOUSE

CATEGORY Type:

**COATING - POWDER**

BACT Size: Small Emitter < 10 lb/day

<b>BACT Determination Number:</b> 290		<b>BACT Determination Date:</b> 11/30/2021	
<b>Equipment Information</b>			
<b>Permit Number:</b> 26840		<b>Equipment Description:</b> SPRAY BOOTH	
<b>Unit Size/Rating/Capacity:</b> ALL		<b>Equipment Location:</b> PACIFIC POWDER COATING 8637 23RD AVE, SACRAMENTO, CA	
<b>BACT Determination Information</b>			
<b>District Contact:</b> Matt Baldwin		Phone No.: (279) 207-1119 email: mbaldwin@airquality.org	
<b>ROCs</b>	<b>Standard:</b>	1.5% VOC by wt.	
	<b>Technology Description:</b>	Low-VOC Coating (< 1.5% VOC by weight) and Natural gas fired curing oven	
	<b>Basis:</b>	Achieved in Practice	
<b>NOx</b>	<b>Standard:</b>	30 ppmvd @ 3% O2	
	<b>Technology Description:</b>	Low-NOx Burner for curing oven	
	<b>Basis:</b>	Achieved in Practice	
<b>SOx</b>	<b>Standard:</b>		
	<b>Technology Description:</b>	Natural gas fired curing oven	
	<b>Basis:</b>	Achieved in Practice	
<b>PM10</b>	<b>Standard:</b>	99% Control	
	<b>Technology Description:</b>	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency)	
	<b>Basis:</b>	Achieved in Practice	
<b>PM2.5</b>	<b>Standard:</b>	99% Control	
	<b>Technology Description:</b>	Powder Recovery System with a Cyclone Followed by a Baghouse or Cartridge Dust Collector or HEPA Filters (≥ 99% efficiency)	
	<b>Basis:</b>	Achieved in Practice	
<b>CO</b>	<b>Standard:</b>		
	<b>Technology Description:</b>	Natural gas fired curing oven	
	<b>Basis:</b>	Achieved in Practice	
<b>LEAD</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>Comments:</b>			

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**  
**Best Available Control Technology (BACT) Guidelines for Non-Major Polluting Facilities\***

10-20-2000 Rev. 0  
 2-5-2018 Rev. 1  
 2-2-2019 Rev. 2

Equipment or Process:                      Dryer or Oven

Subcategory Rating/Size	Criteria Pollutants					Inorganic
	VOC	NO <sub>x</sub>	SO <sub>x</sub>	CO	PM <sub>10</sub>	
Carpet Oven		30 ppm Compliance with Rule 1147 (2-1-2019)	Natural Gas (1990)		Natural Gas (1990)	
Rotary, Spray and Flash Dryers <sup>1)</sup>		Compliance with Rule 1147 (2-1-2019)	Natural Gas (1990)		Natural Gas with Baghouse (1990)	
Tray, Agitated Pan, and Rotary Vacuum Dryers		Compliance with Rule 1147 (2-1-2019)	Natural Gas (1990)		Natural Gas (1990)	
Tenter Frame Fabric Dryer		30 ppm Compliance with Rule 1147 (2-1-2019)	Natural Gas (10-20-2000)		Natural Gas (10-20-2000)	
Other Dryers and Ovens – Direct and Indirect Fired <sup>2,3</sup>		30 ppm corrected to 3% O <sub>2</sub> (04-10-98)	Natural Gas (10-20-2000)		Natural Gas (10-20-2000)	

1. Dryers for foodstuff, pharmaceuticals, aggregate & chemicals.
2. Does not include food or bakery ovens, See listing for “Food Oven.”
3. Does not include digester gas or landfill gas units.

\* Means those facilities that are not major polluting facilities as defined by Rule 1302 - Definitions

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**  
**Best Available Control Technology (BACT) Guidelines for Non-Major Polluting Facilities\***

10-20-2000 Rev. 0  
 2-5-2021 Rev. 1

Equipment or Process: Powder Coating Booth

Rating/Size	Criteria Pollutants					Inorganic
	VOC	NOx	SOx	CO	PM <sub>10</sub>	
≤ 37 Lbs/Day Throughput					Pocket or Bag-Type Filters (10-20-2000)	
< 37 Lbs/Day Throughput					1. Baghouse (≥ 99% efficiency); or 2. Cartridge Filters (≥ 99% efficiency); (1998) or 3. HEPA Filters (≥ 99.97% efficiency); or (2-5-2001)	

\* Means those facilities that are not major polluting facilities as defined by Rule 1302 - Definitions

# Section I: AQMD BACT Determinations

Application No.: 322432

Equipment Category - Spray Booth

<b>1. GENERAL INFORMATION</b>	DATE: 3/18/2004
A. MANUFACTURER:	
B. TYPE: Powder Coating Booth	C. MODEL:
D. STYLE:	
E. APPLICABLE AQMD RULES: 1107, 1171	
F. COST: \$ (NA) SOURCE OF COST DATA:	
G. OPERATING SCHEDULE: 8 HRS/DAY 5 DAYS/WK 52 WKS/YR	

<b>2. EQUIPMENT INFORMATION</b>	APP. NO.: 322432
A. SIZE/DIMENSION/CAPACITY: 4'Wx9'Lx7'H	
B. BLOWERS: 20 hp	C. TOTAL FLOW RATE: scfm
D. FILTERS: baghouse-40 filters, 6"Dx11'-1"L each	
E. PARTS COATED: steel bars, rods, pipes	
F. TYPE OF COATING/ADHESIVE/SOLVENT USED: Epoxy	

<b>3. COMPANY INFORMATION</b>	APP. NO.: 322432
A. NAME: Fletcher Coating	B. SIC CODE: 3499
C. ADDRESS: 426 Fletcher Ave. CITY: Orange STATE: CA ZIP: 92865	
D. CONTACT PERSON: Kurtis Breeding	E. PHONE NO.: 714-637-4763

<b>4. PERMIT INFORMATION</b>	APP. NO.: 322432
A. AGENCY: SCAQMD	B. APPLICATION TYPE: change of conditions
C. AGENCY CONTACT PERSON: Ed O'Neal	D. PHONE NO.: 909-396-2565
E. PERMIT TO CONSTRUCT/OPERATE INFORMATION: <input type="checkbox"/> CHECK IF NO P/C	P/C NO.: D77982 ISSUANCE DATE: 10/27/1993 P/O NO.: F5409 ISSUANCE DATE: 2/19/1997
F. START-UP DATE: 1980	

<b>5. EMISSION INFORMATION</b>	APP. NO.: 322432
<b>A. PERMIT</b>	
A1. PERMIT LIMIT: Only powder coatings may be used. Facility cap of 26,000 lb total powder sprayed. Booth must be vented to cyclone and dust collector. Cleanup materials to contain no VOC.	
A2. BACT/LAER DETERMINATION: Use of powder coating and zero-VOC cleanup materials.	

<b>5. EMISSION INFORMATION</b>		APP. NO.: 322432
A3. BASIS OF THE BACT DETERMINATION: Powder coating, which has very low VOC emission characteristics, is now achieved in practice technology for applying coatings to many types of metal parts.		
<b>B. CONTROL TECHNOLOGY</b>		
B1. MANUFACTURER/SUPPLIER: Torit		
B2. TYPE: Cyclone and dust collector, models 22FM and 22F65, respectively.		
B3. DESCRIPTION: The particulate collection system is intrinsic to this process so that overspray material can be recovered and reused, which is vital to the economics of the process.		
B4. CONTROL EQUIPMENT PERMIT APPLICATION DATA:		P/C NO.: ISSUANCE DATE:
		P/O NO.: ISSUANCE DATE:
B5. WASTE AIR FLOW TO CONTROL EQUIPMENT:		FLOW RATE:
ACTUAL CONTAMINANT LOADING:		BLOWER HP:
B6. WARRANTY:		
B7. PRIMARY POLLUTANTS: PM, VOC		
B8. SECONDARY POLLUTANTS: None		
B9. SPACE REQUIREMENT:		
B10. LIMITATIONS:		B11. UNUSED
B12. OPERATING HISTORY: This equipment has been in regular use for many years.		
B13. UNUSED		B14. UNUSED
<b>C. CONTROL EQUIPMENT COSTS</b>		
C1. CAPITAL COST: <input type="checkbox"/> CHECK IF INSTALLATION COST IS INCLUDED IN CAPITAL COST		
EQUIPMENT: \$      INSTALLATION: \$      (NA) SOURCE OF COST DATA:		
C2. ANNUAL OPERATING COST: \$      (NA) SOURCE OF COST DATA:		
<b>D. DEMONSTRATION OF COMPLIANCE</b>		
D1. STAFF PERFORMING FIELD EVALUATION:		
ENGINEER'S NAME:		INSPECTOR'S NAME: Rhonda Laugeson DATE: 4/30/2002
D2. COMPLIANCE DEMONSTRATION: Inspection--found facility to be operating in compliance.		
D3. VARIANCE:		NO. OF VARIANCES: None DATES:
CAUSES:		
D4. VIOLATION:		NO. OF VIOLATIONS: 2 DATES: 10/31/96, 1/5/01
CAUSES: 10/31/96-missing records, faulty guage, altered baghouse; 1/5/01-powder usage in one booth exceeded daily limit in permit (this permit condition subsequently removed).		
D5. MAINTENANCE REQUIREMENTS:		D6. UNUSED
D7. SOURCE TEST/PERFORMANCE DATA RESULTS AND ANALYSIS:		
DATE OF SOURCE TEST:		CAPTURE EFFICIENCY:
DESTRUCTION EFFICIENCY:		OVERALL EFFICIENCY:
SOURCE TEST/PERFORMANCE DATA:		
OPERATING CONDITIONS:		
TEST METHODS:		

**6. COMMENTS**

APP. NO.: 322432

This is one of four similar powder coating booths at this facility. Parts to be coated are preheated in a 500F oven. The coating is sprayed onto the hot metal and melts in place. The coated parts are allowed to cool in air. Product data sheets for the coating materials used show that all coating materials are zero VOC (although, because the products have not been tested for VOC release using AQMD Method 316C, a presumptive 1% VOC content is used for emission calculations). This facility does "functional" coating, which is intended for corrosion protection. Other facilities do decorative coating, and low-VOC materials are available for those applications as well. There are many suppliers of powder coating materials including DuPont, 3M, Rohm& Haas and Eli Lilly.

**Section I: AQMD BACT Determinations**  
**Application No.: 385818**  
**Equipment Category – Dryer or Oven**

<b>1. GENERAL INFORMATION</b>			DATE: 5/13/2003
A. MANUFACTURER: Industrial Process Equipment			
B. TYPE: Conveyorized		C. MODEL:	
D. STYLE:			
E. APPLICABLE AQMD RULES:			
F. COST: \$ (NA)		SOURCE OF COST DATA:	
G. OPERATING SCHEDULE:                      8 HRS/DAY                      5 DAYS/WK                      52 WKS/YR			

<b>2. EQUIPMENT INFORMATION</b>			APP. NO.: 385818
A. FUNCTION: Powder coat curing oven, 400-600F operating temperature.			
B. MAXIMUM HEAT INPUT: 5 MMBtu/hr		C. MAXIMUM THROUGHPUT:	
D. BURNER INFORMATION:                      NO.: 1                      TYPE: Low-NOx			
E. PRIMARY FUEL: Natural Gas		F. OTHER FUEL: None	
G. OPERATING CONDITIONS: Eight hours per day.			

<b>3. COMPANY INFORMATION</b>			APP. NO.: 385818
A. NAME: Fletcher Coating		B. SIC CODE: 3479	
C. ADDRESS: 426 Fletcher Ave. CITY: Orange                      STATE: CA                      ZIP: 92865			
D. CONTACT PERSON: Kurtis Breeding		E. PHONE NO.: 714-637-4763	

<b>4. PERMIT INFORMATION</b>			APP. NO.: 385818
A. AGENCY: SCAQMD		B. APPLICATION TYPE: new construction	
C. AGENCY CONTACT PERSON: Fred Del Rosario		D. PHONE NO.: 909-396-2663	
E. PERMIT TO CONSTRUCT/OPERATE INFORMATION: <input type="checkbox"/> CHECK IF NO P/C		P/C NO.: F48686 P/O NO.: F48686	ISSUANCE DATE: 2/6/2002 ISSUANCE DATE: 2/6/2002
F. START-UP DATE: December 2002			

<b>5. EMISSION INFORMATION</b>			APP. NO.: 385818
<b>A. PERMIT</b>			
A1. PERMIT LIMIT: 30 ppmvd NOx, corrected to 3% O2, 30-minute average. Facility-wide VOC limit of 780 lb per calendar month.			
A2. BACT/LAER DETERMINATION: Low-NOx Burner			
A3. BASIS OF THE BACT/LAER DETERMINATION:			

**5. EMISSION INFORMATION**

APP. NO.: 385818

**B. CONTROL TECHNOLOGY**

B1. MANUFACTURER/SUPPLIER: Eclipse

B2. TYPE: Low-NO<sub>x</sub>

B3. DESCRIPTION: WINNOX Model WX-500

B4. CONTROL EQUIPMENT PERMIT APPLICATION DATA:	P/C NO.:	ISSUANCE DATE:
	P/O NO.:	ISSUANCE DATE:

B5. WASTE AIR FLOW TO CONTROL EQUIPMENT:	FLOW RATE:
ACTUAL CONTAMINANT LOADING:	BLOWER HP:

B6. WARRANTY: Burner manufacturer literature shows NO<sub>x</sub> <30 and CO <250 (both ppmvd@3%O<sub>2</sub>) down to 10% of rated input.B7. PRIMARY POLLUTANTS: NO<sub>x</sub>, CO, VOC PM

B8. SECONDARY POLLUTANTS:

B9. SPACE REQUIREMENT:

B10. LIMITATIONS: B11. UNUSED

B12. OPERATING HISTORY: Oven started operation in December 2002 and has been in service without problems since that time. The oven has been used only about one 8-hr shift per week due to poor market conditions.

B13. UNUSED B14. UNUSED

**C. CONTROL EQUIPMENT COSTS**

C1. CAPITAL COST:	<input type="checkbox"/>	CHECK IF INSTALLATION COST IS INCLUDED IN EQUIPMENT COST
EQUIPMENT: \$	INSTALLATION: \$	(NA) SOURCE OF COST DATA:

C2. ANNUAL OPERATING COST: \$	(NA)	SOURCE OF COST DATA:
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**D. DEMONSTRATION OF COMPLIANCE**

D1. STAFF PERFORMING FIELD EVALUATION:		
ENGINEER'S NAME:	INSPECTOR'S NAME:	DATE:

D2. COMPLIANCE DEMONSTRATION:

D3. VARIANCE:	NO. OF VARIANCES: None	DATES:
CAUSES:		

D4. VIOLATION:	NO. OF VIOLATIONS: None related to oven	DATES:
CAUSES:		

D5. MAINTENANCE REQUIREMENTS: D6. UNUSED

**5. EMISSION INFORMATION**

APP. NO.: 385818

## D7. SOURCE TEST/PERFORMANCE DATA RESULTS AND ANALYSIS:

DATE OF SOURCE TEST: 12-30-2002

CAPTURE EFFICIENCY:

DESTRUCTION EFFICIENCY:

OVERALL EFFICIENCY:

SOURCE TEST/PERFORMANCE DATA:

NO <sub>x</sub> , ppmvd@3%O <sub>2</sub>	16
CO, ppmvd@3%O <sub>2</sub>	14
O <sub>2</sub> , % (dry)	19.05
Exhaust Flow, dscfm	1560

OPERATING CONDITIONS: Indicated fuel input rate and measured flue gas flow rate indicated that the oven was operating at approximately 20% rated input. Oven temperature was 585F.

TEST METHODS: Source test was accepted by AQMD Monitoring & Source Test Engineering group. However, it was noted that the NO<sub>x</sub> measurement was less than 20% of analyzer range so NO<sub>x</sub> was only proven to be <20 ppmvd@3%O<sub>2</sub>.

**6. COMMENTS**

APP. NO.: 385818

The manufacturer literature indicates that this burner maintains acceptable emissions performance down to approximately 10% of its rated input (10:1 turn-down). This oven requires a maximum turn-down of approximately 5:1. Some ovens require turn-down ratios greater than 10:1, and this burner would not be suitable for those ovens.

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.3.7\***

Last Update: 5/1/2020

**Powder Coating Operation with Curing Oven**

<b>Pollutant</b>	<b>Achieved in Practice or contained in the SIP</b>	<b>Technologically Feasible</b>	<b>Alternate Basic Equipment</b>
VOC	Low VOC content coating with < 1.5% by weight, and use natural gas-fired curing oven	1) Thermal or Catalytic Incineration 2) Carbon Absorption	
SOX	Use natural gas-fired curing oven		
PM10	Enclosed booth with 99% control efficiency, and use natural gas-fired curing oven		
NOX	Use natural gas-fired curing oven		
CO	Use natural gas-fired curing oven		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

# Appendix D

## Cost Effectiveness Determination for Thermal Oxidizers

### Data Inputs

Select the Type of Oxidizer

Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Toluene	37	11,000	4,274	92.13

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

### Enter the design data for the proposed oxidizer:

Number of operating hours/year  
 Inlet volumetric flow rate(Q<sub>wi</sub>) at 77°F and 1 atm.  
 Pressure drop (ΔP)  
 Motor/Fan Efficiency (ε)  
 Inlet Waste Gas Temperature (T<sub>wi</sub>)  
 Operating Temperature (T<sub>o</sub>)  
 Destruction and Removal Efficiency (DRE)  
 Estimated Equipment Life  
 Heat Loss (η)

2,080	hours/year
20,000	scfm*
19	inches of water
60	percent*
100	°F*
2,000	°F*
98.5	percent
20	Years*
1	percent*

Percent Energy Recovery (HR) = 70 Percent

\* 20,000 scfm is a default volumetric flow rate. User should enter actual value, if known.  
 \* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.  
 \* 60% is a default fan efficiency. User should enter actual value, if known.  
 \* 100°F is a default temperature. User should enter actual value, if known.  
 \* Note: Default value for T<sub>fi</sub> is 2000°F for thermal regenerative oxidizers. Use actual value if known. T<sub>fi</sub> for regenerative oxidizers typically between 1800 and 2000°F.  
 \* 20 years is the typical equipment life. User should enter actual value, if known.  
 \* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

**Enter the cost data:**

Desired dollar-year	2024			
CEPCI* for 2024	800.7	Enter the CEPCI value for 2024	536.4	2016 CEPCI
Annual Interest Rate (i)	6.24	%		
Electricity (Cost <sub>elect</sub> )	0.138	\$/kWh		
Natural Gas Fuel Cost (Cost <sub>fuel</sub> )	0.00804	\$/scf		
Operator Labor Rate	\$28.80	per hour		
Maintenance Labor rate	\$31.68	per hour		
Contingency Factor (CF)	10.0	Percent		

\*Enter dollar year first.

\* 10 percent of the total capital investment F45 is a default value for construction contingencies. User may enter values between 5 and 15 percent.

\* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

**Data Sources for Default Values Used in Calculations:**

**Parameters for Common Compounds:**

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

**Footnotes**

\* Greenhouse gas.

\*\* Hazardous air pollutant.

<b>Data Element</b>	<b>Default Value</b>	<b>Sources for Default Values used in the calculation . . .</b>	<b>If you used your own site-specific values, please enter the value used and the reference source . . .</b>	<b>Recommended data sources for site-specific information</b>
Electricity Cost (\$/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, ( <a href="https://www.eia.gov/electricity/annual/html/epa_02_04.html">https://www.eia.gov/electricity/annual/html/epa_02_04.html</a> ).	The electricity rate (13.8 cents/kWh) was based on the commercial rates as approved by the SMAQMD on 10/17/16.	Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at <a href="http://www.eia.gov/electricity/data.cfm#sales">http://www.eia.gov/electricity/data.cfm#sales</a> .
Fuel Cost (\$/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at <a href="http://www.eia.gov/dnav/ng/hist/n3035us3A.htm">http://www.eia.gov/dnav/ng/hist/n3035us3A.htm</a> .	The electricity rate (8.04 \$/MCF) was based on the commercial rates as approved by the SMAQMD on 10/17/16.	Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at <a href="http://www.eia.gov/dnav/ng/hist/n3035us3A.htm">http://www.eia.gov/dnav/ng/hist/n3035us3A.htm</a> .
Operator Labor (\$/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 ( <a href="https://www.bls.gov/oes/current/oes_nat.htm">https://www.bls.gov/oes/current/oes_nat.htm</a> ). Hourly rates for operators based on data for plant and System Operators – other (51-8099).	Bureau of Labor Statistics, May 2023 National Occupational Employment and Wage Estimates – United States, May 2023 ( <a href="https://www.bls.gov/oes/current/oes_nat.htm">https://www.bls.gov/oes/current/oes_nat.htm</a> ). Hourly rates for operators based on data for plant and System Operators – other (51-8099).	Use plant-specific labor rate.
Maintenance Labor (\$/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 ( <a href="https://www.bls.gov/oes/current/oes_nat.htm">https://www.bls.gov/oes/current/oes_nat.htm</a> ). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

## Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream			
Pollutant Name		Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Toluene		37	NA
	0	0	NA
	0	0	NA
	0	0	NA
	0	0	NA
	0	0	NA
	0	0	NA
	0	0	NA
	0	0	NA
	0	0	NA
<b>Total</b>		<b>2,560</b>	<b>0</b>

### Constants used in calculations:

Temperature of auxiliary fuel ( $T_{af}$ ) =  
 Density of auxiliary Fuel at 77 °F ( $\rho_{af}$ ) =  
 Heat Input of auxiliary fuel ( $-\Delta h_{caf}$ ) =  
 Density of waste gas at 77 °F ( $\rho_{wi}$ ) =  
 Mean Heat Capacity of Air ( $C_{pmair}$ )

Reference Temperature ( $T_{ref}$ ) =  
  
 (For thermal oxidizers)

77.0	°F
0.0408	lb/ft <sup>3</sup>
21,502	Btu/lb
0.0739	lb/ft <sup>3</sup>
0.255	Btu/lb °F

Parameter	Equation	Calculated		Calculated	
		Value	Units	Value	Units
Sum of volume fraction of combustible components =	$= (\sum x_i) =$	37	ppmv		
Lower Explosive Limit of waste gas ( $LEL_{mix}$ )	$= [\sum (x_j) / ((\sum x_i) \times LEL_j)]^{-1} =$ Where $x_j$ is the volume fraction and $LEL_j$ the lower explosive limit for each combustible component in the waste gas.	11,000	ppmv		
% $LEL_{mix}$	$= (Total\ Combustible\ Conc.\ In\ Mixture / LEL_{mix}) \times 100 =$	0.34	percent		* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.
Dilution Factor	$= (LEL_{mix} \times 0.249) / (\sum x_i) =$	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	$= (Total\ Adjusted\ Conc.\ With\ Dilution\ Air / LEL_{mix}) \times 100 =$	Not applicable			
Inlet volumetric flow rate ( $Q_{wi}$ ) at 77°F and 1 atm.	(From Data Entry Tab) =	20,000	scfm		
Oxygen Content of gas stream	$= 100 - (\sum x_j \times 100 / 10^6) =$	20.90	percent		
Fan Power Consumption (FP)	$= [(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P] / \epsilon$	74.1	kW		
$Q_{wo}$	$\approx Q_{wi} =$	20,000	scfm		
Operating temperature of oxidizer ( $T_{fi}$ )	(From Data Entry Tab) =	1,900	°F		
Temperature of waste gas at outlet to preheater ( $T_{wo}$ )	$= Heat\ Recovery \times (T_{fi} - T_{wi}) + T_{wi} =$	1,360	°F		Note: this temperature is relevant for incinerators, but not for the RTOs (both regenerative and recuperative).

Parameter	Equation	Calculated Value	Units	Calculated Value	Units
Temperature of flue gas exiting the regenerative oxidizer (T <sub>fo</sub> )	$= T_{fi} - 0.95(T_{fi} - T_{wi}) =$	190	°F		
Heat Input of waste gas (-Δh <sub>cwi</sub> )	$= \sum (-\Delta h_{ci}) x_i$ Where (-Δh <sub>ci</sub> ) is the heat of combustion and x <sub>i</sub> the fraction of component "i" at 77 °F.	0.16	Btu/scf	2.2	Btu/lb
Estimated Auxiliary Fuel Flow (Q <sub>af</sub> ) at 77 °F and 1 atm. Auxiliary fuel Energy Input =	(Calculated using Equation 2.45 in Appendix B)	35.58	scfm		
Minimum Energy required for combustion stabilization =	$= 5\% \times \text{Total Energy Input}$ $= 0.05 \times \rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref}) =$	31,210	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxiliary fuel is sufficient.)		33,470	Btu/min		
Auxiliary fuel flow (Q <sub>af</sub> ) (adjusted for fuel required for combustion stabilization) at 77°F and 1 atm. =		No			
Total Volumetric Throughput (Q <sub>tot</sub> ) at 77 °F and 1 atm.	$= Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af} =$	38	scfm		
		20,038	scfm		

Note: Negative value for calculated Q<sub>af</sub> indicates that the waste gas is sufficient to support combustion.

Note: Additional auxiliary fuel equivalent to 5% of total energy input is required to stabilize combustion.

#### Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i (1+i)^n / (1+i)^n - 1 =$ Where n = Equipment Life and i= Interest Rate	0.0889

**Cost Estimate  
Direct Costs**

**Total Purchased equipment costs (in 2024 dollars)**

Incinerator + auxiliary equipment <sup>a</sup> (A) =			
Equipment Costs (EC) for Regenerative Oxidizer Instrumentation <sup>b</sup> =	$=(2.204 \times 100,000 + 11.57 \text{ Qtot}) \times (2024 \text{ CEPI}/1999 \text{ CEPI}) =$	\$815,826	in 2024 dollars
Sales taxes =	$0.10 \times A =$	\$81,583	
Freight =	$0.03 \times A =$	\$24,475	
	$0.05 \times A =$	\$40,791	
	<b>Total Purchased equipment costs (B) =</b>	<b>\$962,725</b>	<b>in 2024 dollars</b>

Footnotes

- a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
- b - Includes the instrumentation and controls furnished by the incinerator vendor.

**Direct Installation Costs (in 2024 dollars)**

Foundations and Supports =	$0.08 \times B =$	\$77,014	
Handling and Erection =	$0.14 \times B =$	\$134,775	
Electrical =	$0.04 \times B =$	\$38,507	
Piping =	$0.02 \times B =$	\$19,254	
Insulation for Ductwork =	$0.01 \times B =$	\$9,627	
Painting =	$0.01 \times B =$	\$9,627	
Site Preparation (SP) =		\$0	
Buildings (Bldg) =		\$0	
	<b>Total Direct Installation Costs =</b>	<b>\$288,803</b>	
<b>Total Direct Costs (DC) =</b>	<b>B + C + SP + Bldg =</b>	<b>\$1,251,478</b>	<b>in 2024 dollars</b>

**Total Indirect Installation Costs (in 2024 dollars)**

Engineering =	$0.10 \times B =$	\$96,268	
Construction and field expenses =	$0.05 \times B =$	\$48,134	
Contractor fees =	$0.10 \times B =$	\$96,268	
Start-up =	$0.02 \times B =$	\$19,254	
Performance test =	$0.01 \times B =$	\$9,627	
	<b>Total Indirect Costs (IC) =</b>	<b>\$269,549</b>	

Contingency Cost (C) =	\$152,103	\$152,103	
<b>Total Capital Investment =</b>	<b>\$1,673,129</b>	<b>\$1,673,129</b>	<b>in 2024 dollars</b>

**Direct Annual Costs**

Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	\$21,270
Annual Fuel Costs for Natural Gas	= Cost <sub>fuel</sub> × Fuel Usage Rate × 60 min/hr × Operating hours/year	\$38,281
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	\$3,744
	Supervisor = 15% of Operator	\$562
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	\$4,118
	Materials = 100% of maintenance labor	\$4,118

**Direct Annual Costs (DC) = \$72,093 in 2024 dollars**

**Indirect Annual Costs**

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	\$7,525
Administrative Charges	= 2% of TCI	\$33,463
Property Taxes	= 1% of TCI	\$16,731
Insurance	= 1% of TCI	\$16,731
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	\$148,726

**Indirect Annual Costs (IC) = \$223,176 in 2024 dollars**

**Total Annual Cost = DC + IC = \$295,270 in 2024 dollars**

**Cost Effectiveness**

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	\$295,270	per year in 2024 dollars
VOC/HAP Pollutants Destroyed =	10.9	tons/year
Cost Effectiveness =	\$27,100	per ton of pollutants removed in 2024 dollars