SMAQMD BACT CLEARINGHOUSE

CATEGORY Type: **COATING - RAILCAR**

BACT Category: MINOR SOURCE

BACT Determination Number: 230	**BACT Determination Date:** 4/23/2020

Equipment Information

Permit Number: 25959
Equipment Description: PAINT SPRAY BOOTH
Unit Size/Rating/Capacity: < 20 tons VOC/year
Equipment Location: SIEMENS INDUSTRY, INC.
7464 FRENCH RD SACRAMENTO, CA

EXPIRED

BACT Determination Information

District Contact: Jeffrey Quok Phone No.: (916) 874-4863 email: jquok@airquality.org

ROCs	**Standard:**	
	Technology Description:	HVLP Spray or equivalent application equipment, enclosed gun cleaning system. For heaters, use of NG or LPG fired burner. See Comments for VOC Standards.
	Basis:	Achieved in Practice
NOx	**Standard:**	30 ppmvd @ 3% O2 or 0.036 lb/MMBtu
	Technology Description:	For heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu
	Basis:	Achieved in Practice
SOx	**Standard:**	
	Technology Description:	For heaters, natural gas or LPG fired burner
	Basis:	Achieved in Practice
PM10	**Standard:**	
	Technology Description:	1.Enclosed spray booth with dry filters or waterwash, properly maintained, 98% PM control efficiency, 0.0015 gr/dcsf 2.HVLP spray or equivalent application equipment
	Basis:	Achieved in Practice
PM2.5	**Standard:**	
	Technology Description:	1.Enclosed spray booth with dry filters or waterwash, properly maintained, 98% PM control efficiency, 0.0015 gr/dcsf 2.HVLP spray or equivalent application equipment
	Basis:	Achieved in Practice
CO	**Standard:**	400 ppmvd @ 3% O2 or 0.30 lb/MMBtu
	Technology Description:	For heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu
	Basis:	Achieved in Practice
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: BACT for VOC:
For OEM Booths (Misc. metal parts and products): Compliance with SMAQMD Rule 451, Compliance with BACT #230 coating, solvent, and stripper VOC limits (See BACT #230 evaluation for VOC limit tables.
For OEM Booths (Plastic parts and products): Compliance with SMAQMD Rule 468 except where noted in evaluation footnotes (See BACT evaluation for notes).
For refinishing booths: Complaince with SMAQMD Rule 459.

Printed: 4/27/2020

777 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

EXPIRED

DETERMINATION NO.: 230

DATE: April 23, 2020

ENGINEER: Jeffrey Quok

Category/General Equip Description: Coating, Stripping, and Solvent Cleaning – Railcars

Equipment Specific Description: Paint Spray Booth

Equipment Size/Rating: ≤ 20 tons VOC/year, (BACT #230)

BACT Category: Minor Source

Previous BACT Det. No.: N/A

This BACT determination was determined under the project for A/C 25959 (Siemens Industry, Inc.) for coating, stripping, and solvent cleaning - railcars. In a previous SMAQMD evaluation under PO #21960, it was determined that Siemens would need to comply with SMAQMD Rule 459 – Automotive, Mobile Equipment, and Associated Parts and Components Coating Operations for refinishing purposes and SMAQMD Rule 451 – Surface Coating of Miscellaneous Metal Parts and Products/Rule 466 – Solvent Cleaning for original equipment manufacturer (OEM) purposes. Rule 466 Solvent Cleaning was referenced to cover plastic parts solvent cleaning. Since SMAQMD adopted Rule 468 – Surface coating of plastic parts and products on 3/22/18, the standards of Rule 468 will replace Rule 466.Therefore, this BACT will cover standards for railcar automotive coatings, misc. metal parts and product coatings, and plastic parts and product coatings.

BACT/T-BACT ANALYSIS

A.1. ACHIEVED IN PRACTICE (Rule 202, §205.1a)

The following control technologies are currently employed as BACT/T-BACT for paint spray booths used for railcars by the following air pollution control districts:

District/Agency	Best Available Control Technology (BACT)/Requirements
US EPA	**BACT** Source: EPA RACT/BACT/LAER Clearinghouse RBLC ID: OR-0045 (8/04/2005) * This BACT determination was found to be the most stringent Achieved in Practice BACT determination published in the EPA clearinghouse. See Attachment A for more information.

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>US EPA</td><td>
<table>
<tr><td colspan="2">Paint Spray Booth</td></tr>
<tr><td>VOC</td><td>Low VOC coatings, transfer efficiency, operator training, and closed containers</td></tr>
<tr><td>NOx</td><td>N/A – No BACT determinations</td></tr>
<tr><td>SOx</td><td>N/A – No BACT determinations</td></tr>
<tr><td>PM10</td><td>N/A – No BACT determinations</td></tr>
<tr><td>PM2.5</td><td>N/A – No BACT determinations</td></tr>
<tr><td>CO</td><td>N/A – No BACT determinations</td></tr>
</table>
<u>T-BACT</u>
<u>Source: EPA RACT/BACT/LAER Clearinghouse</u>
RBLC ID: NV-0049 (8/20/2009)
<table>
<tr><td colspan="2">Paint Spray Booth</td></tr>
<tr><td>Organic HAP</td><td>Use of HVLP spray guns, keep VOC-containing materials in closed containers, limit of organic HAP content to 47% by weight of the VOC content.(A)</td></tr>
</table>
(A) This paint spray booth’s usage of paints, lacquers, thinners, and solvents is limited to 50 gallons per month and 500 gallons per year.

<u>RULE REQUIREMENTS</u>:
40 CFR 63 Subpart MMMM – National Emission Standards for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts and Products
This regulation applies for facilities that are engaged, either in part or in whole, in the manufacture of miscellaneous metal parts and product, that use 250 gallons per year or more of coatings that contain HAPs, and that are located at a plant site that is a major source as defined in 40 CFR subpart A, §63.2. This BACT Determination is only for minor sources, therefore this subpart does not apply.

Subpart MMMM limits hazardous air pollutants (HAP) for miscellaneous metal parts and products surface coating facilities. The limits can be seen in the table below.
</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>US EPA</td><td>
Organic HAP Emission Limits for Coating Types §63.3890
<table>
<tr><th rowspan="2">Subcategory</th><th colspan="2">Organic HAP Emission Limits
kg HAP/liter of coating solids
(lb HAP/gal of coating solids)</th></tr>
<tr><th>New/Reconstructed Sources(A)</th><th>Existing Sources(B)</th></tr>
<tr><td>General Use Coating</td><td>0.23 (1.9)</td><td>0.31 (2.6)</td></tr>
<tr><td>High Performance Coating</td><td>3.3 (27.5)</td><td>3.3 (27.5)</td></tr>
<tr><td>Magnet Wire Coating</td><td>0.05 (0.44)</td><td>0.12 (1.0)</td></tr>
<tr><td>Rubber-to-Metal Coating</td><td>0.81 (6.8)</td><td>4.5 (37.7)</td></tr>
<tr><td>Extreme Performance Fluoropolymer Coating</td><td>1.5 (12.4)</td><td>1.5 (12.4)</td></tr>
</table>
(A) A source is a new/reconstructed source if construction is commenced after August 12, 2002.
(B) An existing source means any affected source that is not a new or reconstructed source.

Work Practice Standards

(a) For any coating operation(s) on which you use the compliant material option or the emission rate without add-on controls option, you are not required to meet any work practice standards.

(b) If you use the emission rate with add-on controls option, you must develop and implement a work practice plan to minimize organic HAP emissions from the storage, mixing, and conveying of coatings, thinners and/or other additives, and cleaning materials used in, and waste materials generated by the controlled coating operation(s) for which you use this option; or you must meet an alternative standard as provided in paragraph (c) of this section. The plan must specify practices and procedures to ensure that, at a minimum, the elements specified in paragraphs (b)(1) through (5) of this section are implemented.

(1) All organic-HAP-containing coatings, thinners and/or other additives, cleaning materials, and waste materials must be stored in closed containers.

(2) Spills of organic-HAP-containing coatings, thinners and/or other additives, cleaning materials, and waste materials must be minimized.

(3) Organic-HAP-containing coatings, thinners and/or other additives, cleaning materials, and waste materials must be conveyed from one location to another in closed containers or pipes.

(4) Mixing vessels which contain organic-HAP-containing coatings and other materials must be closed except when adding to, removing, or mixing the contents.

(5) Emissions of organic HAP must be minimized during cleaning of storage, mixing, and conveying equipment.
</td></tr>
</table>

District/Agency	Best Available Control Technology (BACT)/Requirements
US EPA	(c) As provided in §63.6(g), we, the U.S. Environmental Protection Agency, may choose to grant you permission to use an alternative to the work practice standards in this section. 40 CFR 63 Subpart HHHHHH – National Emission Standards for Hazardous Air Pollutants for Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources This subpart applies to autobody refinishing operations, among other area sources, that include motor vehicles and mobile equipment spray-applied surface coating operations; and apply coatings that may potentially contain the target HAP compounds of chromium, lead, manganese, nickel, or cadmium. This subpart also applies to operations using MeCl for the removal of dried paint. **General Requirements** For paint stripping operations using MeCl: A. Implement management practice to minimize the evaporative emissions of MeCl. The management practices must address practices in paragraphs 1 through 5, as applicable. 1. Evaluate each application to ensure there is a need for paint stripping. 2. Evaluate each application where a paint stripper containing MeCl is used to ensure that there is no alternative paint stripping technology that can be used. 3. Reduce exposure of all paint strippers containing MeCl to the air. 4. Optimize application conditions when using paint strippers containing MeCl to reduce MeCl evaporation. 5. Practice proper storage and disposal of paint strippers containing MeCl. For coatings that may potentially contain the target HAP compounds of chromium, lead, manganese, nickel, or cadmium: 1. All spray-applied coatings must be performed in a spray booth, preparation station, or mobile enclosures that are fully enclosed with a full roof with four walls or complete side curtains. The enclosure must be ventilated at a negative pressure and equipped with a filter system that can achieve at least 98% capture efficiency. 2. Coatings must be applied with HVLP spray equipment, electrostatic application, airless spray gun, air-assisted airless spray gun, or an equivalent technology for which written approval has been obtained from the U.S. EPA. 3. Spray gun cleaning must be conducted such that an atomized mist or spray of gun cleaning solvent and paint residue is not created outside of a container that collects used cleaning solvent. 4. All new and existing personnel who spray-apply surface coatings must be trained in the proper application of surface coatings. For new affected sources, submit an initial notification to EPA no later than 180 days after initial startup or July 7, 2008, whichever is later. For an existing affected source, submit the initial notification no later than January 11, 2010.

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>USEPA</td><td>Control Techniques Guidelines for Miscellaneous Metal Parts and Plastic Parts Coatings (EPA-453/R- 08-003)

Although not a promulgated rule, this guideline identifies 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. District Rule 468 (Adopted 03/22/2018) was adopted to meet these guidelines.</td></tr>
<tr><td>ARB</td><td>BACT
Source: ARB BACT Clearinghouse

* The ARB BACT Clearinghouse did not contain any BACT determinations that were applicable to this determination. See Attachment B for more information.

<table>
<tr><th colspan="2">ARB BACT Clearinghouse*</th></tr>
<tr><td>VOC</td><td>No standard</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>No standard</td></tr>
<tr><td>PM2.5</td><td>No standard</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>

T-BACT
The ARB BACT Clearinghouse did not contain any T-BACT determinations.</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>SMAQMD</td><td>

BACT
BACT Determination #153 & #154 (2/5/2018)

<table>
<tr><td colspan="2">Paint Spray Booth for Automotive Coatings < 4,700 lbs VOC/year</td></tr>
<tr><td>VOC</td><td>1. Compliance with SMAQMD Rule 459.
2. For heaters, use of natural gas or LPG fired burner</td></tr>
<tr><td>NOx</td><td>Low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu/hr</td></tr>
<tr><td>SOx</td><td>For heaters, use of natural gas or LPG fired burner</td></tr>
<tr><td>PM10</td><td>1. 98% control efficiency, 0.0015 gr/dcsf
2. Spray booth with properly maintained dry filters or waterwash.
3. HVLP spray or equivalent application equipment.
4. For heaters, use of natural gas or LPG fired burner</td></tr>
<tr><td>PM2.5</td><td>1. 98% control efficiency, 0.0015 gr/dcsf
2. Spray booth with properly maintained dry filters or waterwash.
3. HVLP spray or equivalent application equipment.
4. For heaters, use of natural gas or LPG fired burner</td></tr>
<tr><td>CO</td><td>For heaters, use of natural gas or LPG fired burner</td></tr>
</table>

<table>
<tr><td colspan="2">Paint Spray Booth for Automotive Coatings ≥ 4,700 lbs VOC/year</td></tr>
<tr><td>VOC</td><td>1. Coatings with VOC content and transfer efficiency complying with BAAQMD Reg. 8, Rule 45. Add-on control with overall capture/destruction efficiency ≥90% by weight.
2. For heaters, use of natural gas or LPG fired burner</td></tr>
<tr><td>NOx</td><td>Low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu/hr</td></tr>
<tr><td>SOx</td><td>For heaters, use of natural gas or LPG fired burner</td></tr>
<tr><td>PM10</td><td>1. 98% control efficiency, 0.0015 gr/dcsf
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4. For heaters, use of natural gas or LPG fired burner</td></tr>
<tr><td>CO</td><td>For heaters, use of natural gas or LPG fired burner</td></tr>
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T-BACT
BACT Determination #153 & #154 (2/5/2018)

<table>
<tr><th colspan="2">Paint Spray Booth for Automotive Coatings</th></tr>
<tr><td>Organic HAP</td><td>1. Spray booth with filter system, 98% PM control efficiency, HVLP spray equipment or equivalent technology
2. Coatings with VOC content compliant with BAAQMD Reg. 8, Rule 45 and transfer efficiency complying with Reg. 8, Rule 45
3. VOC emission controlled to overall capture/destruction efficiency ≥ 90% by weight</td></tr>
</table>

BACT Determination #124 & #125 (8/26/2016)

<table>
<tr><th colspan="2">Paint Spray Booth for Misc. Metal Parts and Products Coatings < 1,170 lbs VOC/month and < 4,660 lbs VOC/year</th></tr>
<tr><td>VOC</td><td>1. 4,660 lb VOC/year limit
2. HVLP spray or equivalent application equipment
3. Enclosed spray gun cleaning system
4. Compliance with BACT coating, solvent, and stripper VOC limits</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>1. Enclosed spray booth with properly maintained dry filters or waterwash.
2. HVLP spray or equivalent application equipment.</td></tr>
<tr><td>PM2.5</td><td>1. Enclosed spray booth with properly maintained dry filters or waterwash.
2. HVLP spray or equivalent application equipment.</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>

<table>
<tr><th colspan="2">Paint Spray Booth for Misc. Metal Parts and Products Coatings ≥ 1,170 lbs VOC/month or ≥ 4,660 lbs VOC/year</th></tr>
<tr><td>VOC</td><td>1. Compliance with BACT coating, solvent, and stripping VOC limits (See BACT evaluation), and VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency; OR
2. Use of Super Clean Materials (<5% VOC by weight); OR
3. Use of low-VOC materials resulting in an equivalent emission reductions as option #1 and option #2.</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>1. Enclosed spray booth with properly maintained dry filters or waterwash.
2. HVLP spray or equivalent application equipment</td></tr>
<tr><td>PM2.5</td><td>1. Enclosed spray booth with properly maintained dry filters or waterwash.</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
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T-BACT

BACT Determination #124 & #125 (8/26/2016)

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<tr><td>Organic HAP</td><td>1. HVLP spray or equivalent application equipment
2. Enclosed spray gun cleaning system
3. Keep VOC-containing materials in closed containers
4. Limit of organic HAP content to 47% by weight of VOC content
5. Compliance with BACT coating, solvent cleaning, and stripping VOC limits</td></tr>
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<table>
<tr><td colspan="2">Paint Spray Booth for Misc. Metal Parts and Products Coatings ≥ 1,170 lbs VOC/month or ≥ 4,660 lbs VOC/year</td></tr>
<tr><td>Organic HAP</td><td>1. HVLP spray or equivalent application equipment
2. Enclosed spray gun cleaning system
3. Keep VOC-containing materials in closed containers
4. Limit of organic HAP content of 47% by weight of VOC content
5. Compliance with BACT coating, solvent cleaning, and stripping VOC limits (see BACT evaluation). With VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency; OR
6. Use of Super Clean Materials (<5% VOC by weight); OR
7. Use of low-VOC materials resulting in an equivalent emission reductions as option #5 and option #6</td></tr>
</table>

BACT Determination #188 & #189 (2/20/2019)

<table>
<tr><td colspan="2">Paint Spray Booth for Plastic Parts Coatings ≤ 4,700 lbs VOC/year</td></tr>
<tr><td>VOC</td><td>Compliance with SMAQMD Rule 468, except where noted in footnote (A)</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent</td></tr>
<tr><td>PM2.5</td><td>Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent</td></tr>
<tr><td>CO</td><td>No Standard</td></tr>
</table>

(A) The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in the rule): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L.

</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>SMAQMD</td><td>
<table>
<tr><td colspan="2">Paint Spray Booth for Plastic Parts Coatings > 4,700 lbs VOC/year</td></tr>
<tr><td>VOC</td><td>1. Compliance with SMAQMD Rule 468, except where noted in footnote (A) and VOC control system with ≥ 90% overall efficiency, or
2. Use of low-VOC materials resulting in an equivalent remission reduction</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent</td></tr>
<tr><td>PM2.5</td><td>Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>
(A) The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in the rule): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L.

<u>T-BACT</u>

BACT Determination #188 & #189 (2/20/2019)

<table>
<tr><td colspan="2">Paint Spray Booth for Plastic Parts Coatings</td></tr>
<tr><td>Organic HAP & inorganic HAP</td><td>Compliance with NESHAP HHHHHH where applicable.</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>SMAQMD</td><td>

RULE REQUIREMENTS:

Rule 459 Automotive, Mobile Equipment, and Associated Parts and Components Coating Operations (Last amended 8/25/2011)

Vehicle Coating Limits: No person shall apply to any motor vehicle, mobile equipment, or associated parts and components, any coating with a VOC regulatory content, as calculated pursuant to Section 407, in excess of the following limits:

<table>
<tr><th>Coating Category
(SMAQMD Rule 459 Definition)</th><th>VOC Regulatory Limit as Applied
g/l (lbs/gal)</th></tr>
<tr><td>Adhesion Promoter</td><td>540 (4.5)</td></tr>
<tr><td>Clear Coating</td><td>250 (2.1)</td></tr>
<tr><td>Coating Category
(SMAQMD Rule 459 Definition)</td><td>VOC Regulatory Limit as Applied
g/l (lbs/gal)</td></tr>
<tr><td>Color Coating</td><td>420 (3.5)</td></tr>
<tr><td>Multi-Color Coating:
Mobile equipment driven or drawn on rails and its associated parts and components

Any other mobile equipment or motor vehicle and its associated parts and components</td><td>520 (4.3)

680 (5.7)</td></tr>
<tr><td>Pretreatment Coating</td><td>660 (5.5)</td></tr>
<tr><td>Primer/Primer Sealer</td><td>250 (2.1)</td></tr>
<tr><td>Single-Stage Coating</td><td>340 (2.8)</td></tr>
<tr><td>Temporary Protective Coating</td><td>60 (0.5)</td></tr>
<tr><td>Truck Bed Liner Coating</td><td>200 (1.7)</td></tr>
<tr><td>Underbody Coating</td><td>430 (3.6)</td></tr>
<tr><td>Uniform Finish Coating</td><td>540 (4.5)</td></tr>
<tr><td>Any Other Coating Type, Excluding Materials Listed in Section 302</td><td>250 (2.1)</td></tr>
</table>

</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>SMAQMD</td><td>
Vehicle Material Limits: No person shall apply to any motor vehicle any of the following materials with a VOC regulatory content, as calculated pursuant to section 407, in excess of the following limits:
<table>
<tr><th>Material</th><th>VOC Regulatory Limit as Applied
g/l (lbs/gal)</th></tr>
<tr><td>Gasket/Gasket Sealing Material</td><td>200 (1.7)</td></tr>
<tr><td>Cavity Wax</td><td>650 (5.4)</td></tr>
<tr><td>Deadener</td><td>650 (5.4)</td></tr>
<tr><td>Lubricating Wax/Compound</td><td>700 (5.8)</td></tr>
</table>
If anywhere on the container of any automotive coating, or any label or sticker affixed to the container, or in any sales, advertising, or technical literature supplied by a person, any representation is made that indicates that the coating meets the definition of or is recommended for use for more than one of the coating categories listed in Section 301, then the lowest VOC content limit shall apply.

Emission Control Equipment: As an alternative to the coating limits, as applicable, a person may use air pollution control equipment, subject to the approval to the Air Pollution Control Officer, that provides an overall system efficiency of not less than 85% as determined pursuant to Section 406. Any approved emission control equipment must be maintained and used at all times in proper working condition.

Application Equipment Requirement:
A person shall not apply any coating unless one of the following application methods is used:
a. Electrostatic application equipment.
b. High-Volume Low-Pressure spray equipment. The spray gun shall meet one of the following:
1. The spray gun shall be permanently labeled as HVLP; or
2. If the spray gun is not permanently labeled as a HVLP, then the end user shall demonstrate that the spray gun meets the HVLP definition in Section 224 in design and use. A satisfactory demonstration shall be based on the manufacturer’s published technical material on the design of the gun and by a demonstration of the operation of the gun using an air pressure tip gauge from the manufacturer of the gun.
c. Low-Volume Low-Pressure spray equipment.
d. Brush or roll coating, dip coat, or flow coat.
e. Any other application method that achieves a transfer efficiency equivalent to, or higher than, the application methods listed in Sections 305.1 (a)-(d) as determined by the methods specified on Section 504.9. Written approval from the Air Pollution Control Officer shall be obtained for each alternative application method prior to use.
</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>SMAQMD</td><td>

Solvent Cleaning Operations and Storage Requirements:
Any person subject to this rule shall comply with the following requirements:

a. Closed containers shall be used for the disposal of cloth, sponges, or paper used for solvent cleaning operations and coating removal.
b. Volatile organic compound-containing materials shall be stored in closed, vapor-tight containers, when not in use except while adding to or removing them from the containers.
c. A person shall not perform cleaning operations using a solvent with a volatile organic compound content in excess of 25 grams per liter (0.21 pounds per gallon), as determined pursuant to Section 409.
d. For bug and tar removal a person shall not use any solvent other than bug and tar remover regulated under the Consumer Products Regulation (California Code of Regulations Section 94507 et seq.) or a solvent with a volatile organic compound content of no more than 25 grams per liter.

Coating remover (stripper requirements):
A person shall not perform coating removal with a material containing volatile organic compounds in excess of 200 grams per liter (1.7 pounds per gallon).

Rule 451 – Surface Coating of Miscellaneous Metal Parts and Products (Last amended 10/28/2010)
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

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

<table>
<tr><td>Coating Category (SMAQMD Rule 451 Definition)</td><td colspan="2">Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)</td></tr>
<tr><td></td><td>Air Dried</td><td>Baked</td></tr>
<tr><td>Aluminum Coating for Window Frames and Door Frames</td><td>420 (3.5)</td><td>275 (2.3)</td></tr>
<tr><td>Camouflage</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Electrical Insulating</td><td>340 (2.8)</td><td>275 (2.3)</td></tr>
<tr><td>Etching Filler</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
</table>

</td></tr>
</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>SMAQMD</td><td>
<table>
<tr><td>Coating Category (SMAQMD Rule 451 Definition)</td><td colspan="2">Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)</td></tr>
<tr><td></td><td>Air Dried</td><td>Baked</td></tr>
<tr><td>Extreme High Gloss</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Extreme Performance</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Heat Resistant</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Metallic/Iridescent</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Prefabricated Architectural Component</td><td>420 (3.5)</td><td>275 (2.3)</td></tr>
<tr><td>Pretreatment Wash Primer</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Silicone Release Coating</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Solar Absorbent</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>All Other Coatings</td><td>340 (2.8)</td><td>275 (2.3)</td></tr>
</table>
VOC content of coatings used for metal furniture shall not exceed the following limits:
<table>
<tr><td>Coating Category (SMAQMD Rule 451 Definition)</td><td colspan="2">Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)</td></tr>
<tr><td></td><td>Air Dried</td><td>Baked</td></tr>
<tr><td>General, Multi-Component</td><td>340 (2.8)</td><td>275 (2.3)</td></tr>
<tr><td>Etching Filler</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Extreme High Gloss</td><td>340 (2.8)</td><td>360 (3.0)</td></tr>
<tr><td>Extreme Performance</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Heat Resistant</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>SMAQMD</td><td>

<table>
<tr><td>Coating Category (SMAQMD Rule 451 Definition)</td><td colspan="2">Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)</td></tr>
<tr><td></td><td>Air Dried</td><td>Baked</td></tr>
<tr><td>Metallic/Iridescent</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Pretreatment Wash Primer</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Solar Absorbent</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>All Other Coatings</td><td>275 (2.3)</td><td>275 (2.3)</td></tr>
</table>

VOC content for coating removers (strippers):

- A person shall not use a stripper on miscellaneous metal parts and products which contains more than 200 grams of VOC per liter of material (1.7 pounds per gallon).

VOC content surface preparation and cleanup materials:

- A person shall not perform cleanup of application equipment (including spray gun nozzles) with a material containing VOC in excess of 25 grams per liter (0.21 pounds per gallon).
- A person shall not perform product cleaning or surface preparation with a material containing VOC in excess of 25 grams per liter (0.21 pounds per gallon).

Rule 468 – Surface Coating of Plastic Parts and Products (Adopted 3/22/2018)
SMAQMD Rule 468, SJVAPCD Rule 4603, and SCAQMD Rules related to coating of plastic parts are all based on EPA-453/R-08-003 "*Control Techniques Guidelines for Miscellaneous Metal and Plastic Parts Coatings*," US EPA, September 2008, which is the basis for Reasonably Available Control Technologies (RACT). All three rules were adopted to comply with each District's respective portion of the State Implementation Plan (SIP). Since these rules are based on similar guidelines, a rule comparison has been added under Section A.2.

Rule 419 – NOx from Miscellaneous Combustion Units (Amended 10/25/2018)
This rule applies to any miscellaneous combustion unit with a total rated heat input capacity of 2 MMBtu/hr located at a major stationary source of NOx and to any miscellaneous combustion unit or cooking unit with a total rated heat input capacity of 5 MMBtu/hr or greater that is not located at a major stationary source of NOx.

<table>
<tr><th colspan="4">Table 1: Miscellaneous Combustion Units
Emission Limits Expressed as ppmv @ 3% O_2</th></tr>
<tr><th rowspan="4">Equipment Category</th><th colspan="2">NOx Limit
ppmv, corrected to 3% O_2
(lb/MMBtu)</th><th>CO Limit
ppmv, corrected to 3% O_2
(lb/MMBtu)</th></tr>
<tr><th colspan="2">Effective (see Section 401)</th><th rowspan="3">400
(0.30)</th></tr>
<tr><th colspan="2">Process Temperature</th></tr>
<tr><th>< 1200 °F</th><th>≥ 1200 °F</th></tr>
<tr><td>Oven, Dehydrator, Dryer, Heater, or Kiln</td><td>30
(0.036)</td><td>60
(0.073)</td><td></td></tr>
</table>

</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>South Coast AQMD</td><td>

BACT
Source: SCAQMD BACT Guidelines for Non-Major Polluting Facilities, page 121.
(Last Revised 2/1/2019)

<table>
<tr><td colspan="2">Spray Booths</td></tr>
<tr><td>VOC</td><td>For down-draft type < 667 lbs/month VOC emissions or other types with <1170 lbs/month VOC Emissions
1. Compliance with applicable AQMD Regulation XI Rules

For down-draft type ≥ 22 lbs/day VOC emissions or other types with ≥1170 lbs/month VOC Emissions
1. Compliance with applicable AQMD Regulation XI Rules, and VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency; OR
2. Use of Super Clean Materials (<5% VOC by weight); OR
3. Use of low-VOC materials resulting in an equivalent emission reduction</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>Dry filters or waterwash</td></tr>
<tr><td>PM2.5</td><td>No standard</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>

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

RULE REQUIREMENTS:

Reg XI, Rule 1151 – Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations (Last amended 9/5/2014)
A person shall not apply any automotive coating to a motor vehicle, mobile equipment, or associated parts or components of a motor vehicle or mobile equipment that contains VOC in excess of the limits specified in Table of Standards below. Compliance with the applicable VOC content limits shall be based on VOC content, including any material added to the original automotive coating supplied by the manufacturer, as applied, less water and exempt compounds.

Coating Category (SCAQMD Rule 1151 Definition)	VOC Content Limit as Applied g/l (lbs/gal)
Adhesion Promoter	540 (4.5)
Clear Coating	250 (2.1)
Color Coating	420 (3.5)
Multi-Color Coating	680 (5.7)
Pretreatment Coating	660 (5.5)

</td></tr>
</table>

District/Agency	Best Available Control Technology (BACT)/Requirements
South Coast AQMD	

Coating Category (SCAQMD Rule 1151 Definition)	VOC Content Limit as Applied g/l (lbs/gal)
Primer	250 (2.1)
Single-Stage Coating	340 (2.8)
Temporary Protective Coating	60 (0.5)
Truck Bed Liner Coating	310 (2.6)
Underbody Coating	430 (3.6)
Uniform Finish Coating	540 (4.5)
Any Other Coating Type	250 (2.1)

Most Restrictive VOC Limit
If any representation or information on the container of any automotive coating, or any label or sticker affixed to the container, or in any sales, advertising, or technical literature that indicates that the automotive coating meets the definition of or is recommended for use for more than one of the automotive coating categories listed in VOC Content Limit table, then the lowest VOC content shall apply.

Alternative Compliance
A person may comply with the provisions of the VOC content Limit table, by using an approved emission control system, consisting of collection and control devices provided such emission control system is approved pursuant to Rule 203 – Permit to Operate, in writing, by the Executive Officer for reducing emissions of VOC. The Executive Officer shall approve such emission control system only if the VOC emissions resulting from the use of non-compliant automotive coatings will be reduced to a level equivalent to or lower than that which would have been achieved by compliance with the terms of the VOC Content Limit table. The required efficiency of an emission control system at which an equivalent or greater level of VOC emission reduction will be achieved shall be calculated by the following equation:

$$C.E. = \left[1 - \left\{ \frac{(VOC_{LWc})}{(VOC_{LWn,Max})} \times \frac{1-(VOC_{LWn,Max}/D_{n,Max})}{1-(VOC_{LWc}/D_c)} \right\}\right] \times 100$$

Where:

C.E. = Control Efficiency, percent

VOC_{LWc} = VOC Limit of Rule 1151, less water and less exempt compounds, pursuant to paragraph (d)(1).

$VOC_{LWn,Max}$ = Maximum VOC content of non-compliant automotive coating used in conjunction with a control device, less water and exempt compounds.

District/Agency	Best Available Control Technology (BACT)/Requirements
South Coast AQMD	$D_{n,Max}$ = Density of VOC solvent, reducer, or thinner contained in the non-compliant automotive coating containing the maximum VOC. D_c = Density of corresponding VOC solvent, reducer, or thinner used in the compliant automotive coating system = 880 g/L. **Transfer Efficiency** A person shall not apply automotive coatings to any motor vehicle, mobile equipment or any associated parts or components to a motor vehicle or mobile equipment except by the use of one of the following methods: A. Electrostatic application, or B. High-volume, low-pressure (HVLP) spray, or C. Brush, dip, or roller, or D. Spray gun application, provided the owner or operator demonstrate that the spray gun meets the HVLP definition in paragraph (c)(17) in design and use. A satisfactory demonstration must be based on the manufacturer's published technical material on the design of the spray gun and by a demonstration of the operation of the spray gun using an air pressure tip gauge from the manufacturer of the spray gum. Any such other automotive coating application methods as demonstrated, in accordance with the provisions of subparagraph (h)(1)(F), to be capable of achieving equivalent or better transfer efficiency than the automotive coating application method listed in clause (d)(6)(A)(ii), provided written approval is obtained from the Executive Officer Prior to use. **Reg XI, Rule 1107 – Coating of Metal Parts and Products (Last amended 1/6/2006)** 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: A. Electrostatic application B. Flow coat C. Dip coat D. Roll coat E. High-volume, low-pressure (HVLP) spray F. Hand Application Methods G. 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 An operator shall not apply **any coating to metal parts and products** that exceeds the applicable limit specified below:

District/Agency	Best Available Control Technology (BACT)/Requirements

South Coast AQMD

Coating Category (SCAQMD Rule 1107 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)	
	Air Dried	Baked
General One-Component	275 (2.3)	275 (2.3)
General, Multi-Component	340 (2.8)	275 (2.3)
Military Specification	340 (2.8)	275 (2.3)
Etching Filler	420 (3.5)	420 (3.5)
Solar Absorbent	420 (3.5)	360 (3.0)
Heat Resistant	420 (3.5)	360 (3.0)
Extreme High Gloss	420 (3.5)	360 (3.0)
Metallic	420 (3.5)	420 (3.5)
Extreme Performance	420 (3.5)	360 (3.0)
Prefabricated Architectural One-Component	420 (3.5)	275 (2.3)
Prefabricated Architectural Multi-Component	420 (3.5)	275 (2.3)
Touch Up	420 (3.5)	360 (3.0)
Repair	420 (3.5)	360 (3.0)
Silicone Release	420 (3.5)	420 (3.5)
High-Performance Architectural	420 (3.5)	420 (3.5)
Camouflage	420 (3.5)	420 (3.5)
Vacuum-Metalizing	420 (3.5)	420 (3.5)
Mold-Seal	420 (3.5)	420 (3.5)
High-Temperature	420 (3.5)	420 (3.5)
Electric-Insulating Varnish	420 (3.5)	420 (3.5)
Pan Backing	420 (3.5)	420 (3.5)
Pretreatment Coatings	420 (3.5)	420 (3.5)

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>South Coast AQMD</td><td>
VOC Content for coating removers (strippers):
A person shall not use a stripper on miscellaneous metal parts and products which contains more than 200 grams of VOC per liter of material.

Regulation IX, Rule 1145 – Plastic, Rubber, Leather, and Glass Coatings (Last amended 12/04/2009)

SMAQMD Rule 468, SJVAPCD Rule 4603, and SCAQMD Rules related to coating of plastic parts are all based on EPA-453/R-08-003 “Control Techniques Guidelines for Miscellaneous Metal and Plastic Parts Coatings,” US EPA, September 2008, which is the basis for Reasonably Available Control Technologies (RACT). All three rules were adopted to comply with each District’s respective portion of the State Implementation Plan (SIP). Since these rules are based on similar guidelines, a rule comparison has been added under Section A.2.

Reg XI, Rule 1171 – Solvent Cleaning Operations (Last amended 5/1/2009)
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.

<table>
<tr><th>Solvent Cleaning Activity</th><th>VOC limits
g/l (lb/gal)</th></tr>
<tr><td>(A) Product cleaning during manufacturing process or surface preparation for coating, adhesive, or ink application</td><td></td></tr>
<tr><td>(i) General</td><td>25
(0.21)</td></tr>
<tr><td>(ii) Electrical apparatus components & electronic components</td><td>100
(0.83)</td></tr>
<tr><td>(iii) Medical Devices & pharmaceuticals</td><td>800
(6.7)</td></tr>
<tr><td>(B) Repair and Maintenance Cleaning</td><td></td></tr>
<tr><td>(i) General</td><td>25
(0.21)</td></tr>
<tr><td>(ii) Electrical apparatus components & electronic components</td><td>100
(0.83)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>South Coast AQMD</td><td>
<table>
<tr><th>Solvent Cleaning Activity</th><th>VOC limits
g/l (lb/gal)</th></tr>
<tr><td>(iii) Medical Devices & pharmaceuticals</td><td></td></tr>
<tr><td>(a) Tools, equipment, & machinery</td><td>800
(6.7)</td></tr>
<tr><td>(b) General work surfaces</td><td>600
(5.0)</td></tr>
<tr><td>(C) Cleaning of coatings or adhesives application equipment</td><td>25
(0.1)</td></tr>
<tr><td>(D) Cleaning of polyester resin application equipment</td><td>25
(0.21)</td></tr>
</table>

Reg XI, Rule 1147 – NOx Reductions from Miscellaneous Sources
(Last amended 7/7/2017)
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.

<table>
<tr><th rowspan="3">Equipment Category</th><th colspan="3">NOx Emission Limit
PPM @ 3% O2, dry or pound/MMBtu heat input</th></tr>
<tr><th colspan="3">Process Temperature</th></tr>
<tr><th>≤800° F</th><th>>800° F and <1200° F</th><th>≥1200 ° F</th></tr>
<tr><td>Make-Up air heater or other air heater located outside of building with temperature controlled zone inside building</td><td>30 ppm or 0.036 lb/MMBtu</td><td>30 ppm or 0.036 lb/MMBtu</td><td>-</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>San Diego County APCD</td><td>

BACT
Source: NSR Requirements for BACT, page 3-3. (June 2011)

<table>
<tr><td colspan="2">Automotive Refinishing Operations (<5 gal/day)</td></tr>
<tr><td>VOC</td><td>Compliance with Rule 67.20.1, Motor Vehicle and Mobile Equipment Refinishing Operations</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>Spray booth equipped with overspray filters</td></tr>
<tr><td>PM2.5</td><td>Spray booth equipped with overspray filters</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>

Source: NSR Requirements for BACT, page 3-20. (June 2011)

<table>
<tr><td colspan="2">Metal Parts & Products coating (<10 gal/day)</td></tr>
<tr><td>VOC</td><td>Compliance with Rule 67.3, Metal Parts & Products Coating Operations</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>Spray booth equipped with overspray filters</td></tr>
<tr><td>PM2.5</td><td>Spray booth equipped with overspray filters</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>

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

RULE REQUIREMENTS:

Regulation 4, Rule 67.20.1 – Motor Vehicle and Mobile Equipment Coating Operations (Effective 6/30/2010)
This rule applies to all motor vehicle and mobile equipment coating operations including finishing or refinishing of motor vehicles, mobile equipment, non-motorized models, and their associated parts and components.

</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>San Diego County APCD</td><td>

VOC Content Limits

<table>
<tr><th>Coating Category
(SDAPCD Rule 67.20.1 Definition)</th><th>VOC Content Limit as Applied
g/l (lbs/gal)</th></tr>
<tr><td>Adhesion Promoter</td><td>540 (4.5)</td></tr>
<tr><td>Clear Coating</td><td>250 (2.1)</td></tr>
<tr><td>Color Coating</td><td>420 (3.5)</td></tr>
<tr><th>Coating Category
(SDAPCD Rule 67.20.1 Definition)</th><th>VOC Content Limit as Applied
g/l (lbs/gal)</th></tr>
<tr><td>Multi-Color Coating</td><td>680 (5.7)</td></tr>
<tr><td>Pigmented Coating for Military Tactical Support Vehicles and Equipment</td><td>420 (3.5)</td></tr>
<tr><td>Pretreatment Coating</td><td>660 (5.5)</td></tr>
<tr><td>Primer</td><td>250 (2.1)</td></tr>
<tr><td>Coating Category
(SDAPCD Rule 67.20.1 Definition)</td><td>VOC Content Limit as Applied
g/l (lbs/gal)</td></tr>
<tr><td>Primer for Military Tactical Support Vehicles and Equipment</td><td>420 (3.5)</td></tr>
<tr><td>Primer Sealer</td><td>250 (2.1)</td></tr>
<tr><td>Single-Stage Coating</td><td>340 (2.8)</td></tr>
<tr><td>Temporary Protective Coating</td><td>60 (0.5)</td></tr>
<tr><td>Truck Bed Liner Coating</td><td>310 (2.6)</td></tr>
<tr><td>Underbody Coating</td><td>430 (3.6)</td></tr>
<tr><td>Uniform Finish Coating or Blender</td><td>540 (4.5)</td></tr>
<tr><td>Any Other Coating Type</td><td>250 (2.1)</td></tr>
</table>

Most Restrictive VOC Content Limit
If anywhere on the automotive coating container, or any label or sticker affixed to the container, or in any sales, advertising, or technical literature, any representation is made that indicates that the coating meets the definition of or is recommended for use for more than one of the coating categories listed in the VOC Content Limit table, then the lowest VOC content limit shall apply.

</td></tr>
</table>

District/Agency	Best Available Control Technology (BACT)/Requirements
San Diego County APCD	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. **Coating Application Equipment** A person shall conduct motor vehicle and mobile equipment coating operations by using only the following coating application methods: 1. Electrostatic spray application; or 2. Flow coat application; or 3. Dip coat application; or 4. Roll coat; or 5. Hand application methods; or 6. High-volume low-pressure spray. Facilities using an HVLP spray gun shall have available on site pressure gauges in proper operating condition to measure the air cap pressure or have available manufacturer's technical information regarding the correlation option is used to demonstrate compliance, a handle air inlet pressure gauge will be required on site in proper operating condition to measure the handle air inlet pressure; or 7. Other coating application methods that are demonstrated to have transfer efficiency at least equal to one of the above application methods, and which are used in such a manner that the operating parameters under which they were demonstrated to achieve such transfer efficiency are permanent features of the method. Such coating application methods shall be approved in writing by the Air Pollution Control Officer prior to use. **Cleaning of Coating Application Equipment** A person shall not clean coating application equipment used in motor vehicle and mobile equipment coating operations unless: 1. The VOC content of cleaning material does not exceed 25 grams per liter (0.21 lbs/gal), as applied; and 2. The cleaning material is flushed or rinsed through the application equipment, including paint lines, without exposure to air, into a container which has in place a lid that completely covers the container and has no visible holes, breaks or openings; and either 3. 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 4. A system is used that totally encloses the component parts being cleaned during the washing, rinsing, and draining process.

District/Agency	Best Available Control Technology (BACT)/Requirements
San Diego County APCD	**Surface Preparation and Other Cleaning Operations** A person shall not use any material for surface preparation or any other surface cleaning unless its VOC content is 25 grams or less per liter of material (0.21 lbs/gal), as applied. **Waste Disposal** A person shall not use coating application equipment or any other means to dispose of waste coatings, coating components, surface preparation materials, or cleaning materials by spraying into the air, except when momentarily purging coating material from a spray applicator cap immediately before or after applying the coating material. **Control Equipment** In lieu of complying with the provisions of the VOC Content Limits, Most Restrictive VOC Content Limit, Coating Application Equipment, Cleaning of Coating Application Equipment, and Surface Preparation and Other Cleaning Operations requirements, a person may elect to us an air pollution control system which: 1. Has been installed in accordance with an Authority to Construct; and 2. Includes an emission collection system which captures emissions generated from coating, surface preparation, and/or application equipment cleaning and transports the captured emissions to an air pollution control device; and 3. Has an overall control efficiency of at least 85% by weight. **Regulation 4, Rule 67.3** – Metal Parts and Products Coating Operations (Revised 4/9/2003) 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). A person shall not apply any **specialty coating to metal parts and products** with a VOC content in excess of the following limits expressed as either grams of VOC per liter of coating or pounds of VOC per gallon of coating, as applied, less water and exempt compounds:

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>San Diego County APCD</td><td>
<table>
<tr><td rowspan="2">Coating Category
(SDCAPCD Rule 67.3 Definition)</td><td colspan="2">Maximum Allowable VOC Content
Excluding Water and Exempt Compounds
grams/liter
(lbs-VOC/gal)</td></tr>
<tr><td>Air Dried</td><td>Baked</td></tr>
<tr><td>Chemical Agent Resistant</td><td>420</td><td>420</td></tr>
<tr><td>Heat Resistant</td><td>420</td><td>360</td></tr>
<tr><td>High Gloss</td><td>420</td><td>360</td></tr>
<tr><td>High Performance Architectural</td><td>420</td><td>420</td></tr>
<tr><td>Metallic Topcoat</td><td>420</td><td>360</td></tr>
<tr><td>Pretreatment Wash Primer</td><td>420</td><td>420</td></tr>
<tr><td>Solar Absorbent</td><td>420</td><td>360</td></tr>
<tr><td>All Other Coatings</td><td>340</td><td>275</td></tr>
</table>

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
• 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.
</td></tr>
</table>

District/Agency	Best Available Control Technology (BACT)/Requirements
San Diego County APCD	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.

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>Bay Area AQMD</td><td>

BACT

Source: BAAQMD BACT Guideline
Document # 161.3.1 for <40lb/day (12/16/91)
Document # 161.3.2 for ≥40 lb/day (5/5/95)

<table>
<tr><td colspan="2">Spray Booths – Coating of Motor Vehicle and Mobile Equipment, Rework or Bodyshop</td></tr>
<tr><td>POC</td><td>For (< 40 lb/day) VOC emissions
1. Coatings with VOC content less than and transfer efficiency greater than that required by Reg. 8, Rule 45, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible); or
2. Compliance with Reg. 8, Rule 45 (Achieved in Practice)

For (≥ 40 lb/day) VOC emissions
1. Coatings with VOC content less than and transfer efficiency greater than that required by Reg. 8, Rule 45, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible); or
2. Coatings with VOC content and transfer efficiency complying with Reg. 8, Rule 45, and emission controlled to overall capture/destruction efficiency ≥ 90% by weight (Achieved in Practice)</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>Dry filters or waterwash, properly maintained</td></tr>
<tr><td>PM2.5</td><td>No standard</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
<tr><td>NPOC</td><td>For (< 40 lb/day) VOC emissions
1. Coatings with VOC content less than and transfer efficiency greater than that required by Reg. 8, Rule 45, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible); or
2. Compliance with Reg. 8, Rule 45 (Achieved in Practice)

For (≥ 40 lb/day) VOC emissions
1. Coatings with VOC content less than and transfer efficiency greater than that required by Reg. 8, Rule 45, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible)</td></tr>
</table>

</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>Bay Area AQMD</td><td>
Source: BAAQMD BACT Guideline
Document # 161.5.1 for <50lb/day (12/16/03)
Document # 161.5.2 for ≥50 lb/day (12/13/91)

<table>
<tr><th colspan="2">Spray Booths – Miscellaneous Metal Parts and Products</th></tr>
<tr><td>VOC</td><td>For <50 lb VOC/day emissions
1. Coatings with VOC content and transfer efficiency complying with Reg. 8, Rule 19, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible); or
2. Complying with Reg. 8, Rule 19 (Achieved in Practice)

For ≥50 lb VOC/day emissions
1. Coatings with VOC content less than and transfer efficiency greater than that required by Reg. 8, Rule 19, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible); or
2. Complying with VOC content and transfer efficiency complying with Reg. 8, Rule 19, and emissions controlled to overall capture/destruction efficiency ≥90% (Achieved in Practice)</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>Dry filters or waterwash, properly maintained</td></tr>
<tr><td>PM2.5</td><td>No standard</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>

<u>T-BACT</u>
There are no T-BACT standards published for coating of misc. metal parts and products in the clearinghouse for this category.

<table>
<tr><th colspan="2">Spray Booths – Coating of Motor Vehicle and Mobile Equipment, Rework or Bodyshop</th></tr>
<tr><td>POC</td><td>For (< 40 lb/day) VOC emissions
1. Coatings with VOC content less than and transfer efficiency greater than that required by Reg. 8, Rule 45, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible); or
2. Compliance with Reg. 8, Rule 45 (Achieved in Practice)

For (≥ 40 lb/day) VOC emissions
1. Coatings with VOC content less than and transfer efficiency greater than that required by Reg. 8, Rule 45, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible); or
2. Coatings with VOC content and transfer efficiency complying with Reg. 8, Rule 45, and emission controlled to overall capture/destruction efficiency ≥ 90% by weight (Achieved in Practice)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>Bay Area AQMD</td><td>

RULE REQUIREMENTS:
Reg 8, Rule 45 – Motor Vehicle and Mobile Equipment Coating Operations (12/03/2008)

Coating Limits
No person shall finish or refinish any vehicles, mobile equipment or their parts and components using 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 applied, excluding water and exempt solvents, in excess of the following limits unless emissions to the atmosphere are controlled to an equivalent level by air pollution abatement equipment with an overall control efficiency of at least 85% and which meets the requirements of Regulation 2, Rule 1:

<table>
<tr><th>Coating Category
(BAAQMD Rule 45 Definition)</th><th>VOC Content Limit as Applied
g/l (lbs/gal)</th></tr>
<tr><td>Adhesion Promoter</td><td>540 (4.5)</td></tr>
<tr><td>Clear Coating</td><td>250 (2.1)</td></tr>
<tr><td>Color Coating</td><td>420 (3.5)</td></tr>
<tr><td>Multi-Color Coating</td><td>680 (5.7)</td></tr>
<tr><td>Pretreatment Coating</td><td>660 (5.5)</td></tr>
<tr><td>Primer</td><td>250 (2.1)</td></tr>
<tr><td>Primer Sealer</td><td>250 (2.1)</td></tr>
<tr><td>Single-Stage Coating</td><td>340 (2.8)</td></tr>
<tr><td>Temporary Protective Coating</td><td>60 (0.5)</td></tr>
<tr><td>Truck Bed Liner Coating</td><td>310 (2.6)</td></tr>
<tr><td>Underbody Coating</td><td>430 (3.6)</td></tr>
<tr><td>Uniform Finish Coating</td><td>540 (4.5)</td></tr>
<tr><td>Any Other Coating Type</td><td>250 (2.1)</td></tr>
</table>

Transfer Efficiency: A person shall not apply any coating to any motor vehicles or mobile equipment or their parts and components with spray application equipment unless one of the following methods is used:

A. Electrostatic application equipment, operated in accordance with the manufacturer's recommendations; or
B. High-Volume Low-Pressure (HVLP) spray equipment, operated in accordance with the manufacturer's recommendations; or
C. Any alternative coating application method that achieves a transfer efficiency equivalent to, or higher than, the application methods listed above. Prior written approval from the APCO shall be obtained for each alternative method used.

</td></tr>
</table>

District/Agency	Best Available Control Technology (BACT)/Requirements
Bay Area AQMD	**Surface Preparation and Solvent Loss Minimization:** Any person using an organic solvent for surface preparation and cleanup or mixing, using or disposing of coating or stripper containing organic solvent: A. Shall close containers used for the storage or disposal of cloth or paper used for solvent surface preparation and cleanup. B. Shall close containers of fresh or spent solvent, coating, catalyst, thinner, or reducer when not in use. C. Shall not use organic compounds for the cleanup of spray equipment, including paint lines, unless equipment for collecting the organic compounds and minimizing their evaporation to the atmosphere is used. D. The VOC content of surface preparation solvent shall not exceed 25 g/l (0.2 lb/gal). This limit shall not apply to surface preparation solvent used as bug and tar remover provided that the VOC content of such solvent does not exceed 350 g/l (2.9 lb/gal). Usage of solvent used as bug and tar remover is limited as follows: i. 20 gallons in any consecutive 12-month period for facilities and operations with 400 gallons or more of coating usage per year; ii. 15 gallons in any consecutive 12-month period for facilities and operations with 150 gallons or more of coating usage per year; and iii. 10 gallons in any consecutive 12-month period for facilities and operations with less than 150 gallons of coating usage per year. **Specialty Coatings** The volume of adhesion promoter, uniform finish coating and multi-color coating combined shall not exceed 5.0% of all topcoats applied, on a monthly basis. **Filtration:** A person shall not apply single or multi-stage topcoats subject to the coating limits to any vehicle except when exhausted through properly maintained particulate filtration media. A person shall not apply clear coating, color coating, multi-color coating, single-stage coating or uniform finish coating to any vehicle except when exhausted through properly maintained particulate filtration media. This requirement applies to all persons applying coating subject to this rule at stationary and mobile locations. The filter system shall meet the requirements of Regulation 2, Rule 1, as applicable. **Most Restrictive VOC Limit:** If anywhere on the container or any automotive coating, or any label or sticker affixed to the container, or in any sales, advertising, or technical literature supplied by a person, any representation is made that indicates that the coating meets the definition of or is recommended for use for more than one of the coating categories listed in Coating Limits table, then the lowest VOC content limit shall apply. **Reg 8, Rule 19 Surface Preparation and Coating of Misc. Metal Parts and Products** (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%: D. High Volume Low Pressure (HVLP) Spray, operated in accordance with the manufacturer's recommendations; or E. Electrostatic spray, operated in accordance with the manufacturer's recommendations; or F. Detailing Gun; or G. 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.

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>Bay Area AQMD</td><td>
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.
<table>
<tr><td>Coating Category (BAAQMD Rule 19 Definition)</td><td colspan="2">Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)</td></tr>
<tr><td></td><td>Air Dried</td><td>Baked</td></tr>
<tr><td>Camouflage</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>High Gloss</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Heat Resistant</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>High Performance Architectural</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Metallic Topcoat</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Pretreatment Wash Primer</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Silicone Release</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Solar Absorbant</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Extreme Performance</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>High Temperature</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>All Other Coatings</td><td>340 (2.8)</td><td>275 (2.3)</td></tr>
</table>
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:
E. Shall use closed containers for the storage or disposal of cloth or paper used for solvent surface preparation and clean up.
F. 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.
G. Shall close containers of coating, catalyst, or solvent when not in use.
</td></tr>
</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>Bay Area AQMD</td><td>

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%.

Regulation 8, Rule 31 – Surface Coating of Plastic Parts and Products (last amended 10/16/2002)

VOC Content of Coatings for Miscellaneous Plastic Parts and Coatings

<table>
<tr><th>Coating Category</th><th>VOC Content, less water grams/liter, (lb/gal)</th></tr>
<tr><td>General</td><td>340 (2.8)</td></tr>
<tr><td colspan="2">Flexible Coatings</td></tr>
<tr><td>Flexible Primer</td><td>490 (4.1)</td></tr>
<tr><td>Color Topcoat</td><td>450 (3.8)</td></tr>
<tr><td>Base Coat/clear coat (combined system)</td><td>540 (4.5)</td></tr>
<tr><td colspan="2">Specialty Coatings</td></tr>
<tr><td>Camouflage</td><td>420 (3.5)</td></tr>
<tr><td>Conductive</td><td>325 (2.7)</td></tr>
<tr><td>Metallic Topcoat</td><td>420 (3.5)</td></tr>
<tr><td>Extreme Performance</td><td>750 (6.2)</td></tr>
<tr><td>High Gloss</td><td>420 (3.5)</td></tr>
<tr><td>Optical</td><td>800 (6.7)</td></tr>
</table>

<table>
<tr><th>Surface Preparation and Cleaning Solvent</th><th>VOC Content as applied grams/liter, (lb/gal)</th></tr>
<tr><td>General</td><td>50 (0.42)</td></tr>
</table>

</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>San Joaquin Valley APCD</td><td>

BACT
Source: SJVUAPCD BACT Guideline
Guideline 4.2.1 Automotive Spray Painting Operation, <5.0 MMBtu/hr (3/23/2010)

<table>
<tr><td colspan="2">Automotive Spray Painting Operation, < 5.0 MMBtu/hr (also applies to operations without a heat source)</td></tr>
<tr><td>VOC</td><td>1. HVLP spray guns, coatings, cleaning materials, and solvents compliant with District Rule 4612 (Achieved in Practice)
2. VOC capture and control system (Technologically Feasible)</td></tr>
<tr><td>NOx</td><td>Natural gas or LPG fired burner</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>Spray booth with exhaust filters; 95% control efficiency</td></tr>
<tr><td>PM2.5</td><td>No standard</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>

Source: SJVUAPCD BACT Guideline
Guideline 4.3.1 Air Dried (3/18/1999)
Guideline 4.3.2 Heat Dried (12/9/1997)

<table>
<tr><td colspan="2">Metal Parts and Products Coating</td></tr>
<tr><td>VOC</td><td>For Metal Parts and Coating – Air Dried (excluding specialty coating)
1. Coatings with a VOC content of 2.8 lb/gal or less; HVLP (or equivalent) spray equipment; and an enclosed spray gun cleaning system (Achieved in Practice)
2. Thermal/catalytic incineration (Technologically Feasible)
3. Carbon adsorption (Technologically Feasible)

For Metal Parts and Coating – Heat Dried
1. HVLP guns, the use of an enclosed gun cleaner & coatings compliant with District Rule 4603 (Achieved in Practice)
2. Thermal/catalytic oxidation (Technologically Feasible)
3. Carbon adsorption (Technologically Feasible)
4. The use of an enclosed gun cleaner & low VOC coatings (2.1 lb VOC/gal as applied) (Technologically Feasible)</td></tr>
<tr><td>NOx</td><td>No standard</td></tr>
<tr><td>SOx</td><td>No standard</td></tr>
<tr><td>PM10</td><td>For Metal Parts and Coating – Air Dried
1. Enclosed paint spray booth with particulate filters and HVLP application equipment (or other application methods listed in Rule 4603)

For Metal Parts and Coating – Heat Dried
1. Enclosed paint booth with dry filters and use of HVLP gun (Achieved in practice)</td></tr>
<tr><td>PM2.5</td><td>No standard</td></tr>
<tr><td>CO</td><td>No standard</td></tr>
</table>

</td></tr>
</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>San Joaquin Valley APCD</td><td>

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

RULE REQUIREMENTS:
Rule 4612 – Motor Vehicle and Mobile Equipment Coating Operations
(Amended 10/21/2010)

Coating Limits
No person shall apply to any motor vehicle, mobile equipment, or associated parts and components, any coating with a VOC regulatory content, as calculated pursuant to Section 3.45.1, in excess of the applicable limits in Table 1, except as provided in Section 5.3.

<table>
<tr><th>Coating Category
(SJVAPCD Rule 4612 Definition)</th><th>VOC Regulatory Limit as Applied
g/l (lbs/gal)</th></tr>
<tr><td>Adhesion Promoter</td><td>540 (4.5)</td></tr>
<tr><td>Clear Coating</td><td>250 (2.1)</td></tr>
<tr><td>Color Coating</td><td>420 (3.5)</td></tr>
<tr><td>Multi-Color Coating</td><td>680 (5.7)</td></tr>
<tr><td>Pretreatment Coating</td><td>660 (5.5)</td></tr>
<tr><td>Primer</td><td>250 (2.1)</td></tr>
<tr><td>Primer Sealer</td><td>250 (2.1)</td></tr>
<tr><td>Single-Stage Coating</td><td>340 (2.8)</td></tr>
<tr><td>Temporary Protective Coating</td><td>60 (0.5)</td></tr>
<tr><td>Truck Bed Liner Coating</td><td>310 (2.6)</td></tr>
<tr><td>Underbody Coating</td><td>430 (3.6)</td></tr>
<tr><td>Uniform Finish Coating</td><td>540 (4.5)</td></tr>
<tr><td>Any Other Coating Type</td><td>250 (2.1)</td></tr>
</table>

Most Restrictive VOC Limit
If anywhere on the container of any automotive coating, or any label or sticker affixed to the container, or in any sales, advertising, or technical literature, any representation is made that indicates that the coating meets the definition of or is recommended for use for more than one of the coating categories listed in Coating Limits table, then the lowest applicable VOC content limit in the Coating Limits Table shall apply.

VOC Emission Control System
In lieu of complying with the applicable requirements of Section 5.1, 5.7, or 5.8, a person may use a VOC emission control system that meets all of the following requirements:

1. The VOC emission control system shall be approved, in writing, by the APCO.

</td></tr>
</table>

District/Agency	Best Available Control Technology (BACT)/Requirements
San Joaquin Valley APCD	2. The VOC emission control system shall achieve an overall capture and control efficiency of at least 85% by weight. 3. In no case shall compliance through the use of a VOC emission control system result in a VOC emissions in excess of the VOC emissions which would result from compliance with applicable requirements of Section 5.1, 5.7, or 5.8. **Coating Application Methods** Except for underbody coatings, graphic arts operations, truck bed liner coatings, or any coating use of less than one (1.0) fluid ounce (29.6 milliliters), no person shall apply any coating to any motor vehicle, mobile equipment, or associated parts and components unless one of the following application methods is used: 1. Brush, dip, or roller; 2. Electrostatic spray 3. High-volume low-pressure (HVLP) spray equipment A. HVLP spray equipment shall be operated in accordance with the manufacturer's recommendations B. A person shall not sell or offer for sale for use within the SJVAB any HVLP spray gun without a permanent marking denoting the maximum inlet air pressure in psig at which the gun will operate within the parameters specified in Section 3.0. 4. Use of a spray gun not permanently marked HVLP. If a spray gun is used, the operator must demonstrate that the gun meets the HVLP definition in Section 3.21 in design and use. A satisfactory demonstration must be based on the manufacturer's published technical material on the design of the gun and by a demonstration of the operation of the gun using an air pressure tip gauge designed specifically for the gun in use. 5. Any other coating application method that is capable of achieving at least 65 percent transfer efficiency, as determined per Section 6.8.8. Written approval from the APCO shall be obtained for each alternative method prior to use. 6. In lieu of complying with the applicable provisions of Sections 5.7.1 through 5.7.5, an operator may control VOC emissions from coating application with a VOC emission control system that meets the requirements of Section 5.3 around the coating operation. **Organic Solvent Cleaning Requirements** For solvent cleaning operations other than for bug and tar removal, a person shall not use solvents that have VOC content greater than 25 grams VOC per liter of cleaning material, as calculated using the equation listed in Section 3.45.3. For bug and tar removal, a person shall not use any material other than bug and tar remover regulated under Consumer Products Regulation (California Code of Regulations Section 94507 et seq.). In lieu of complying with Sections 5.8.1 and 5.8.2, a person may control VOC emissions from solvent cleaning with an APCO-approved VOC emission control system for the solvent cleaning operation that meets the requirements of Section 5.3.

District/Agency	Best Available Control Technology (BACT)/Requirements
San Joaquin Valley APCD	**Rule 4603 –Surface Coating of Metal Parts and Products, Plastic Parts and Products, and Pleasure Crafts** (Amended 9/17/2009) 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: A. Electrostatic application B. Electrodeposition C. High-Volume, Low-Pressure (HVLP) spray i. HVLP spray equipment shall be operated in accordance with manufacturer's recommendations. II. 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. D. Flow coating E. Roll coating F. Dip coating G. Brush coating H. Continuous coating; or I. 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.

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>San Joaquin Valley APCD</td><td>

Specialty Coating Limits
An operator shall not apply to any metal part or product any specialty coating with a VOC content in excess of the limits in the table below, except for large appliance parts or products, and metal furniture.

<table>
<tr><th rowspan="2">Coating Category (SJVAPCD Rule 4603 Definition)</th><th colspan="2">Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)</th></tr>
<tr><th>AIR DRIED</th><th>BAKED</th></tr>
<tr><td>Camouflage</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Extreme Performance</td><td>420 (3.5)</td><td>360 (3.0) (A)</td></tr>
<tr><td>Heat Resistant</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Extreme High Gloss</td><td>420 (3.5)</td><td>360 (3.0) (A)</td></tr>
<tr><td>High Performance Architectural</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>High Temperature</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Metallic Coating</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Pretreatment Wash Primer</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Touch Up and Repair coating</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Silicone Release</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Solar Absorbant</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Solid Fill Lubricant</td><td>880 (7.3)</td><td>880 (7.3)</td></tr>
</table>

(A) SJVAPCD's Rule 4603 lists extreme performance and extreme high gloss coatings as having a VOC limit lf 3.5 lbs-VOC/gal. However, the 3.5 lbs-VOC/gal limit is an erroneous conversion of the 360 g/liter limit and has been corrected in the table to 3.0 lbs-VOC/gal.

</td></tr>
</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>San Joaquin Valley APCD</td><td>

Large Appliance Parts or Products and Metal Furniture Coating Limits
An operator shall not apply any coating to large appliance parts or products, and metal furniture, which has a VOC content, as applied, that exceeds the applicable limit specified below:

<table>
<tr><td>Coating Category
(SJVAPCD Rule 4603 Definition)</td><td colspan="2">Maximum Allowable VOC Content
Excluding Water and Exempt Compounds
grams/liter
(lbs-VOC/gal)</td></tr>
<tr><td></td><td>AIR DRIED</td><td>BAKED</td></tr>
<tr><td>General, One Component</td><td>275 (2.3)</td><td>275 (2.3)</td></tr>
<tr><td>General, Multi- Component</td><td>340 (2.8)</td><td>275 (2.3)</td></tr>
<tr><td>Extreme High Gloss</td><td>340 (2.8)</td><td>360 (3.0)</td></tr>
<tr><td>Extreme Performance</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Heat Resistant</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Metallic Coating</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Pretreatment Coating</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Solar Absorbent</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
</table>

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:

<table>
<tr><th>Type of Solvent Cleaning Operation</th><th>VOC Content Limit</th></tr>
<tr><td>Product cleaning during manufacturing process or surface preparation for coating application</td><td>25 (0.21)</td></tr>
<tr><td>Repair and maintenance cleaning</td><td>25 (0.21)</td></tr>
<tr><td>Cleaning of coating application equipment</td><td>25 (0.21)</td></tr>
</table>

SMAQMD Rule 468, SJVAPCD Rule 4603, and SCAQMD Rules related to coating of plastic parts are all based on EPA-453/R-08-003 "*Control Techniques Guidelines for Miscellaneous Metal and Plastic Parts Coatings*," US EPA, September 2008, which is the basis for Reasonably Available Control Technologies (RACT). All three rules were adopted to comply with each District's respective portion of the State Implementation Plan (SIP). Since these rules are based on similar guidelines, a rule comparison has been added under Section A.2.

</td></tr>
</table>

A.2. COMPARISON OF DISTRICT RULE REQUIREMENTS FOR MISCELLANEOUS PLASTIC PARTS AND PRODUCTS:

Table 1: VOC Content of Coatings for Miscellaneous Plastic Parts and Coatings

Coating Category	**VOC Content less water and exempt compounds, grams/liter**		
	SMAQMD Rule 468	**SCAQMD Rule 1145**	**SJVAPCD Rule 4603**
General One-Component Coatings	280	120	280
General Multi-Component Coatings	420	120	420
Electric Dissipating Coatings and Shock Free Coatings	800	360	800
Extreme Performance Coatings: One-component Two-component	 280 420	 120 420	 280 420
Metallic Coatings	420	420	420
Military Specification Coatings: One-component Two-component	 340 420	 340 420	 340 420
Mold Seal Coatings	760	750	760
Multi-Colored Coatings	680	680	680
Optical Coatings	800	50	800
Vacuum-Metalizing Coatings	800	800	800
All Other Coatings	280	120	280

Table 2: VOC Content of Coatings for Transportation Plastic Parts

Coating Category	**VOC Content less water and exempt compounds, grams/liter**			
	SMAQMD Rule 468		**SJVAPCD Rule 4603**	
Exterior Parts	**Air-Dried**	**Baked**	**Air-Dried**	**Baked**
Flexible Primer	580	540	580	540
Non-Flexible Primer	580	420	580	420
Base Coat	600	520	600	520
Clear Coatings	540	480	540	480
Touch-up and Repair Coatings	620	620	620	620

Table 2: VOC Content of Coatings for Transportation Plastic Parts

Coating Category	VOC Content less water and exempt compounds, grams/liter			
	SMAQMD Rule 468		SJVAPCD Rule 4603	
All Other Coatings	600	520	600	520
Interior Parts	**Air-Dried**	**Baked**	**Air-Dried**	**Baked**
Flexible Primer	600	540	600	540
Non-Flexible Primer	600	420	600	420
Base Coat	600	520	600	520
Clear Coatings	600	480	600	480
Touch-up and Repair Coatings	620	620	620	620
All Other Coatings	600	520	600	520

Exemptions:

The above rules include various exemptions for sources specific to each District. For example:

- SMAQMD exempts facilities that emit less than 2.7 tons per year of VOC.
- SJVAPCD and SMAQMD allows up to 55 gallons per year of non-compliant coatings.
- SJVAPCD exempts facilities that emit less than 2.7 tons per year of VOC from the pleasure craft standards.
- SCAQMD generally exempts coatings operations that emit less than 3 pounds per day or 66 pounds per month of VOC.
- Touch-up and repair, clear/translucent coatings, and performance testing on coatings at paint manufacturing facilities are exempted by SCAQMD and SJVAPCD.

In order to simplify BACT for regulated sources within the District, achieved in practice BACT will be compliance with SMAQMD Rule 468, except that for the coating categories listed in Table 1 (see above), SCAQMD Rule 1145 VOC content limits will apply.

The following achieved in practice control technologies have been identified and are ranked based on stringency. The VOC emissions from use of coatings and solvents were split into two categories, without add-on controls and with add-on controls. The annual usage trigger levels were left off due to the variability in different districts cost effectiveness threshold levels for which the add-on control devices were required. In this case, the overall capture and control efficiency of the add-on control devices was compared for stringency.

Also, due to the large size and flow rates of Siemens' rail car booths, generalized cost estimates would be inaccurate. Add-on control thresholds specific to the Siemens' facility will be determined in the Cost Effective Determination section.

SMAQMD has determined that Siemens' railcar coating will need to comply with SMAQMD Rule

459 – Automotive, Mobile Equipment, and Associated Parts and Components Coating Operations for refinishing purposes and SMAQMD Rule 451 – Surface Coating of Miscellaneous Metal Parts and Products/Rule 468 – Surface Coating of Plastic Parts and Products for original equipment manufacturer (OEM) purposes. Therefore, the BACT Determination will have separate standards for refinishing and OEM purposes.

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
VOC	For OEM Booths without Add-on Controls **(Misc. Metal Parts and Products)** 1. HVLP spray or equivalent application equipment, enclosed spray gun cleaning system, compliance with SMAQMD Rule 451, and compliance with BACT #124 coating, solvent, and stripper VOC limits – [SMAQMD] 2. Compliance with SCAQMD Regulation XI, Rule 1107 – [SCAQMD] 3. Compliance with SDCAPCD Rule 67.3 – [SDCAPCD] 4. Compliance with BAAQMD Regulation 8, Rule 19 – [BAAQMD] 5. Utilizing High-volume low-pressure (HVLP) spray or equivalent application equipment, Coatings with a VOC content of 2.8 lb/gal or less (excluding specialty coatings and heat dried), and enclosed spray gun cleaning system - [SJVAPCD] 6. Low VOC coatings, transfer, efficiency, operating training, and closed containers. [EPA: OR-0045] For OEM Booths with Add-on Controls **(Misc. Metal Parts and Products)** 1. Complying with VOC content and transfer efficiency required by BAAQMD Reg. 8, Rule 19, and emissions controlled to overall capture/destruction efficiency ≥90% [BAAQMD] 2a. Compliance with SMAQMD Rule 451, compliance with BACT #125 coating, solvent, and stripping VOC limits, and VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency; OR [SMAQMD] 2b. Use of Super Clean Materials (<5% VOC by weight); OR [SMAQMD] 2c. Use of low-VOC materials resulting in an equivalent emission reduction [SMAQMD] 3a. Compliance with applicable AQMD Regulation XI Rules, and VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency; OR [SCAQMD] 3b. Use of Super Clean Materials (<5% VOC by weight); OR [SCAQMD] 3c. Use of low-VOC materials resulting in an equivalent emission reduction [SCAQMD] For OEM Booths **(Misc. Metal Parts and Products)** – Heat Dried 1. HVLP guns, the use of an enclosed gun cleaner, and coatings compliant with SJVAPCD Rule 4603 [SJVAPCD] For OEM Booths without Add-on Controls **(Plastic Parts and Products)** 1. Compliance with District Rules and Regulations (See above discussion and rule comparison) [SMAQMD, SCAQMD, SJVAPCD] 2. 4.3 lb/gallon daily average [USEPA] For OEM Booths with Add-on Controls **(Plastic Parts and Products)** 1. VOC Control System with ≥ 95% Overall Control Efficiency [USEPA] (A) 2. Coating with Lower VOC Content than Required by Applicable BAAQMD Rules, and Emissions from Coating Area, Flash Off Area, Drying Area, and Oven Vented to Control Device Achieving ≥ 90% Overall Efficiency [BAAQMD] 3a. Compliance with SCAQMD Rule 1145, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, OR [SCAQMD] 3b. Use of Super Compliant Materials (< 5% VOC by weight): OR [SCAQMD] 3c. Use of Low-VOC Materials Resulting in an Equivalent Emission Reduction [SCAQMD]

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
VOC	For **Refinishing** Booths without Add-on Controls 1. Compliance with SMAQMD Rule 459. For heaters, use of natural gas or LPG fired burner [SMAQMD] 2. Compliance with SCAQMD Regulation XI, Rule 1151 and 1171 for Down-Draft Booths [SCAQMD] 3. Compliance with Rule 67.20.1, Motor Vehicle and Mobile Equipment Refinishing Operations [SDAPCD] 4. Compliance with SCAQMD Regulation XI, Rule 1151 and 1171 for Non-Down-Draft Booths [SCAQMD] 5. Compliance with Reg. 8, Rule 45 [BAAQMD] 6. High-volume low-pressure (HVLP) spray guns, coatings, cleaning materials, and solvents compliant with District Rule 4612 [SJVAPCD] For **Refinishing** Booths with Add-on Controls 1. Coatings with VOC content and transfer efficiency complying with Reg. 8, Rule 45, and emission controlled to overall capture/destruction efficiency ≥ 90% by weight [BAAQMD, SMAQMD] 1a. For heaters, use of natural gas or LPG fired burner [SMAQMD] 2a. Compliance with applicable AQMD Regulation XI Rules, and VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency; OR [SCAQMD] 2b. Use of Super Compliant Materials (<5% VOC by weight); OR [SCAQMD] 2c. Use of low-VOC materials resulting in an equivalent emission reduction [SCAQMD] 3. High-volume low-pressure (HVLP) spray guns, coatings, cleaning materials, and solvents compliant with District Rule 4612 [SJVAPCD] 4. Compliance with Rule 67.20.1, Motor Vehicle and Mobile Equipment Refinishing Operations [SDAPCD]
NOx	1. For Heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu [SMAQMD, SCAQMD] 2. No Standard – [SDCAPCD, BAAQMD, SJVAPCD]
SOx	1. For Heaters, natural gas or LPG fired burner [SMAQMD] 2. No Standard – [SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]
PM10	Coating Operations 1. 98% control efficiency, 0.0015 gr/dcsf. Enclosed spray booth with properly maintained dry filters or waterwash. HVLP spray or equivalent application equipment – [SMAQMD] 2. Enclosed spray booth with particulate filters and HVLP application equipment, 95% control efficiency – [SJVAPCD] 3. Spray booth equipped with overspray filters – [SDCAPCD] 4. Dry filters or waterwash, properly maintained – [SCAQMD, BAAQMD] Fuel Combustion from Heaters 1. Natural gas or LPG fired burner [SMAQMD] 2. No Standard – [SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
PM2.5	Coating Operations 1. 98% control efficiency, 0.0015 gr/dcsf. Enclosed spray booth with properly maintained dry filters or waterwash. HVLP spray or equivalent application equipment – [SMAQMD] 2. Spray booth equipped with overspray filters [SDCAPCD] 3. No Standard – [SCAQMD, BAAQMD, SJVAPCD] Fuel Combustion from Heaters 1. Natural gas or LPG fired burner [SMAQMD] 2. No Standard – [SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]
CO	1. For Heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu [SMAQMD Rule 419] 2. No Standard – [SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]
Organic HAP (T-BACT)	For OEM Booths without Add-on Controls **(Misc. Metal Parts and Products)** 1. HVLP spray or equivalent application equipment, enclosed spray gun cleaning system, keep VOC containing materials in closed containers, limit organic HAP content to 47% by weight of VOC content, compliance with BACT coating, solvent cleaning, and stripping VOC limits. – [SMAQMD] 2. Use of HVLP spray guns, keep VOC-containing materials in closed containers, and limit of organic HAP content to 47% by weight of the VOC content. [US EPA, NV-0049] For OEM Booths with Add-on Controls (**Misc. Metal Parts and Products)** 1. HVLP spray or equivalent application equipment, enclosed spray gun cleaning system, keep VOC containing materials in closed containers, limit organic HAP content to 47% by weight of VOC content, compliance with SMAQMD Rule 451, compliance with BACT coating, solvent cleaning, and stripping VOC limits. – [SMAQMD] 1a. VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency; OR – [SMAQMD] 1b. Use of Super Clean Materials (<5% VOC by weight); OR – [SMAQMD] 1c. Use of low-VOC materials resulting in an equivalent emission reductions as options 1a and 1b. – [SMAQMD] 2. Use of HVLP spray guns, keep VOC-containing materials in closed containers, and limit of organic HAP content to 47% by weight of the VOC content. [US EPA, NV-0049] For OEM Booths **(Plastic Parts and Products)** 1. Compliance with NESHAP HHHHHH where applicable. For **refinishing** booths 1. Spray booth with filter system, 98% PM control efficiency, HVLP spray equipment or equivalent technology [SMAQMD, US EPA, 40 CFR 63 Subpart HHHHH] 2. Coatings with VOC content compliant with BAAQMD Reg. 8, Rule 45 and transfer efficiency complying with Reg. 8, Rule 45 [BAAQMD, SMAQMD] 3. VOC emission controlled to overall capture/destruction efficiency ≥ 90% by weight [BAAQMD, SMAQMD]

(A) Since the scope of this BACT determination is for a non-major source, this achieved in practice technology will be moved to the technologically feasible section, since this source would be considered a major source for SMAQMD (≥ 25 tons VOC per year).

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

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
VOC	<u>For OEM Booths without Add-on Controls (**Misc. Metal Parts and Products**)</u> 1. HVLP spray or equivalent application equipment 2. Enclosed spray gun cleaning system 3. Compliance with SMAQMD Rule 451(A), compliance with SMAQMD BACT coating, solvent, and stripper VOC limits <u>For OEM Booths with Add-on Controls (**Misc. Metal Parts and Products**)</u> 1. Compliance with SMAQMD Rule 451, compliance with SMAQMD BACT coating, solvent, and stripping VOC limits, and VOC control system with overall capture/destruction efficiency ≥90%; OR 2. Use of Super Clean Materials (<5% VOC by weight); OR 3. Use of low-VOC materials resulting in an equivalent emission reductions as option #1 and #2 <u>For OEM Booths without Add-on Controls VOC Emissions (**Plastic Parts and Products**)</u> 1. Compliance with District Rule 468(A), except where noted in footnote(B) <u>For OEM Booths with Add-on Controls VOC Emissions (**Plastic Parts and Products**)</u> 1. Compliance with District Rule 468(A), except where noted in footnote(B) **and** VOC control system with ≥ 90% overall efficiency, or 2. Use of low-VOC materials resulting in an equivalent emission reduction. <u>For **Refinishing** Booths without Add-on Controls</u> 1. Compliance with SMAQMD Rule 459(A). 2. For heaters, use of natural gas or LPG fired burner <u>For **Refinishing** Booths with Add-on Controls</u> 1. Coatings with VOC content and transfer efficiency complying with Reg. 8, Rule 45, and emission controlled to overall capture/destruction efficiency ≥ 90% by weight 2. For heaters, use of natural gas or LPG fired burner	SMAQMD SMAQMD, BAAQMD
NOx	For Heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu	SMAQMD, SCAQMD
SOx	For Heaters, Natural Has or LPG Fired Burner	SMAQMD

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
PM10	1. Enclosed spray booth with dry filters or waterwash, properly maintained, 98% PM control efficiency, 0.0015 gr/dcsf 2. HVLP spray or equivalent application equipment 3. For heaters, natural gas or LPG fired burner	SMAQMD
PM2.5	1. Enclosed spray booth with dry filters or waterwash, properly maintained, 98% PM control efficiency, 0.0015 gr/dcsf 2. HVLP spray or equivalent application equipment 3. For heaters, natural gas or LPG fired burner	SMAQMD
CO	For Heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu	SMAQMD
Organic HAP (T-BACT)	For OEM Booths without Add-on Controls **(Misc. Metal Parts and Products)** 1. HVLP spray or equivalent application equipment 2. Enclosed spray gun cleaning system 3. Keep VOC-containing materials in closed containers 4. Limit of organic HAP content to 47% by weight of VOC content 5. Compliance with SMAQMD Rule 451(A) 6. Compliance with BACT coating, solvent cleaning, and stripping VOC limits For OEM Booths with Add-on Controls VOC Emissions (**Misc. Metal Parts and Products**) 1. HVLP spray or equivalent application equipment 2. Enclosed spray gun cleaning system 3. Keep VOC-containing materials in closed containers 4. Limit of organic HAP content of 47% by weight of VOC content 5. Compliance with SMAQMD Rule 451(A) 6. Compliance with BACT coating, solvent cleaning, and stripping VOC limits. With VOC control system with an overall capture/destruction efficiency ≥90%; OR 7. Use of Super Clean Materials (<5% VOC by weight); OR 8. Use of low-VOC materials resulting in an equivalent emission reductions as option #6 and #7 For OEM Booths (**Plastic Parts and Products**) 1. Compliance with NESHAP HHHHHH where applicable For **Refinishing** Booths 1. Spray booth with filter system, 98% PM control efficiency, HVLP spray equipment or equivalent technology 2. Coatings with VOC content compliant with BAAQMD Reg. 8, Rule 45 and transfer efficiency complying with Reg. 8, Rule 45 3. VOC emission controlled to overall capture/destruction efficiency ≥ 90% by weight	SMAQMD, BAAQMD, EPA (NV-0049)

(A) Compliance with SMAQMD Rules 451, 459, and 468 includes use of exemptions of these rules. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as

well.

(B) The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in the rule): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L.

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.

Pollutant	Technologically Feasible Alternative
VOC	1. Carbon adsorber without rotoconcentrator 2. Carbon adsorber with rotoconcentrator 2. Regenerative Thermal Oxidizer with rotoconcentrator
NOx	No other technologically feasible option identified
SOx	No other technologically feasible option identified
PM10	No other technologically feasible option identified
PM2.5	No other technologically feasible option identified
CO	No other technologically feasible option identified

Rotoconcentrator

The large size of Siemens' railcar paint booths result in high exhaust flow rates between 30,000 to 45,000 scfm. For these high flow rates add-on control devices would typically use a rotor concentrator to reduce the exhaust gas volume for a more concentrated VOC air stream. While the rotoconcentrator presents additional capital cost, the upfront capital cost is offset by the reduction in operational costs of each control technology. However, use of the rotoconcentrator reduces the control efficiency of each device as concentrators are not 100 percent efficient at concentrating the entire VOC fraction from the waste gas stream. Based on vendor information, this technology has an estimated capture efficiency of 96%, which will be incorporated into the overall control efficiency.

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.

Maximum Cost per Ton of Air Pollutants Controlled

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

Pollutant	Maximum Cost ($/ton)
VOC	17,500
NO_X	24,500
PM10	11,400
SO_X	18,300
CO	TBD if BACT triggered

Cost Effectiveness Analysis Summary

Environmental Resources Management (ERM) performed a cost effective analysis for the Siemens' facility in 2016. Due to the large size and flow rates of Siemens' rail car booths, ERM obtained specific costs from vendors to get an accurate cost assessment for add-on control equipment. The cost effectiveness analysis below will revise ERM's analysis to update various cost and facility parameters. The cost effective analysis is based on Siemens' accepted facility limit of 20 tons VOC/year.

The cost analysis was processed in accordance with the EPA OAQPS Air Pollution Control Cost Manual (Sixth Edition). The sales tax rate was based on the District's standard rate of 8.5%. The electricity (11.24 cents/kWh) and natural gas (6.41 dollars/1,000 cubic feet) rates were based on an industrial application as approved by the District. 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 operator (Occupation Code 51-9121: Coating, painting, and spraying machine setters, operators, and tenders) and labor (Occupation Code 49-9099: Installation, maintenance, and repair workers, all other) rates were based on data from the Bureau of Labor Statistics.

Carbon Adsorber with rotoconcentrator:

As shown in Attachment C, the cost effectiveness for the add-on carbon adsorber with rotoconcentrator system to control VOC was calculated to be **$91,601/ton** (see attached Paint Spray Booth Cost for Railcars). The following basic parameters were used in the analysis.

Equipment Life = 10 years

Total Capital Investment = $4,554,946

Direct Annual Cost = $1,055,634 per year

Indirect Annual Cost = $647,979 per year

Total Annual Cost = $1,703,613 per year

VOC Removed = 18.598 tons per year

Cost of VOC Removal = $91,601 per ton reduced

Therefore, the add-on carbon adsorber with rotoconcentrator system is considered not cost effective and is eliminated.

Carbon Adsorber without rotoconcentrator:

As shown in Attachment C, the cost effectiveness for the add-on carbon adsorber without rotoconcentrator system to control VOC was calculated to be **$103,815/ton** (see attached Paint Spray Booth Cost for Railcars). The following basic parameters were used in the analysis.

Equipment Life = 10 years

Total Capital Investment = $5,326,316

Direct Annual Cost = $1,285,634 per year

Indirect Annual Cost = $748,941 per year

Total Annual Cost = $2,034,575 per year

VOC Removed = 19.598 tons per year

Cost of VOC Removal = $103,815 per ton reduced

Therefore, the add-on carbon adsorber without rotoconcentrator system is considered not cost effective and is eliminated.

Regenerative Thermal Oxidizer with rotoconcentrator:

As shown in Attachment C, the cost effectiveness for the add-on regenerative thermal oxidizer with rotoconcentrator system to control VOC was calculated to be **$103,815/ton** (see attached Paint Spray Booth Cost for Railcars). The following basic parameters were used in the analysis.

Equipment Life = 10 years

Direct Cost = $4,255,685

Direct Annual Cost = $233,527 per year

Indirect Annual Cost = $887,550 per year

Total Annual Cost = $1,121,078 per year

VOC Removed = 18.598 tons per year

Cost of VOC Removal = $60,279 per ton reduced

Therefore, the add-on regenerative thermal oxidizer with rotoconcentrator system is considered not cost effective and is eliminated.

C. SELECTION OF BACT:

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

BACT for Paint Spray Booths for Rail Cars ≤20 tons VOC/year		
Pollutant	**Standard**	**Source**
VOC	1. HVLP spray or equivalent application equipment 2. Enclosed spray gun cleaning system 3. For heaters, use of natural gas or LPG fired burner For **OEM booths** (**Misc. Metal Parts and Products**) 1. Compliance with SMAQMD Rule 451(A), compliance with SMAQMD BACT coating, solvent, and stripper VOC limits (see Tables 1-4 below) For **OEM booths** (**Plastic Parts and Products**) 1. Compliance with SMAQMD Rule 468(A), except where noted in footnote(B) For **refinishing** booths 1. Compliance with SMAQMD Rule 459(A).	SMAQMD
NOx	For heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu	SMAQMD, SCAQMD
SOx	For heaters, natural gas or LPG fired burner	SMAQMD
PM10	1. Enclosed spray booth with dry filters or waterwash, properly maintained, 98% PM control efficiency, 0.0015 gr/dcsf 2. HVLP spray or equivalent application equipment 3. For heaters, natural gas or LPG fired burner	SMAQMD SCAQMD SDAPCD BAAQMD SJVAPCD
PM2.5	1. Enclosed spray booth with dry filters or waterwash, properly maintained, 98% PM control efficiency, 0.0015 gr/dcsf 2. HVLP spray or equivalent application equipment 3. For heaters, natural gas or LPG fired burner	SMAQMD SCAQMD SDAPCD BAAQMD SJVAPCD
CO	For heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu	SMAQMD

(A) Compliance with SMAQMD Rules 451, 459, 468 includes use of exemptions of these rules. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.

(B) The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in the rule): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L.

T-BACT for Paint Spray Booths for Rail Car ≤20 tons VOC/year		
Pollutant	**Standard**	**Source**
Organic HAP (T-BACT)	For OEM booths (**Misc. Metal Parts and Products**) 1. VOC emission controlled to overall capture/destruction efficiency ≥ 90% by weight 2. HVLP spray or equivalent application equipment 3. Enclosed spray gun cleaning system 4. Keep VOC-containing materials in closed containers 5. Limit of organic HAP content to 47% by weight of VOC content 6. Compliance with SMAQMD Rule 451(A) 7. Compliance with BACT coating, solvent cleaning, and stripping VOC limits For OEM booths (**Plastic Parts and Products**) 1. VOC emission controlled to overall capture/destruction efficiency ≥ 90% by weight 2. Compliance with NESHAP HHHHHH where applicable For **refinishing** booths 1. Spray booth with filter system, 98% PM control efficiency, HVLP spray equipment or equivalent technology 2. Coatings with VOC content compliant with BAAQMD Reg. 8, Rule 45 and transfer efficiency complying with Reg. 8, Rule 45 3. VOC emission controlled to overall capture/destruction efficiency ≥ 90% by weight	SMAQMD EPA (NV-0049) BAAQMD

(A) Compliance with SMAQMD Rule 451 includes use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 451.

An operator shall not apply **any coating to miscellaneous metal parts and products, except for metal furniture** that exceeds the applicable limit specified below:

Table 1: BACT Coating VOC Limits for Miscellaneous Metal Parts and Products

Coating Category (SCAQMD Rule 1107 & SMAQMD Rule 451 Definitions)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)	
	Air Dried	Baked
General One- Component (A) (C)	275 (2.3)	275 (2.3)
Aluminum Coating for Window Frames and Door Frames (B)	420 (3.5)	275 (2.3)
Camouflage (A) (B)	420 (3.5)	420 (3.5)
Electrical Insulating (B)	340 (2.8)	275 (2.3)
Etching Filler (A) (B) (D)	**340 (2.8)**	**275 (2.3)**
Extreme High Gloss (A) (B)	420 (3.5)	360 (3.0)
Extreme Performance (A) (B)	420 (3.5)	360 (3.0)
Heat Resistant (A) (B)	420 (3.5)	360 (3.0)

Coating Category (SCAQMD Rule 1107 & SMAQMD Rule 451 Definitions)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)	
	Air Dried	Baked
Metallic/Iridescent (A) (B)	420 (3.5)	420 (3.5)
Prefabricated Architectural Component (B)	420 (3.5)	275 (2.3)
Pretreatment Wash Primer (B)	420 (3.5)	420 (3.5)
Silicone Release (A) (B)	420 (3.5)	420 (3.5)
Solar Absorbent (A) (B)	420 (3.5)	360 (3.0)
All Other Coatings (B)	340 (2.8)	275 (2.3)

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1107.
(B) VOC limits are based on SMAQMD Rule 451.
(C) One Component coating is a coating that is ready for application as it comes out of its container to form an acceptable dry film. A thinner, necessary to reduce the viscosity, is not considered a component.
(D) This SMAQMD coating category is not defined in SJVAPCD's Rule 4603. Therefore, under SJVAPCD's Rule 4603 this coating would be subject to its general coating VOC limit (340 g/l air dried, 275 g/l baked), which is more stringent than the limits of SMAQMD Rule 451.

An operator shall not apply **any coating to metal furniture** that exceeds the applicable limit specified below:

Table 2: BACT Coating VOC Limits for Metal Furniture

Coating Category (SMAQMD Rule 451 and SJVAPCD Rule 4603 Definitions)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/gal)	
	Air Dried	Baked
General, Multi-Component (A)	340 (2.8)	275 (2.3)
Etching Filler (C)	275 (2.3)	275 (2.3)
Extreme High Gloss (A)	340 (2.8)	360 (3.0)
Extreme Performance (A)	420 (3.5)	360 (3.0)
Heat Resistant (A)	420 (3.5)	360 (3.0)
Metallic/Iridescent (A)	420 (3.5)	420 (3.5)
Pretreatment Coatings/Wash Primer (A)	420 (3.5)	420 (3.5)
Solar Absorbent (A)	420 (3.5)	360 (3.0)
All Other Coatings (B)	275 (2.3)	275 (2.3)

(A) VOC limits based on SMAQMD Rule 451 and SJVAPCD Rule 4603.
(B) VOC limits based on SMAQMD Rule 451.
(C) VOC limits based on limits for general, one-component coating category, in SCAQMD Rule 1107 and SJVAPCD Rule 4603, since these rules do not have a category that fits SMAQMD Definition for etching filler.

An operator shall not use organic solvents for cleaning operations that exceed the content limits specified in the table below:

Table 3: BACT Solvent Cleaning VOC Limit(A)

Solvent Cleaning Requirement	
VOC Limit	25 grams VOC/liter of material (0.21 lb VOC/gal)

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1171.

A person shall not use VOC containing materials for stripping unless the material meets the following requirement:

Table 4: BACT Stripper VOC Limit(A)

Stripper Requirement	
VOC Limit	≤ 200 grams VOC/liter

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1107.

APPROVE BY: *Brian F Krebs* **DATE:** 4/23/20

Attachment A

Review of BACT Determinations published by EPA

List of BACT determinations published in EPA's RACT/BACT/LAER Clearinghouse (RBLC) for Miscellaneous Metal Parts and Products Surface Coating:

RBLC	Permit Date	Process Code [A]	Process/Equipment	Pollutant	Standard	Control Technology	Case-By-Case Basis
NV-0050	11/30/2009	41.013	Paint Spray Booth	VOC	N/A	Limiting the average VOC content to 6.84 lbs/gallon	Other Case-by-Case
				HAP	N/A	Limiting the average HAP content to 3.21 lbs/gallon	Other Case-by-Case
NV-0049	8/20/2009	41.013	Paint Spray Booth	VOC	N/A	High-Volume Low-Volume pressure spray guns, keeping VOC containing materials in closed containers, consumption of paint, lacquers, thinners, and solvents are limited to a total of 50 gallons per month and 500 gallons per year based on a weighted average VOC content of 7.25 pounds per gallon.	Other Case-by-Case
				PM10 [B]	N/A	Exhaust air from the surface coating operation shall be filtered at 99% control efficiency for particulate matter	Other Case-by-Case
				HAP	N/A	BACT consists of those described in the process and the limit of HAP content to 47% of the VOC content	Other Case-by-Case
NV-0047	2/26/2008	41.013	Paint Booths – Surface Coating	VOC	91.71 lb/month	Carbon Adsorption System and High-Volume Low-Pressure Spray Guns	Other Case-by-Case

RBLC	Permit Date	Process Code (A)	Process/Equipment	Pollutant	Standard	Control Technology	Case-By-Case Basis
				PM10 (B)	1.28 lb/month	Filter Cartridge (99%) and High-Volume Low-Pressure Spray guns (65%)	Other Case-by-Case
IA-0078	8/19/2005	41.013	Paint Booth	VOC	N/A	Low VOC Coatings	BACT-PSD
OR-0045	8/04/2005	41.013	Coach Painting and Finishing	VOC	2.1 lb/gal	Low-VOC coatings, transfer, efficiency, operator training, and closed container requirements	BACT-PSD

(A) Process Code 41.013 includes miscellaneous metal parts and products surface coating surface coatings.
(B) Filterable particulate matter less than 10 micrometers.

= Selected as the most stringent BACT determination achieved in practice.
= Selected as the most stringent T-BACT determination.

Attachment B

Review of BACT Determinations published by ARB

List of BACT determinations published in ARB's BACT Clearinghouse for spray booths that were used for miscellaneous metal parts and products:

Capacity	Source	Date	NOx	VOC	CO	PM10
N/A	SCAQMD (A)	01/06/1999	0.27 lb/hr	216 lb/day, zeolite concentrator and thermal oxidizer	0.16 lb/hr	
3'6"W x 3'8"L x 6'3" H	SCAQMD (B)	08/30/1990		200 gal of coatings/year		
45'W x 58"L x 7"H	SCAQMD (C)	04/01/2001		98% Control, Regenerative thermal oxidizer and baghouse, VOC limit of 118,800 lb/month		
60'W x 60'L x 20'6"H	SCAQMD (D)	05/08/2002		85.5% control, carbon adsorber, water-base enamel		
16'4"W x 12'2"L x 10'8"H	SCAQMD (E)	07/01/1999		15 lb VOC/day		
4'W x 9'L x 7'H	SCAQMD (F)	02/19/1997		Low-VOC powder coating		
96"W x 81"L x 90" H and 5'W x 7'L x 8'H	SCAQMD (G)	10/28/2002		Carbon adsorption, steam desorption, thermal oxidizer, 95% efficiency		
5,000 scfm	SCAQMD (H)	08/14/2008		VOC concentrator and Regenerative thermal oxidizer, 2 tons/year		
Four spray booths arranged in series, 124.7 lbs VOC/hr emission to control	SCAQMD (I)	02/06/2001		667 lb VOC/month limit, use of Regenerative Thermal Oxidizer (RTO)		

(A) Spray booth used for Aerospace coatings.
(B) Spray booth used for coating rubber parts

(C) Spray booth used for vinyl applications to large-area molds
(D) Spray booth used for recreational vehicles chassis undercoating
(E) Spray booth used for auto parts coating
(F) Spray booth used for powder coating metal parts
(G) Spray booth used for spa manufacturing line which includes adhesive, polyurethane foam, and wood coatings.
(H) Spray booth used for ship coatings
(I) Spray booth used for coating aluminum extrusion parts

= Not applicable to this determination. Equipment is for a specific purpose outside of the scope of this determination.

Attachment C

Cost Effectiveness Determinations

Carbon Adsorption with Concentrator

Carbon Canister system with Roto Concentrator to handle all paint booths

Carbon Working Capacity			Assumption based on concentration after concentrator Max rate 3250 lb/day (16 hr). 21,240 flow rate after concentrator of 10:1 Assume 5mg/m3 is 1ppm.
Concentration	510	ppm	
Flow rate	21240	scfm	Concentrated Stream
Partial Pressure	0.007494909	psia	assuming at atmospheric pressure
k	0.527		
m	0.0703		
mass loading we	0.373599848	lb/lb	Equation 1.1 assume xylene parameters
Canister Size	12500	lb/lb	Based on largest canister from Calgon
Number of canisters	3		Based on 10,000 cfm per canister
Total annual loading of VOCs	39996		Based on desired permit conditions
Mass of carbon for annual loadings	107,056	lb/lb	
Number of canister changes per year	8.56		
Cost per Canister	$ 115,000.00		Based on email estimate of cost from calgon
Annual Cost of Carbon Canisters	$ 1,035,000.00		Cost per canister
Vessel Footprint			
Height	22.33333333	ft	Based on size given from calgon
Length	8	ft	Based on size given from calgon
Width	8.333333333	ft	Based on size given from calgon
Footprint for 22 canisters	558.3333333	ft2	

Cost analysis for offsite carbon canister exchange system and rotor concentrator to handle all paint booths

Cost analysis based on method from USEPA. 2002. EPA Air Pollution Control Cost Manual 6th Edition EPA/452/B-02-001

Equipment Cost	1	A	$ 2,157,150.50	Based on USEPA Cost Estimation Procedure (see next sheet for details
Canisters			$ 345,000.00	Based on cost per canister
Rotor Concentrator			$ 1,812,150.50	Based on quote from Anguil, scaled based on 6/10ths rule and separation of rotor concentrator and thermal oxidizer.
Instrumentation	0.1	A	$ 215,715.05	
Sales Tax	0.085	A	$ 183,357.79	
Freight	0.1	A	$ 215,715.05	Based on quote from Anguil

Purchased Equipment Costs	**1.285**	**A = B**	**$**	**2,771,938.39**	
Direct Installation Costs					
Foundation and Supports	0.08	B	$	221,755.07	
Handling & Erection	0.14	B	$	388,071.38	
Electrical	0.04	B	$	110,877.54	
Piping	0.02	B	$	55,438.77	
Insulation for ductwork	0.01	B	$	27,719.38	
Painting	0.01	B	$	27,719.38	
Direct installation costs	**0.3**	**B**	**$**	**831,581.52**	
Site Preparation	$15/sqft		$	8,375.00	based on estimated footprint
Buildings	$150/sqft		$	83,750.00	based on estimated footprint
Total Direct Costs			**$**	**3,695,644.91**	
Indirect Costs Installation					
Engineering	0.1	B	$	277,193.84	
Construction and field expenses	0.05	B	$	138,596.92	
Contractor fees	0.1	B	$	277,193.84	
Start-up	0.02	B	$	55,438.77	
Performance test	0.01	B	$	27,719.38	
Contingencies	0.03	B	$	83,158.15	
Total Indirect Costs	**0.31**	**B**	**$**	**859,300.90**	
Total Capital investment			**$**	**4,554,945.81**	
Direct Annual Costs					
Operating labor					
					Based on 351 days of
Operator	.5hr/shift	$16.77/hr	$	5,886.27	operation
Supervisor	15% operator		$	882.94	
Operating Materials	NA				
Maintenance					
Labor	.5hr/shift	$19.75/hr	$	6,932.25	
Material	100% of labor		$	6,932.25	
Utilities					
					Electricity use of canister not
Electricity			NA		available
					Annual Cost of canisters assume 8 canister
Carbon Replacement			$	1,035,000.00	replacements per year

Total Direct			**$ 1,055,633.71**	
Indirect Annual Costs				
Overhead			$ 12,380.23	60% of Operating, supervisor & maintenance labor & maintenance Materials
Administrative charges	2% TCI		$ 91,098.92	
Property tax	1% TCI		$ 45,549.46	
Insurance	1%TCI		$ 45,549.46	
Capital Recovery			$ 453,401.16	5% and 10 year
Total Annualized Cost			**$ 1,703,612.92**	**Adjusted-previously not include total direct only indirect**
Potential VOC Emissions	19.998	tons		Max year =4x max quarterly facility wide of 9,999 lbs/qtr
Destruction Efficiency 93%	18.59814	Tons Reduced per year		
			$ 91,601.25	**per ton reduced**

Carbon Adsorption with Concentrator

Carbon Canister system with no Roto Concentrator to handle all paint booths

Carbon Working Capacity			Assumption based on concentration without concentrator Max rate 3250 lb/day (16 hr). 212,400 flow rate of all booths Assume 5mg/m3 is 1ppm.
Concentration	51	ppm	
Flow rate	212400	scfm	Unconcentrated Stream
Partial Pressure	0.000749491	psia	assuming at atmospheric pressure
k	0.527		
m	0.0703		
mass loading we	0.317765461	lb/lb	Equation 1.1 assume xylene parameters
Canister Size	12500	lb/lb	Based on largest canister from Calgon
Number of canisters	22		Based on 10,000 cfm per canister
Total annual loading of VOCs	39996		Based on desired permit conditions
Mass of carbon for annual loadings	125,866	lb/lb	
Number of canister changes per year	10.07		
Cost per Canister	$ 115,000.00		Based on email estimate of cost from calgon
Annual Cost of Carbon Canisters	$ 1,265,000.00		Cost per canister
Vessel Footprint			
Height	22.33333333	ft	Based on size given from calgon
Length	8	ft	Based on size given from calgon
Width	8.333333333	ft	Based on size given from calgon
Footprint for 22 canisters	4094.444444	ft2	

Cost analysis for offsite carbon canister exchange system and no rotor concentrator to handle all paint booths
Cost analysis based on method from USEPA. 2002. EPA Air Pollution Control Cost Manual 6th Edition EPA/452/B-02-001

Equipment Cost	1	A	$ 2,530,000.00	Based on USEPA Cost Estimation Procedure (see next sheet for details
Canisters			$ 2,530,000.00	Based on cost per canister
Instrumentation	0.1	A	$ 253,000.00	
Sales Tax	0.085	A	$ 215,050.00	
Freight	0.1	A	$ 253,000.00	Based on quote from Anguil
Purchased Equipment Costs	**1.285**	**A = B**	**$ 3,251,050.00**	
Direct Installation Costs				
Foundation and Supports	0.08	B	$ 260,084.00	

Handling & Erection		0.14	B	$ 455,147.00	
Electrical		0.04	B	$ 130,042.00	
Piping		0.02	B	$ 65,021.00	
Insulation for ductwork		0.01	B	$ 32,510.50	
Painting		0.01	B	$ 32,510.50	
Direct installation costs		**0.3**	**B**	**$ 975,315.00**	
Site Preparation	$15/sqft			$ 8,375.00	based on estimated footprint
Buildings	$150/sqft			$ 83,750.00	based on estimated footprint
Total Direct Costs				**$ 4,318,490.00**	
Indirect Costs Installation					
Engineering		0.1	B	$ 325,105.00	
Construction and field expenses		0.05	B	$ 162,552.50	
Contractor fees		0.1	B	$ 325,105.00	
Start-up		0.02	B	$ 65,021.00	
Performance test		0.01	B	$ 32,510.50	
Contingencies		0.03	B	$ 97,531.50	
Total Indirect Costs		**0.31**	**B**	**$ 1,007,825.50**	
Total Capital investment				**$ 5,326,315.50**	
Direct Annual Costs					
Operating labor					
Operator	.5hr/shift		$16.77/hr	$ 5,886.27	Based on 351 days of operation
Supervisor	15% operator			$ 882.94	
Operating Materials	NA				
Maintenance					
Labor	.5hr/shift		$19.75/hr	$ 6,932.25	
Material	100% of labor			$ 6,932.25	
Utilities					
Electricity				NA	Electricity use of canister not available
Carbon Replacement				$ 1,265,000.00	Annual Cost of canisters assume 9cannister replacements per year
Total Direct				**$ 1,285,633.71**	
Indirect Annual Costs					
Overhead				$ 12,380.23	60% of Operating, supervisor & maintenance labor & maintenance Materials
Administrative charges	2% TCI			$ 106,526.31	

Property tax	1% TCI		$ 53,263.16	
Insurance	1%TCI		$ 53,263.16	
Capital Recovery			$ 523,508.53	5% and 10 year
Total Annualized Cost			**$ 2,034,575.09**	**Adjusted-previously not include total direct only indirect**
Potential VOC Emissions	19.998	tons		Max year =4x max quarterly predicted facility wide of 8635 lbs/qtr (Q4 2016)
Destruction Efficiency 98%	19.59804	Tons Reduced per year		
			$ 103,815.23	**per ton reduced**

Regenerative Thermal Oxidizer with Concentrator

Regenerative Fuel Requirements

Based on method from USEPA. 2002. EPA Air Pollution Control Cost Manual

Step				
1	Establish Design Specifications			
	Volumetric flow rate (SCFM)	212400	scfm	
	Temperature	77	°F	
	Oxygen content	20.9	%	
	Chemical composition of the combustibles	510.6326	ppm	Assumption based on concentration after concentrator Max rate 3250 lb/day (16 hr). 21,240 flow rate after concentrator of 10:1 Assume 5mg/m3 is 1ppm.
	Inerts content			
	Heating value			
	Particulate content			
	Desired control efficiency	93	%	
	combustion chamber outlet temperature			
	Desired percent energy recovery			
Step 2	Verify that the oxygen content of the waste gas exceeds 20%			
	Equation 2.12	99.94894	%	$Oxygen\ Content = Air\ Content \times 0.209$
	Equation 2.13	20.88933	%	
	Oxygen content >20%	Yes		
Step 3	Calculate the LEL and % of the LEL of the gas mixture			
	Equation 2.14 and 2.15	20.4253	%	Solvents have LEL % between 1-2.5%, assume 2.5% and 510 ppm
	Below 25%	Yes		
Step 4	Calculate the volumetric heat of combustion of the waste gas streams			

				Assume 510 ppm and 15,000 Btu/pound (solvents range from 13,000-18,000) Assume density 0.30635 lb/scf (@ 25C, atm, avg MW of 120)	
	Equation 2.16	31.75216	Btu/lb	Since mostly air assume 0.0739 lb/scf	4595.25
Step 5	Establish the incinerator operating temperature				
		1800	°F	Typical temperature 1800-2000	
Step 6	Calculate the waste gas temperature at the exit of the preheater				
	Not necessary				
Step 7	Calculate the auxiliary fuel requirement				
	N	0.0085		range 0.2-1.5% picked mean	
	pwi	0.0739			
	Qwi	33600			
	Cpm	0.255			
	Tfo	185			
	Tref	77			
	Tfi	1800		step 5	
	Twi	100			
	hcwi	31.75216		step 4	
	paf	0.0408		methane at 77F	
	hcaf	21502		for methane	
	Qaf	-33.4148	scfm	Using equation on 2-60	
Step 8	Verify that the auxiliary fuel requirement is sufficient to stabilize the burner				
	Aux Fuel Energy Input	-29314.2	btu/min		
	5% of Total Energy Input	54493.8	btu/min		
	Since less than 5% set at 5%	54493.8	btu/min		
	Qaf	62.11665	scfm		
Step 9	Calculate the flue gas volumetric flow rate				
		33662.12	scfm		
	Electricity				
	Equation 2.42	124.7181	kW	pressure drop 19 inches and efficiency of 60%	

Cost analysis based on method from USEPA. 2002. EPA Air Pollution Control Cost Manual 6th Edition EPA/452/B-02-001

Primary Control Device	1	A	$2,278,297.30	Based on quote from Anguil and 6/10th rule
Instrumentation	0.1	A	$ 227,829.73	
Sales Tax	0.085	A	$ 193,655.27	
Freight	0.1	A	$ 227,829.73	Based on quote from Anguil
Purchased Equipment Costs	**1.285**	**A = B**	**$2,927,612.03**	
Direct Installation Costs				
Foundation and Supports	0.08	B	$ 234,208.96	
Handling & Erection	0.14	B	$ 409,865.68	
Electrical	0.04	B	$ 117,104.48	
Piping	0.02	B	$ 58,552.24	
Insulation for ductwork	0.01	B	$ 29,276.12	
Painting	0.01	B	$ 29,276.12	
Direct installation costs	**0.3**	**B**	**$ 878,283.61**	
Site Preparation	$15/sqft		$ 40,890.00	Cost estimate from Siemens assume 2,726 sqft
Buildings	$150/sqft		$ 408,900.00	Cost estimate from Siemens assume 2,726 sqft
Total Direct Costs			**$4,255,685.64**	
Indirect Costs Installation				
Engineering	0.1	B	$ 292,761.20	
Construction and field expenses	0.05	B	$ 146,380.60	
Contractor fees	0.1	B	$ 292,761.20	
Start-up	0.02	B	$ 58,552.24	
Performance test	0.01	B	$ 29,276.12	
Contingencies	0.03	B	$ 87,828.36	
Total Indirect Costs	**0.31**	**B**	**$ 907,559.73**	
Total Capital investment			**$5,163,245.37**	
Direct Annual Costs				
Operating labor				
Operator	.5hr/shift	$16.77/hr	$ 5,886.27	Based on 351 days of operation
Supervisor	15% operator		$ 882.94	

Operating Materials	NA			
Maintenance				
Labor	.5hr/shift	$19.75/hr	$ 6,932.25	
Material	100% of labor		$ 6,932.25	
Utilities				
Natural gas	$6.41/1000cf		$ 134,166.60	
Electricity	$.1124/kwh		$ 78,726.88	Power Equation 2.42
Total Direct			**$ 233,527.19**	
Indirect Annual Costs				
Overhead			$ 12,380.23	60% of Operating, supervisor & maintenance labor & maintenance Materials
Administrative charges	2% TCI		$ 103,264.91	
Property tax	1% TCI		$ 51,632.45	
insurance	1%TCI		$ 51,632.45	
Capital Recovery			$ 668,640.28	5% and 10 year
Total Annualized Cost			**$1,121,077.51**	**Adjusted-previously not include total direct only indirect**
Potential VOC Emissions	19.998	tons		Max year =4x max quarterly facility wide of 9,999 lbs/qtr
Destruction Efficiency 93%	18.59814	Tons	Reduced per year	
			$ 60,279.01	**per ton reduced**