SMAQMD BACT CLEARINGHOUSE

ACTIVE

CATEGORY Type: **COATING - METAL**

BACT Category: MINOR SOURCE

BACT Determination Number: 234	**BACT Determination Date:** 12/8/2020

Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: PAINT SPRAY BOOTH
Unit Size/Rating/Capacity: <5,475 lbs VOC/year
Equipment Location:

BACT Determination Information

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

ROCs	**Standard:**	< 5,475 lb VOC/year
	Technology Description:	HVLP spray or equivalent application equipment, enclosed spray gun cleaning system, see coments for VOC content limits.
	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:	No standard
	Basis:	
PM10	**Standard:**	
	Technology Description:	Enclosed spray booth with properly maintained dry filters or waterwash. HVLP spray or equivalent application equipment.
	Basis:	Achieved in Practice
PM2.5	**Standard:**	
	Technology Description:	Enclosed spray booth with properly maintained dry filters or waterwash. 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:
Compliance with SMAQMD Rule 451 coating, solvent, and stripper VOC limits except for 2 coating categories (For General - One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard). Compliance with SMAQMD Rule 451 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.

Printed: 12/8/2020

SMAQMD BACT CLEARINGHOUSE

ACTIVE

CATEGORY Type: **COATING - METAL**

BACT Category: MINOR SOURCE

BACT Determination Number: 235	**BACT Determination Date:** 12/8/2020

Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: PAINT SPRAY BOOTH
Unit Size/Rating/Capacity: ≥ 5,475 lb VOC/year
Equipment Location:

BACT Determination Information

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

ROCs	**Standard:**	≥ 5,475 lb VOC/year
	Technology Description:	See Comments for VOC Standards
	Basis:	Cost Effective
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:	No standard
	Basis:	
PM10	**Standard:**	
	Technology Description:	Enclosed spray booth with properly maintained dry filters or waterwash. 2.HVLP spray or equivalent application equipment.
	Basis:	Achieved in Practice
PM2.5	**Standard:**	
	Technology Description:	Enclosed spray booth with properly maintained dry filters or waterwash. 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: 1. Compliance with SMAQMD Rule 451 coating, solvent, and stripping VOC limits except for 2 coating categories (For General - One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard), 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 option #2.

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777 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.:	234 & 235
DATE:	December 8, 2020
ENGINEER:	Jeffrey Quok

Category/General Equip Description:	Coating, Stripping, and Solvent Cleaning – Miscellaneous Metal Parts and Products
Equipment Specific Description:	Paint Spray Booth
Equipment Size/Rating:	< 5,475 lbs VOC/year, Minor Source (BACT #234) ≥ 5,475 lbs VOC/year, Minor Source (BACT #235)
Previous BACT Det. No.:	124 & 125

This BACT determination will update Determinations #124 & 125 for coating, stripping, and solvent cleaning - miscellaneous metal parts and products.

BACT/T-BACT ANALYSIS

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

The following control technologies are currently employed as BACT/T-BACT for paint spray booths used for miscellaneous metal parts and products coating operations 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><th colspan="2">Paint Spray Booth</th></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>

T-BACT
Source: EPA RACT/BACT/LAER Clearinghouse
RBLC ID: NV-0049 (8/20/2009)

<table>
<tr><th colspan="2">Paint Spray Booth</th></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.

RULE REQUIREMENTS:
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. These BACT Determinations are 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><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>US EPA</td><td>
Organic HAP Emission Limits for Coating Types §63.3890
<table>
<tr><td rowspan="2">Subcategory</td><td colspan="2">Organic HAP Emission Limits
kg HAP/liter of coating solids
(lb HAP/gal of coating solids)</td></tr>
<tr><td>New/Reconstructed Sources(A)</td><td>Existing Sources(B)</td></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.

(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.
</td></tr>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>ARB</td><td>
<u>BACT</u>
<u>Source: ARB BACT Clearinghouse</u>

* 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>

<u>T-BACT</u>
The ARB BACT Clearinghouse did not contain any T-BACT determinations.
</td></tr>
<tr><td>SMAQMD</td><td>
<u>BACT</u>
Source: SMAQMD BACT Determination #124 & #125.
(Last Revised 8/22/2016)

<table>
<tr><th colspan="2">#124 - 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 Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 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>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>
</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><th colspan="2">#125 - 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. Compliance with Rule 451 coating, solvent, and stripper standards except for 2 coating categories For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard) BACT coating, solvent, and stripping VOC limits, 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>
</table>
<u>T-BACT</u>
BACT Determination #124 & #125 (8/26/2016)
<table>
<tr><th colspan="2">BACT #124 - 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>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 Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard)</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><th colspan="2">BACT #125 - 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>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 Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard). 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>

RULE REQUIREMENTS:

Rule 451 (Last amended 10/20/2010)
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:

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

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>SMAQMD</td><td>
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 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><td colspan="4">TABLE 1: MISCELANNEOUS COMBUSTION UNITS
EMISSION LIMITS EXPRESSED AS PPMV, corrected to 3% O_2</td></tr>
<tr><td rowspan="3">Equipment Category</td><td colspan="2">NOx Limit
ppmv, corrected to 3% O_2
(lb/MMBtu)</td><td>CO Limit
ppmv, corrected to 3% O_2
(lb/MMBtu)</td></tr>
<tr><td colspan="2">Process Temperature</td><td>Process Temperature</td></tr>
<tr><td>< 1200 °F</td><td>≥ 1200 °F</td><td>All</td></tr>
<tr><td>Oven, Dryer, Dehydrator, Heater, or Kiln</td><td>30
(0.036)</td><td>60
(0.073)</td><td>400
(0.30)</td></tr>
</table>
</td></tr>
<tr><td>South Coast AQMD</td><td>
<u>BACT</u>
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><u>For down-draft type < 667 lbs/month VOC emissions or other types with < 1,170 lbs/month VOC Emissions</u>
1. Compliance with applicable AQMD Regulation XI Rules

<u>For down-draft type ≥ 22 lbs/day VOC emissions or other types with ≥ 1,170 lbs/month VOC Emissions</u>
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>
</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>

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

RULE REQUIREMENTS:

Reg XI, Rule 1107 – Coating of Metal Parts and Products (Last amended 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:

<table>
<tr><th rowspan="2">Coating Category (SCAQMD Rule 1107 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>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>Military Specification</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>Solar Absorbent</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>Extreme High Gloss</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Metallic</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Extreme Performance</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Prefabricated Architectural One-Component</td><td>420 (3.5)</td><td>275 (2.3)</td></tr>
<tr><td>Prefabricated Architectural Multi-Component</td><td>420 (3.5)</td><td>275 (2.3)</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 rowspan="2">Coating Category (SCAQMD Rule 1107 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>Touch Up</td><td>420 (3.5)</td><td>360 (3.0)</td></tr>
<tr><td>Repair</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>High-Performance Architectural</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Camouflage</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Vacuum-Metalizing</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Mold-Seal</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>Electric-Insulating Varnish</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Pan Backing</td><td>420 (3.5)</td><td>420 (3.5)</td></tr>
<tr><td>Pretreatment Coatings</td><td>420 (3.5)</td><td>420 (3.5)</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.

Reg XI, Rule 1171 (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>
</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>(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>
<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 3-20. (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 67.3 (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:

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

<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.

District/Agency	Best Available Control Technology (BACT)/Requirements
Bay Area AQMD	**BACT** 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)

Spray Booths – Miscellaneous Metal Parts and Products	
VOC	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)
NOx	No standard
SOx	No standard
PM10	Dry filters or waterwash, properly maintained
PM2.5	No standard
CO	No standard

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

<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 19 (10/16/2002)
Any person who utilizes spray application equipment to apply coatings to miscellaneous metal parts or products shall use one or more of the following application methods, unless emissions to the atmosphere are controlled by an approved emission control system with an overall abatement efficiency of at least 85%:
A. High Volume Low Pressure (HVLP) Spray, operated in accordance with the manufacturer's recommendations; or
B. Electrostatic spray, operated in accordance with the manufacturer's recommendations; or
C. Detailing Gun; or
D. Any other coating spray application that achieves an equivalent transfer efficiency compared to the spray application methods listed above. Prior written approval from the APCO shall be obtained for each alternative method used.

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

<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>

</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>
Solvent Evaporative Loss Minimization:
Unless emissions to the atmosphere are controlled by an approved emission control system with an overall abatement efficiency of at least 85%, any person using organic solvent for surface preparation and cleanup or any person mixing, using or disposing of coating containing organic solvent:
A. Shall use closed containers for the storage or disposal of cloth or paper used for solvent surface preparation and clean up.
B. The person shall not use organic solvent for the cleanup of spray equipment, including paint lines with VOC content in excess of 50 g/l (0.42 lb/gal) unless either
i. The solvent is pressurized through the spray equipment with atomizing air off or dispensed from a small non-atomizing container, and collected and stored in a closed container until recycled or properly disposed of offsite, or
ii. A spray gun washer subject to and in compliance with the requirements of Regulation 8, Rule 16 is used.
C. Shall close containers of coating, catalyst, or solvent when not in use.

Surface Preparation Standards:
No person shall use a solvent with a VOC content that exceeds 50 g/l (0.42 lbs/gal), as applied, for surface preparation in any operation subject to this Rule unless emissions to the atmosphere are controlled to an equivalent level by an approved emission control system with an overall abatement efficient of at least 85%.
</td></tr>
<tr><td>San Joaquin Valley APCD</td><td>
<u>BACT</u>
Source: <u>SJVUAPCD BACT Guideline</u>
<u>Guideline 4.3.1 Air Dried (3/18/1999)</u>
<u>Guideline 4.3.2 Heat Dried (12/9/1997)</u>

<table>
<tr><th colspan="2">Metal Parts and Products Coating</th></tr>
<tr><td>VOC</td><td>
<u>For Metal Parts and Coating – Air Dried (excluding specialty coating)</u>
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)

<u>For Metal Parts and Coating – Heat Dried</u>
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>
</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>
<table>
<tr><td colspan="2">Metal Parts and Products Coating</td></tr>
<tr><td>PM10</td><td><u>For Metal Parts and Coating – Air Dried</u>
1. Enclosed paint spray booth with particulate filters and HVLP application equipment (or other application methods listed in Rule 4603)

<u>For Metal Parts and Coating – Heat Dried</u>
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>

<u>T-BACT</u>
There are no T-BACT standards published in the clearinghouse for this category.

<u>RULE REQUIREMENTS</u>:
<u>Rule 4603</u> (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.
</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>
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.

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

The following 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.

SMAQMD has found that coating processes exempted in SMAQMD's Rule 451 can't be achieved in practice using the previously determined BACT VOC limits that combined other air district rule VOC limits. The combined BACT VOC limits also did not take into account the exemptions listed in the respective air district rules. Therefore, SMAQMD's BACT will be

updated to include compliance with Rule 451 which will allow the use of exemptions to apply to BACT limits.

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
VOC	<u>For booths without add-on controls</u> 1. 4,660 lb VOC/year limit, HVLP spray or equivalent application equipment, enclosed spray gun cleaning system, compliance with SMAQMD Rule 451(A), and compliance with Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard) – [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] <u>For booths with add-on controls</u> 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(A), compliance with Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard), 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 SCAQMD 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] <u>For Metal Parts and Products – Heat Dried [SJVAPCD]</u> 1. HVLP guns, the use of an enclosed gun cleaner, and coatings compliant with SJVAPCD Rule 4603
NOx	1. For heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu [SMAQMD Rule 419, SCAQMD Rule 1147] 2. No Standard – [SDCAPCD, BAAQMD, SJVAPCD]
SOx	No Standard – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
PM10	1. 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 (or other application methods listed in Rule 4603) – [SJVAPCD] 3. Spray booth equipped with overspray filters – [SDCAPCD] 4. Dry filters or waterwash, properly maintained – [SCAQMD, BAAQMD] <u>For Metal Parts and Products – Heat Dried [SJVAPCD]</u> 1. Enclosed paint booth with dry filters and use of HVLP gun
PM2.5	1. 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]
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)	<u>For booths without add-on controls</u> 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(A), compliance with Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard) – [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] <u>For booths with add-on controls</u> 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(A), compliance with Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard). – [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]

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

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 booths < 4,660 lbs/year VOC Emissions</u> 1. HVLP spray or equivalent application equipment 2. Enclosed spray gun cleaning system 3. Compliance with SMAQMD Rule 451(A), compliance with Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard) <u>For booths ≥ 4,660 lbs/year VOC Emissions</u> 1. Compliance with SMAQMD Rule 451(A), compliance with Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard), 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	SMAQMD SMAQMD, BAAQMD
NOx	For heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu	SMAQMD, SCAQMD
SOx	No standard	
PM10	1. Enclosed spray booth with properly maintained dry filters or waterwash. 2. HVLP spray or equivalent application equipment	SMAQMD
PM2.5	1. Enclosed spray booth with properly maintained dry filter or waterwash. 2. HVLP spray or equivalent application equipment	SMAQMD
CO	For heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu	SMAQMD

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
Organic HAP (T-BACT)	<u>For booths with < 4,660 lbs/year VOC Emissions</u> 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 Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard)	SMAQMD, SCAQMD, SJVAPCD, EPA (NV-0049)
	<u>For booths with ≥ 4,660 lbs/year VOC Emissions</u> 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 Rule 451 coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard). 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 option #7	SMAQMD, SCAQMD, SJVAPCD, BAAQMD, EPA (NV-0049)

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

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 2. Thermal Oxidizer
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

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
NOx	24,500
PM10	11,400
SOx	18,300
CO	TBD if BACT triggered

Cost Effectiveness Analysis Summary

A previous cost effectiveness analysis determined that 4,660 lb VOC/year was the highest allowable uncontrolled emission rate that did not require any add-on control devices. This BACT determination will revisit this limit by using new cost data. The cost analysis was processed in accordance with the EPA OAQPS Air Pollution Control Cost Manual (Sixth Edition, EPA/452/B-02-001).The sales tax rate was based on the District's standard rate of 8.25%. The electricity (13.80 cents/kWh) and natural gas (8.04 dollars/1,000 cubic feet) rates were based on a commercial 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 labor

(Occupation Code 51-9122: Painters, Transportation Equipment) and maintenance (Occupation Code 49-9099: Installation, maintenance, and repair workers, all other) rates were based on data from the Bureau of Labor Statistics.

Carbon Adsorber:
The cost effectiveness based on a maximum annual VOC emission rate of 5,475 lb VOC/year for the add-on carbon adsorber system to control VOC was calculated to be **$17,517/ton** (as shown in Attachment C - Paint Spray Booth Cost for Metal Parts and Products Coating Effectiveness Analysis). The following basic parameters were used in the analysis.

Equipment Life = 10 years

Total Capital Investment = $12,737

Direct Annual Cost = $37,515 per year

Indirect Annual Cost = $5,644 per year

Total Annual Cost = $43,159 per year

VOC Removed = 2.46 tons per year

Cost of VOC Removal = $17,517.49 per ton reduced

Therefore, uncontrolled VOC emissions of 5,475 pounds per year or greater is the cost-effective threshold for control equipment using carbon adsorption control technology.

Thermal Oxidizer:
The cost effectiveness based on a maximum annual VOC emission rate of 19,764 lb VOC/year for the add-on thermal oxidizer system to control VOC was calculated to be **$17,500/ton** (as shown in Attachment C - Paint Spray Booth Cost for Metal Parts and Products Coating Effectiveness Analysis). The following basic parameters were used in the analysis.

Equipment Life = 10 years

Direct Cost = $176,248

Direct Annual Cost = $108,471 per year

Indirect Annual Cost = $47,169 per year

Total Annual Cost = $155,640 per year

VOC Removed = 8.894 tons per year

Cost of VOC Removal = $17,500.00 per ton reduced

Therefore, uncontrolled VOC emissions of 19,764 pounds per year or greater is the cost-effective threshold for control equipment using thermal oxidation control technology.

Conclusion: In this analysis, different emission operating levels are presented with the corresponding total cost per ton of VOC controlled using either a carbon adsorption control or a thermal oxidizer. Uncontrolled VOC emission level of 5,475 pounds per year or greater must be reached in order for the carbon adsorption control option to be cost effective. Uncontrolled VOC emission level of 19,764 pounds per year or greater must be reached in order for a thermal oxidizer to be cost effective. The emissions levels for the cost effectiveness of controls is based on the District cost effective limit for VOC of $17,500 per ton controlled.

With EPA's new cost data, the highest allowable uncontrolled emission rate to not require add-on control devices will be updated to 5,475 lb/year based on the cost of carbon adsorption.

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 Miscellaneous Metal Parts and Products Coatings < 5,475 lbs VOC/year		
Pollutant	**Standard**	**Source**
VOC	1. < 5,475 lb VOC/year limit 2. HVLP spray or equivalent application equipment 3. Enclosed spray gun cleaning system 4. Compliance with SMAQMD Rule 451(A) coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard).	SMAQMD, SCAQMD, SJVAPCD
NOx	For heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu	SMAQMD, SCAQMD
SOx	No standard	
PM10	1. Enclosed spray booth with properly maintained dry filters or waterwash. 2. HVLP spray or equivalent application equipment.	SMAQMD, SCAQMD, SDAPCD, BAAQMD, SJVAPCD
PM2.5	1. Enclosed spray booth with properly maintained dry filters or waterwash. 2. HVLP spray or equivalent application equipment.	SMAQMD, SCAQMD, SDAPCD, BAAQMD, SJVAPCD
CO	For heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu	SMAQMD

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

T-BACT FOR Paint Spray Booths for Miscellaneous Metal Parts and Products Coatings < 5,475 lbs VOC/year		
Pollutant	**Standard**	**Source**
Organic HAP (T-BACT)	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) coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard).	SMAQMD, SCAQMD, SJVAPCD, US EPA (NV-0049)

(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.

BACT FOR Paint Spray Booths for Miscellaneous Metal Parts and Products Coatings ≥ 5,475 lb VOC/year		
Pollutant	**Standard**	**Source**
VOC	1. Compliance with SMAQMD Rule 451(A) coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard), 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 option #2.	SMAQMD, SCAQMD, SJVAPCD, BAAQMD
NOx	For heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu	SMAQMD, SCAQMD
SOx	No standard	
PM10	1. Enclosed spray booth with properly maintained dry filters or waterwash. 2. HVLP spray or equivalent application equipment	SMAQMD, SCAQMD, SDAPCD, BAAQMD, SJVAPCD
PM2.5	1. Enclosed spray booth with properly maintained dry filters or waterwash. 2. HVLP spray or equivalent application equipment	SDCAPCD
CO	For heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu	SMAQMD

(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.

T-BACT FOR Paint Spray Booths for Miscellaneous Metal Parts and Products Coatings ≥ 5,475 lb VOC/year		
Pollutant	**Standard**	**Source**
Organic HAP (T-BACT)	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) coating, solvent, and stripper standards except for 2 coating categories (For General – One Component use SCAQMD Regulation XI, Rule 1107 standard and for Etching Filler use SJVAPCD Rule 4603 Standard). With VOC control system with overall capture/destruction efficiency ≥ 90%; 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	SMAQMD, SCAQMD, SJVAPCD, BAAQMD, US EPA (NV-0049)

(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.

APPROVE BY: *Brian F Krebs* **DATE:** 12-08-2020

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 Determination for Carbon Adsorption and Thermal Oxidizers

COST EFFECTIVENESS ANALYSIS FOR CARBON ADSORPTION

This cost effectiveness analysis was performed using EPA's OAQPS Control Cost Manual
EPA publication no. 452/B-02-001

VOC Parameters

VOC of concern		Toluene
Cost of pure VOC ($/ton)		100
Molecular weight of VOC (Refer to Control Cost Manual, pg 3-63)		92.13
Emission rate (lbs/hr - inlet)		2.6
Inlet concentration (ppm)		23
k factor (Refer to Control Cost Manual, pg 4-11)		0.551
m factor (Refer to Control Cost Manual, pg 4-11)		0.11
Partial pressure (psi)		0.000343974

Gas Parameters

Total gas flow rate (acfm - inlet)		8,000
Total gas pressure (psi - inlet)		14.7

Equipment Parameters

Removal efficiency (%)		90.0%
Adsorption time (hours)		8
Desorption time (hours)		8
Number of adsorbing beds		1
Number of Desorbing beds		1
Equipment life (years)		10

Operating Parameters

Hours per day		8
Days per week		5
Weeks per year		52

Carbon Requirements

Controlled VOC Emissions with max operation (tons/year)	((2.6 lbs VOC/hr)*(0.9)*(8 hours/day)*(5 days/week)*(52 weeks/year))/(2000 lbs/ton)	2.46375
VOC Emissions BACT add on limit (lb/year)		5475
Controlled VOC Emissions BACT add on limit (tons/year)	(5475 lbs/year)*0.9	2.46
Carbon working capacity (lb VOC/lb carbon)		0.25
Amount of carbon needed (lbs)	(5475 lbs voc)/(0.25 lb VOC/lb carbon)	19,710
Carbon cost	($1.5/lb carbon)*(19,710 lbs carbon)	$29,565
Carbon life (years)		5

Direct Costs:

Purchased Equipment Cost		
Adsorber and auxiliary equipment	EPA Cost Control Manual, Equation 1.25	$9,749.21
Instrumentation	1% of equipment cost ($9749.21)*0.1	$974.92
Sales taxes	8.25% of equipment cost ($9749.21)*0.0825	$804.31
Freight	5% of equipment cost ($9749.21)*0.05	$487.46
Purchased Equipment Cost		$12,015.90
Direct installation costs		
		$ -
Foundations & supports		
		$ -
Handling & erection		
		$ -
Electrical		
		$ -
Piping		
		$ -
Insulation		
		$ -
Painting		
		$ -
Direct installation costs		
Indirect Costs:		
Indirect Costs (installation)		
		$ -
Engineering		
		$ -
Construction and field expenses		
		$ -
Contractor fees		
Start-up	2% of equipment cost ($12,015.90)*0.02	$ 240.32
Performance test	1% of equipment cost ($12,015.90)*0.01	$ 120.16
Contingencies	3% of equipment cost ($12,015.90)*0.03	$ 360.48
Total Indirect Costs		$ 720.95
Total Capital Investment		$12,736.85
Interest Rate		0.05
Equipment Life (years)		10
Capital Recovery Factor (CRF)		0.1295
Capital recovery cost	($12,736.85*0.1295)	$1,649.48
Direct Annual Costs		
Labor wage ($/hr)		22.34
operator hour (hrs/shift)		0.5
shifts per day (shift/day)		1
days of work per year (days/year)		260

Operator labor		
Operator	($22.34)*(0.5 hours/shift)*(1 shift/day)*(260 days/year)	$2,904.20
Supervisor		$0.00
Material	equal to operator costs	$2,904.20
Replacement labor		$0.00
Utilities		
Electrical Cost		
kW/hp		0.746
hp		10
hours/year		2080
kWh price		0.138
Electrical	(0.746 kw/hp)*(10 hp)*(2,080 hours/year)*($0.1380/kwh)	$2,141.32
Total Direct Annual Costs (without carbon costs)		$7,949.72
Indirect Annual Costs		
Overhead	60% of maintenance labor and materials	$3,485.04
Administrative Charges	2% of Total Capital Investment	$ 254.74
Property Tax	1% of Total Capital Investment	$ 127.37
Insurance	1% of Total Capital Investment	$ 127.37
Total Indirect Annual Costs (without Capital Recovery)		$3,994.51
Ton VOC controlled		2.464
Carbon needed (lb/year)		19,710
Cost of Carbon per year	(19,710 lb carbon)*($1.50/lb carbon)	$29,565.00
Total Annual Costs		$43,158.71
Cost of VOC Removal	($43,158.71)/(2.464 tons voc)	$17,517.49

Determination of Maximum Annual VOC Limit Not Requiring Add-on Bact

Annual Direct Operating Cost (without carbon costs)	$7,949.72
Annual Indirect Operating Cost	$5,643.99
Carbon working capacity (lb carbon/lb VOC)	0.25
Annual lb VOC PTE	5475
Annual tons Controlled VOC	2.464
Control Efficiency	0.900
Amount of Carbon Needed	19710
Cost of Carbon	$29,565.00
Total Annual Cost	$43,158.71
Cost per ton VOC Controlled	$17,517.49

COST EFFECTIVENESS ANALYSIS FOR THERMAL INCINERATION

This cost effectiveness analysis was performed using EPA's OAQPS Control Cost Manual
EPA publication no. 450/3-90-006

FACILITY NAME:
LOCATION:
PERMIT NO.:
EQUIPMENT DESCRIPTION: METAL COATING PAINT SPRAY BOOTH

VOC Parameters

VOC of concern	Toluene
Molecular weight of VOC (see Control Cost Manual, p 3-63)	92.13
Heat of combustion (Btu/lb - see Control Cost Manual, p 3-63)	17,601
Heating value of VOC (Btu/scf)	4,074
Emission rate (lbs/hr - inlet)	2.1
Inlet concentration (ppm)	18

Gas Parameters

Total gas flow rate (scfm - inlet)	8000
Total gas pressure (psi - inlet)	14.7
Inlet gas temperature (deg F)	71

Equipment Parameters

Level of energy recovery (0%, 35%, 50% or 70%)	70%
Control efficiency (%)	90.0%
Equipment life (years)	10

Operating Parameters

Hours per day	8
Days per week	5
Weeks per year	52
Shifts per day	2

Incinerator Parameters

Volumetric heat of combustion of effluent (Btu/scf)	0.07
Heat of combustion per pound of effluent (Btu/lb)	1.01
Temperature Required for incineration (deg F)	1,500.00
Gas temperature at exit of pre-heater (deg F)	1,071.30
Effluent gas temperature (deg F)	499.7

Electricity Usage

Price of electricity ($/kWh)	$0.14
System fan (kWh/yr)	61,651.20
Total Power Used (kWh/yr)	61,651.20

Gas Usage

Price of gas ($/1000 cu.ft.)	$8.04
Auxiliary fuel required (scfm)	87.53

CAPITAL COST

Direct Costs:

Incinerator	$110,000
Auxiliary equipment (if not included above)	$0
Equipment Cost (A)	**$110,000**
Instrumentation (0.1A if not included above)	$11,000
Sales taxes (0.0825A)	$9,075
Freight (0.05A)	$5,500
Total Equipment Cost (B)	**$135,575**

Direct Installation Costs:

Foundation & Supports (0.08B)	$10,846
Handling & erection (0.14B)	$18,981
Electrical (0.04B)	$5,423
Piping (0.02B)	$2,712
Insulation for duct work (0.01B)	$1,356
Painting (0.01B)	$1,356
Direct Installation Cost	**$40,673**
Site preparation	$0
Facilities & buildings	$0
Total Direct Costs	**$176,248**

Indirect Costs (installation)

Engineering (0.10B)	$13,558
Construction & field expenses (0.05B)	$6,779
Contractor fees (0.10B)	$13,558
Start-up (0.02B)	$2,712
Performance test (0.01B)	$1,356
Contingencies (0.03B)	$4,067
Total Indirect Costs	**$42,028**
TOTAL CAPITAL INVESTMENT	**$218,276**

ANNUAL COST

Direct Annual Costs

Operating Cost		
	Operator (@ $22.34/hr & .5 hr per shift)	$5,808.40
	Supervisor (15% of operator)	$871.26
	Operating materials	$0.00
Maintenance		
	Labor (@19.75/hr & .5 hr per shift)	$5,135.00
	Material (same as labor)	$5,135.00
Utilities		
	Price of electricity ($/kWh)	$0.14
	Price of gas ($/1000 cu.ft.)	$8.04
	Electricity ($/yr)	$3,699.07
	Natural Gas ($/yr)	$87,822.36
	Total Direct Costs	**$108,471.09**
Indirect Annual Costs		
Overhead		$10,169.80
Administrative charges		$4,365.52
Property taxes		$2,182.76
Insurance		$2,182.76
Interest rate (%)		5%
Equipment life (years)		10
CRF		0.1295
Capital recovery		$28,267.71
	Total Indirect Costs	**$47,168.53**
TOTAL ANNUAL COST		**$155,639.63**

Annual Cost ($/yr)	$155,639.63
Annual Emissions Uncontrolled (lbs/year)	19,764
Annual Emissions Reductions (tons/yr)	8.9

(annual emissions based on BACT determination limit for add-on controls)

COST PER TON OF VOCs REDUCED ($/ton)	**$17,500.00**