777 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.:	124 & 125
DATE:	July 25, 2016
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:	<1,170 lbs VOC/month and ≤4,660 lbs VOC/year, Minor Source (BACT #124) ≥1,170 lbs VOC/month or >4,660 lbs VOC/year, Minor Source (BACT #125)
Previous BACT Det. No.:	78

This BACT determination will update Determination #78 for paint spray booths used for miscellaneous metal parts and products. This BACT determination will also include stripping and solvent cleaning operations related to miscellaneous metal parts and products coating operations. Additionally, this determination is being updated to include T-BACT for HAPs associated with VOC and PM emissions.

This BACT was determined under the project for A/C 24749 (Rex Moore Group Inc.).

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><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></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. 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.

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

District/Agency	Best Available Control Technology (BACT)/Requirements
US EPA	**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.

<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>
</table>

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>SMAQMD</td><td>
<u>BACT</u>
BACT Determination #78 (8/27/2014)
<table>
<tr><th colspan="2">Paint Spray Booth</th></tr>
<tr><td>VOC</td><td>4,700 lb VOC/quarter/year limit, use of low VOC coatings and solvents, and high efficiency spray equipment complying with Rule 451</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>High transfer efficiency application equipment</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 current BACT determination does not address T-BACT.

<u>RULE REQUIREMENTS</u>:

<u>Rule 451 (Last amended 10/20/2010)</u>
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
</td></tr>
</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>SMAQMD</td><td>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 rowspan="2">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>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>
<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>
</td></tr>
</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>SMAQMD</td><td>
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>
<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).
</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 112.
(Last Revised 10/3/2008)

<table>
<tr><th colspan="2">Spray Booths</th></tr>
<tr><td>VOC</td><td>For non-automotive booths with <1170 lbs/month VOC Emissions
1. Compliance with applicable AQMD Regulation XI Rules

For non-automotive booths 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 1107 (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

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</table>

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>South Coast AQMD</td><td>
An operator shall not apply any coating to metal parts and products that exceeds the applicable limit specified below:
<table>
<tr><td>Coating Category (SCAQMD Rule 1107 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>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>
<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>
</table>
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</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><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><td>Solvent Cleaning Activity</td><td>VOC limits
g/l (lb/gal)</td></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>
<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>
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<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></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).

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</table>

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

</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>
equipment or when cleaning material is being added, provided the cleaned equipment or equipment parts are drained to the container until dripping ceases; or
• A system is used that totally encloses the component parts being cleaned during the washing, rinsing, and draining processes; or
• Other application equipment cleaning methods that are demonstrated to be as effective as any of the equipment described above in minimizing the emissions of VOC to the atmosphere, provided that the device has been tested and approved prior to use by the Air Pollution Control Officer.

A person shall not use VOC containing materials for the cleaning of coating application equipment used in operations subject to this rule unless:
• The cleaning material contains 25 grams or less of VOC per liter of material; or
• The cleaning material is flushed or rinsed through the application equipment in a contained manner that will minimize evaporation into the atmosphere; or
• The application equipment or equipment parts are cleaned in a container which is open only when being accessed for adding, cleaning, or removing application equipment or when cleaning material is being added, provided the cleaned equipment or equipment parts are drained to the container until dripping ceases; or
• A system is used that totally encloses the component parts being cleaned during the washing, rinsing, and draining processes.
</td></tr>
<tr><td>Bay Area AQMD</td><td>
<u>BACT</u>
Source: <u>BAAQMD BACT Guideline</u>
<u>Document # 161.5.1 for <50lb/day</u> (12/16/03)
<u>Document # 161.5.2 for ≥50 lb/day</u> (12/13/91)

<table>
<tr><th colspan="2">Spray Booths – Miscellaneous Metal Parts and Products</th></tr>
<tr><td>VOC</td><td><u>For <50 lb VOC/day emissions</u>
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)

<u>For ≥50 lb VOC/day emissions</u>
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>
</td></tr>
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<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</td></tr>
<tr><td>Bay Area AQMD</td><td>
<u>T-BACT</u>
There are no T-BACT standards published in the clearinghouse for this category.

<u>RULE REQUIREMENTS</u>:

<u>Reg 8, Rule 19</u> (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>
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</table>

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

<table>
<tr><td>District/Agency</td><td>Best Available Control Technology (BACT)/Requirements</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><td colspan="2">Metal Parts and Products Coating</td></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>
<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
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District/Agency	Best Available Control Technology (BACT)/Requirements
San Joaquin Valley APCD	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><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 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.

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<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 rowspan="2">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>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>
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</table>

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

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
VOC	For booths with <1,170 lbs/month VOC Emissions 1. Compliance with SCAQMD Regulation XI, Rule 1107 – [SCAQMD] 2. 4,700 lb VOC/year limit, high efficiency spray equipment, compliance with SMAQMD Rule 451 limits – [SMAQMD] 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] For booths with ≥1,170 lbs/month VOC Emissions [SCAQMD] 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 4. 4,700 lb VOC/year limit, high efficiency spray equipment, compliance with SMAQMD Rule 451 limits – [SMAQMD] For booths with ≥1,500 lbs/month (average of ≥50 lbs/day) VOC Emissions [BAAQMD] 1. Complying with VOC content and transfer efficiency required by Reg. 8, Rule 19, and emissions controlled to overall capture/destruction efficiency ≥90% For Metal Parts and Products – Heat Dried [SJVAPCD] 1. HVLP guns, the use of an enclosed gun cleaner, and coatings compliant with SJVAPCD Rule 4603
NOx	No Standard – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]
SOx	No Standard – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]
PM10	1. Enclosed spray booth with particulate filters and HVLP application equipment (or other application methods listed in Rule 4603) – [SJVAPCD] 2. Spray booth equipped with overspray filters – [SDCAPCD] 3. Dry filters or waterwash, properly maintained – [SCAQMD, BAAQMD] 4. High transfer efficiency application equipment – [SMAQMD] For Metal Parts and Products – Heat Dried [SJVAPCD] 1. Enclosed paint booth with dry filters and use of HVLP gun
PM2.5	1. Spray booth equipped with overspray filters [SDCAPCD] 2. No Standard – [SMAQMD, SCAQMD, BAAQMD, SJVAPCD]
CO	1. No Standard – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]
Organic HAP (T-BACT)	1. 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]

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 with <1,170 lbs/month VOC Emissions</u> 1. 4,700 lb VOC/year limit 2. HVLP spray or equivalent application equipment 3. Enclosed spray gun cleaning system 4. Compliance with applicable SCAQMD Regulation XI Rules, SMAQMD Rule 451, and SJVAPCD Rule 4603, whichever is more stringent. <u>For booths with ≥1,170 lbs/month VOC Emissions</u> 1. Compliance with applicable SCAQMD Regulation XI Rules, SMAQMD Rule 451, and SJVAPCD Rule 4603, whichever is more stringent, 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 #2	SMAQMD (Rule 451) SJVAPCD (Rule 4603) SCAQMD (Reg. XI, Rule 1107) SDCAPCD (Rule 67.3) BAAQMD (Reg. 8, Rule 19) SCAQMD (BACT Guidelines for Non-Major Polluting Facilities, pg 112) SMAQMD (Rule 451) SJVAPCD (Rule 4603)
NOx	No standard	
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 filter or waterwash. 2. HVLP spray or equivalent application equipment	SMAQMD SCAQMD SDAPCD BAAQMD SJVAPCD
CO	No Standard	
Organic HAP (T-BACT)	<u>For booths with <1,170 lbs/month VOC Emissions</u> 1. 4,700 lb VOC/year limit 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 the VOC content. 6. Compliance with applicable SCAQMD Regulation XI Rules, SMAQMD Rule 451, and SJVAPCD Rule 4603, whichever is more stringent.	SMAQMD (Rule 451) SJVAPCD (Rule 4603) SCAQMD (Reg. XI, Rule 1107) SDCAPCD (Rule 67.3) BAAQMD (Reg. 8, Rule 19) US EPA (NV-0049)

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
Organic HAP (T-BACT)	For booths with ≥1,170 lbs/month VOC Emissions 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 the VOC content 5. Compliance with applicable SCAQMD Regulation XI Rules, SMAQMD Rule 451, and SJVAPCD Rule 4603, whichever is more stringent. 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 options #5 and #6	SCAQMD (BACT Guidelines for Non-Major Polluting Facilities, pg 112) SMAQMD (Rule 451) SJVAPCD (Rule 4603) US EPA (NV-0049)

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
NO_X	24,500
PM_{10}	11,400
SO_X	18,300
CO	TBD if BACT triggered

Cost Effectiveness Analysis Summary

A previous cost effectiveness analysis determined that 4,700 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 control efficiency data. The new BACT determination will use a control efficiency of 90% (previously 85.5%) per BAAQMD's BACT determination. In order to find the highest allowable annual VOC emission limit that does not result in carbon adsorption being cost effective, the cost analysis performed for this permit was done with the emission limit as a variable. See Attachment D - *Determination of Maximum Annual VOC Limit Not Requiring Add-on BACT* for this analysis. The resulting maximum annual VOC emission limit, 4,660 lb VOC/year, will be the set limit for this determination. Using 4,660 lb VOC/year as the maximum emission rate, a cost effective analysis for carbon adsorption and incineration was performed below.

Carbon Adsorber:
As shown in Attachment C, the cost effectiveness for the add on carbon adsorber system to control VOC was calculated to be **$17,504.00/ton** (see attached 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 = $9,756.24

Direct Annual Cost = $31,015.71 per year

Indirect Annual Cost = $5,690.18 per year

Total Annual Cost = $36,705.89 per year

VOC Removed = 2.1 tons per year

Cost of VOC Removal = $17,504.00 per ton reduced

Therefore, the add on carbon adsorber system is considered not cost effective and is eliminated.
Thermal Oxidizer:

Equipment Life = 10 years

Direct Cost = $175,533

Direct Annual Cost = $100,581.48 per year

Indirect Annual Cost = $57,091.34 per year

Total Annual Cost = $157,672.82 per year

VOC Removed = 2.1 tons per year

Cost of VOC Removal = $75,173.58 per ton reduced

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, PM10, and PM2.5 will be the following:

BACT FOR Paint Spray Booths for Miscellaneous Metal Parts and Products Coatings < 1,170 lbs VOC/month and < 4,660 lbs VOC/year (A)		
Pollutant	**Standard**	**Source**
VOC	1. 4,660 lb VOC/year limit (A) 2. HVLP spray or equivalent application equipment 3. Enclosed spray gun cleaning system 4. Compliance with BACT coating, solvent, and stripper VOC limits, see Tables 1-4 below.	SMAQMD (Rule 451) SJVAPCD (Rule 4603) SCAQMD (Reg. XI, Rule 1107) SDCAPCD (Rule 67.3) BAAQMD (Reg. 8, Rule 19)
NOx	No standard	
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	No Standard	

(A) VOC yearly limit was recalculated using new cost data. See Attachment D – Determination of Maximum Annual VOC Limit Not Requiring Add-on BACT

T-BACT FOR Paint Spray Booths for Miscellaneous Metal Parts and Products Coatings < 1,170 lbs VOC/month and < 4,660 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 BACT coating, solvent cleaning, and stripping VOC limits (see Tables 1-4 below).	SCAQMD US EPA (NV-0049)

BACT FOR Paint Spray Booths for Miscellaneous Metal Parts and Products Coatings ≥ 1,170 lbs VOC/month or ≥ 4,660 lb VOC/year		
Pollutant	**Standard**	**Source**
VOC	1. Compliance with BACT coating, solvent, and stripping VOC limits (see Tables 1-4 below), 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 optioin #2.	SCAQMD (Reg. XI, Rule 1136)
NOx	No standard	
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.	SDCAPCD
CO	No Standard	

T-BACT FOR Paint Spray Booths for Miscellaneous Metal Parts and Products Coatings ≥ 1,170 lbs VOC/month or ≥ 4,660 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 BACT coating, solvent cleaning, and stripping VOC limits (see Tables 1-4 below). 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	SCAQMD (BACT Guidelines for Non-Major Polluting Facilities, pg 112) US EPA (NV-0049)

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)
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.

REVIEWED BY: _____ **DATE:** _____

APPROVE BY:  **DATE:** 7/22/16

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)	5.73
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)	0.00033692

Gas Parameters

Total gas flow rate (acfm - inlet)	18,000
Total gas pressure (psi - inlet)	14.7

Equipment Parameters

Removal efficiency (%)	90%
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)	5.36
VOC Emissions BACT add on limit (lbs/year)	4660
Controlled VOC Emissions BACT add on limit (tons/year)	2.097
Carbon working capacity (lb VOC/lb carbon)	0.25
Amount of carbon needed (lbs)	16,776
Carbon cost	$25,164
Carbon life (years)	5

Direct Costs:

Purchased Equipment Cost	
Adsorber and auxiliary equipment	$7,800.00
Instrumentation	$780.00
Sales taxes	$234.00

Freight	$390.00
Purchased Equipment Cost	$9,204.00
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	$184.08
Performance test	$92.04
Contingencies	$276.12
Total Indirect Costs	$552.24
Total Capital Investment	$9,756.24
Interest Rate	0.1
Equipment Life (years)	10
Capital Recovery Factor (CRF)	0.1627
Capital recovery cost	$1,587.34
Capital Recovery Inflation adjustment	$1,867.93
Direct Annual Costs	
Labor wage ($/hr)	22
operator hour (hrs/shift)	0.5
shifts per day (shift/day)	1
days of work per year (days/year)	260
Operator labor	
Operator	$2,860.00
Material	$2,860.00
Replacement labor	$131.71
Utilities	
Electrical Cost	
kW/hp	0.746

hp	10
hours/year	1040
kWh price	0.09
Electrical	$698.26
Total Direct Annual Costs (without carbon and electrical costs)	$5,851.71
Indirect Annual Costs	
Overhead	$3,432.00
Administrative Charges	$195.12
Property Tax	$97.56
Insurance	$97.56
Total Indirect Annual Costs (without Capital Recovery)	$3,822.25
Ton VOC controlled	2.1
Carbon needed	16,776
Cost of Carbon per year	$25,164.00
Total Annual Costs	**$36,705.89**
Cost of VOC Removal ($/ton)	**$17,504.00**

COST EFFECTIVENESS ANALYSIS FOR THERMAL INCINERATION

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
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)	7.5
Inlet concentration (ppm)	26

Gas Parameters

Total gas flow rate (scfm - inlet)	18000
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%
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)	0.09
Heat of combustion per pound of effluent (Btu/lb)	1.22
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)	$0.06
System fan (kWh/yr)	138,715.20
Total Power Used (kWh/yr)	138,715.20

Gas Usage

Price of gas ($/1000 cu.ft.)	$3.30
Auxiliary fuel required (scfm)	196.60

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 (0.0775A)		$8,525
Freight (0.05A)		$5,500
	Total Equipment Cost (B)	**$135,025**

Direct Installation Costs:

Foundation & Supports (0.08B)		$10,802
Handling & erection (0.14B)		$18,904
Electrical (0.04B)		$5,401
Piping (0.02B)		$2,701
Insulation for duct work (0.01B)		$1,350
Painting (0.01B)		$1,350
	Direct Installation Cost	**$40,508**
Site preparation		$0
Facilities & buildings		$0
	Total Direct Costs	**$175,533**

Indirect Costs (installation)

Engineering (0.10B)		$13,503
Construction & field expenses (0.05B)		$6,751
Contractor fees (0.10B)		$13,503
Start-up (0.02B)		$2,701
Performance test (0.01B)		$1,350
Contingencies (0.03B)		$4,051
	Total Indirect Costs	**$41,858**
TOTAL CAPITAL INVESTMENT		**$217,390**

ANNUAL COST

Direct Annual Costs

Operating Cost		
	Operator (@ $12.96/hr & .5 hr per shift)	$3,369.60
	Supervisor (15% of operator)	$505.44
	Operating materials	$0.00
Maintenance		
	Labor (@14.26/hr & .5 hr per shift)	$3,707.60
	Material (same as labor)	$3,707.60
Utilities		
	Price of electricity ($/kWh)	$0.06
	Price of gas ($/1000 cu.ft.)	$3.30
	Electricity ($/yr)	$8,322.91
	Natural Gas ($/yr)	$80,968.33

Total Direct Costs		**$100,581.48**
Indirect Annual Costs		
Overhead		$6,774.14
Administrative charges		$4,347.81
Property taxes		$2,173.90
Insurance		$2,173.90
Interest rate (%)		5%
Equipment life (years)		10
CRF		0.1627
Capital recovery		$35,369.39
Capital Recovery Inflation Adjustment		$41,621.58
Total Indirect Costs		**$57,091.34**
TOTAL ANNUAL COST		**$157,672.82**
Annual Emissions Reductions (tons/yr)	(annual emissions based on BACT determination limit for add-on controls)	2.1
COST PER TON OF VOCs REDUCED ($/ton)		**$75,173.58**