SMAQMD BACT CLEARINGHOUSE

ACTIVE

CATEGORY Type: **COATING - WOOD**

BACT Category: Minor Source BACT

BACT Determination Number: 347	**BACT Determination Date:** 5/17/2024

Equipment Information

Permit Number: N/A -- Generic BACT Determination

Equipment Description: COATING OPERATION

Unit Size/Rating/Capacity: ≤ 6,198 lbs VOC/year and facilities ≤ 40,000 lbs VOC/year

Equipment Location:

BACT Determination Information

District Contact: Jeff Quok Phone No.: (279) 207-1145 email: jquok@airquality.org

ROCs	**Standard:**	See Technology Description
	Technology Description:	1.< 6,198 lb VOC/year limit 2.HVLP spray or equivalent application equipment 3.Compliance with SMAQMD Rule 463(A) and BACT coating, solvent, and stripper VOC limits
	Basis:	Achieved in Practice
NOx	**Standard:**	See Technology Decription
	Technology Description:	For booth heaters: < 1,200 °F: 30 ppm or 0.036 lb/MMBtu ≥ 1,200 °F: 60 ppm or 0.073 lb/MMBtu
	Basis:	Achieved in Practice
SOx	**Standard:**	No standard
	Technology Description:	
	Basis:	Achieved in Practice
PM10	**Standard:**	See Technology Decription
	Technology Description:	1.Enclosed spray booth with properly maintained dry filters or waterwash 2.HVLP spray or equivalent application equipment
	Basis:	Achieved in Practice
PM2.5	**Standard:**	See Technology Decription
	Technology Description:	1.Enclosed spray booth with properly maintained dry filters or waterwash 2.HVLP spray or equivalent application equipment
	Basis:	Achieved in Practice
CO	**Standard:**	For heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu
	Technology Description:	
	Basis:	Achieved in Practice
LEAD	**Standard:**	No standard
	Technology Description:	
	Basis:	

Comments: (A)Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

T-BACT: See BACT Determination evaluation for full T-BACT standards.

Printed: 5/16/2024

SMAQMD BACT CLEARINGHOUSE

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Equipment Description: COATING OPERATION

Unit Size/Rating/Capacity: ≥ 6,198 lb VOC/year and facilities > 40,000 lbs VOC/year

Equipment Location:

BACT Determination Information

District Contact: Jeff Quok Phone No.: (279) 207-1145 email: jquok@airquality.org

ROCs	**Standard:**	See Technology Description
	Technology Description:	1.Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent, and stripper VOC limits, and VOC control system with overall capture/destruction efficiency ≥ 90%; OR 2.Use of Super Clean Materials (< 5% VOC by weight); OR
	Basis:	Cost Effective
NOx	**Standard:**	See Technology Description
	Technology Description:	For booth heaters: < 1,200 °F: 30 ppm or 0.036 lb/MMBtu ≥ 1,200 °F: 60 ppm or 0.073 lb/MMBtu
	Basis:	Achieved in Practice
SOx	**Standard:**	No standard
	Technology Description:	
	Basis:	
PM10	**Standard:**	See Technology Description
	Technology Description:	1.Enclosed spray booth with properly maintained dry filters or waterwash 2.HVLP spray or equivalent application equipment
	Basis:	Achieved in Practice
PM2.5	**Standard:**	See Technology Description
	Technology Description:	1.Enclosed spray booth with properly maintained dry filters or waterwash 2.HVLP spray or equivalent application equipment
	Basis:	Achieved in Practice
CO	**Standard:**	For heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu
	Technology Description:	
	Basis:	Achieved in Practice
LEAD	**Standard:**	No standard
	Technology Description:	
	Basis:	

Comments: (A)Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

T-BACT: See BACT Determination evaluation for full T-BACT standards.

Printed: 5/16/2024

777 12th Street, Ste. 300

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NOS.:	347 & 348
DATE:	5/17/2024
ENGINEER:	Jeffrey Quok

Category/General Equip Description:	Coating, Stripping, and Solvent Cleaning – Wood Products
Equipment Specific Description:	Paint Spray Booth
Equipment Size/Rating:	≤ 6,198 lbs VOC/year and facilities ≤ 40,000 lbs VOC/year (BACT #347) > 6,198 lbs VOC/year and facilities > 40,000 lbs VOC/year (BACT #348)
Previous BACT Det. No.:	#277 & #278

This Best Available Control Technology (BACT) determination will update Determinations #277 & #278 for coating, stripping, and solvent cleaning – wood products. Wood products include cabinets (kitchen, bath, and vanity), tables, chairs, beds, sofas, shutters, art objects, and any other coated objects made of solid wood, and/or wood composition. Coatings are materials applied to a surface which forms a film in order to beautify and/or protect such a surface.

BACT/T-BACT ANALYSIS

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

The following control technologies are currently employed as BACT for coating, stripping, and solvent cleaning - wood products by the following agencies and air pollution control districts:

US EPA

BACT
Source: EPA RACT/BACT/LAER Clearinghouse

RBLC ID: VA-0300 (12/15/2006)
RBLC ID: IL-0122 (10/25/26)
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.

Paint Spray Booth, Wood Coating (RBLC ID: VA-0300 and RBLC ID: IL-0122)	
VOC	Without add-on Control (VA-0300) Proper spraying techniques and the use of high solids coating whenever possible. With add-on Control (IL-0122) HVLP spray equipment, air assisted airless spray equipment or equipment with equivalent or better transfer efficiency; work practices; oxidizer with 98% destruction efficiency(A).
NOx	N/A – No BACT determinations
SOx	N/A – No BACT determinations
PM10	Dry filters, proper spray techniques, and work practice standards of 40 CFR 63 subpart JJ. Each filter shall be equipped with a device to continuously measure the differential pressure drop across the filter. (VA-0300)
PM2.5	N/A – No BACT determinations
CO	N/A – No BACT determinations

(A) The 98% destruction efficiency compliance verification is listed as "unknown" and therefore will not be considered achieved in practice.

T-BACT
Source: EPA RACT/BACT/LAER Clearinghouse

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

RULE REQUIREMENTS:

40 CFR 63 Subpart JJ – National Emission Standards for Wood Furniture Manufacturing Operations
This regulation applies for facilities that are engaged, either in part or in whole, in the manufacture of wood furniture or wood furniture components and that are located at a plant site that is a major source as defined in 40 CFR subpart A, §63.2.

Subpart JJ limits volatile hazardous air pollutants (VHAP) of finishing operations and contact adhesives and also limits the VOC strippable spray booth material. The limits can be seen in the table below.

Table 3 to Subpart JJ of Part 63—Summary of Emission Limits

Emission Point	**Existing Source**	**New Source**
Finishing Operations:		
(a) Achieve a weighted average VHAP content across all coatings (maximum kg VHAP/kg solids [lb VHAP/lb solids], as applied	(A)1.0	(A)0.8

Emission Point	Existing Source	New Source
Finishing Operations:		
(b) Use compliant finishing materials (maximum kg VHAP/kg solids [lb VHAP/lb solids], as applied):		
— stains	(A)1.0	(A)1.0
—washcoats	(A) (B)1.0	(A) (B)0.8
—sealers	(A)1.0	(A)0.8
—topcoats	(A)1.0	(A)0.8
—basecoats	(A) (B)1.0	(A) (B)0.8
—enamels	(A) (B)1.0	(A) (B)0.8
—thinners (maximum percent VHAP allowable); or	10.0	10.0
(c) As an alternative, use control device; or	(C)1.0	(C)0.8
(d) Use any combination of (a), (b), and (c)	1.0	0.8
Cleaning Operations:		
Strippable spray booth material (maximum VOC content, kg VOC/kg solids [lb VOC/lb solids])	0.8	0.8
Contact Adhesives:		
(a) Use compliant contact adhesives (maximum kg VHAP/kg solids [lb VHAP/lb solids], as applied) based on following criteria:		
i. For aerosol adhesives, and for contact adhesives applied to nonporous substrates	(D)NA	(D)NA
ii. For foam adhesives used in products that meet flammability requirements	1.8	0.2
iii. For all other contact adhesives (including foam adhesives used in products that do not meet flammability requirements); or	1.0	0.2
(b) Use a control device	(E)1.0	(E)0.2
All Finishing Operations and Contact Adhesives:		
(a) Achieve total free formaldehyde emissions across all finishing operations and contact adhesives, lb per rolling 12 month period, as applied	400	400
(b) Use coatings and contact adhesives only if they are low-formaldehyde coatings and contact adhesives	(F)1.0	(F)1.0

(A) The limits refer to the VHAP content of the coating, as applied.
(B) Washcoats, basecoats, and enamels must comply with the limits presented in this table if they are purchased premade, that is, if they are not formulated onsite by thinning other finishing materials.

If they are formulated onsite, they must be formulated using compliant finishing materials, i.e., those that meet the limits specified in this table, and thinners containing no more than 3.0 percent VHAP by weight.

(C) The control device must operate at an efficiency that is equivalent to no greater than 1.0 kilogram (or 0.8 kilogram) of VHAP being emitted from the affected emission source per kilogram of solids used.

(D) There is no limit on the VHAP content of these adhesives.

(E) The control device must operate at an efficiency that is equivalent to no greater than 1.0 kilogram (or 0.2 kilogram) of VHAP being emitted from the affected emission source per kilogram of solids used.

(F) The limits refer to the formaldehyde content by weight of the coating or contact adhesive, as specified on certified product data sheets.

40 CFR 63 Subpart QQQQ – National Emission Standards for Surface Coating of Wood Building Products

This regulation applies to wood building product coating operations that use 1,100 gallons of coatings per year or are located at or are part of a major source of Hazardous Air Pollutants (HAPS).

Subpart QQQQ limits hazardous air pollutants (HAP) for surface coating of wood building products. The limits can be seen in the table below.

Table 1 to Subpart QQQQ of Part 63—Emission Limits for New or Reconstructed Affected Sources

You must comply with the emission limits that apply to your affected source in the following table as required by §63.4690.

If the affected source applies coating to products in the following subcategory. . .	Then, the organic HAP emission limit for the affected source, in grams HAP/liter solids (lb HAP/gal solids)[(A)] [(B)] is:
1. Exterior siding and primed door skins	0 (0.00)
2. Flooring	0 (0.00)
3. Interior wall paneling or tileboard	5 (0.04)
4. Other interior panels	0 (0.00)
5. Doors, windows, and miscellaneous	57 (0.48)

(A) Determined as a rolling 12-month emission rate according to the requirements in §63.4741, §63.4751, or §63.4761, as applicable.

(B) If the affected source applies coatings to products in more than one of the subcategories listed in the table, then you must determine the applicable emission limit according to §63.4690(c).

Table 2 to Subpart QQQQ of Part 63—Emission Limits for Existing Affected Sources

You must comply with the emission limits that apply to your affected source in the following table as required by §63.4690.

If the affected source applies coating to products in the following subcategory. . .	Then, the organic HAP emission limit for the affected source, in grams HAP/liter solids (lb HAP/gal solids)[A] [B] is:
1. Exterior siding and primed door skins	7 (0.06)
2. Flooring	93 (0.78)
3. Interior wall paneling or tileboard	183 (1.53)
4. Other interior panels	20 (0.17)
5. Doors, windows, and miscellaneous	231 (1.93)

(A) Determined as a rolling 12-month emission rate according to the requirements in §63.4741, §63.4751, or §63.4761, as applicable.
(B) If the affected source applies coatings to products in more than one of the subcategories listed in the table, then you must determine the applicable emission limit according to §63.4690(c).

40 CFR 63 Subpart HHHHHH – National Emission Standards for Hazardous Air Pollutants for Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources

This subpart applies to spray application of coatings containing compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd), collectively referred to as the target HAP to any part or product made of plastic. This subpart also applies to operations using methylene chloride (MeCl) for the removal of dried paint.

General Requirements

For paint stripping operations using MeCl:

A. Implement management practice to minimize the evaporative emissions of MeCl. The management practices must address practices in paragraphs 1 through 5, as applicable.
   1. Evaluate each application to ensure there is a need for paint stripping.
   2. Evaluate each application where a paint stripper containing MeCl is used to ensure that there is no alternative paint stripping technology that can be used.
   3. Reduce exposure of all paint strippers containing MeCl to the air.
   4. Optimize application conditions when using paint strippers containing MeCl to reduce MeCl evaporation.
   5. Practice proper storage and disposal of paint strippers containing MeCl.

For coatings that may potentially contain the target HAP compounds of chromium, lead, manganese, nickel, or cadmium:

A. All spray-applied coatings must be performed in a spray booth, preparation station, or mobile enclosures that are fully enclosed with a full roof with four walls or complete side curtains. The enclosure must be ventilated at a negative pressure and equipped with a filter system that can achieve at least 98% capture efficiency.
B. Coatings must be applied with HVLP spray equipment, electrostatic application, airless spray gun, air-assisted airless spray gun, or an equivalent technology for which written approval has been obtained from the U.S. EPA.
C. Spray gun cleaning must be conducted such that an atomized mist or spray of gun cleaning solvent and paint residue is not created outside of a container that collects used cleaning solvent.
D. All new and existing personnel who spray-apply surface coatings must be trained in the proper application of surface coatings.

E. For new affected sources, submit an initial notification to EPA no later than 180 days after initial startup or July 7, 2008, whichever is later. For an existing affected source, submit the initial notification no later than January 11, 2010.

California Air Resource Board (CARB)

BACT
Source: CARB BACT Clearinghouse
CARB BACT Guidelines Search

There are no applicable BACT standards published in the clearinghouse for this category. The BACT Guidelines search contained BACTs from SMAQMD, SCAQMD, BAAQMD, and SJVAPCD that will be reviewed in the specific District evaluations in this Determination.

RULE REQUIREMENTS:

None

Sacramento Metropolitan AQMD

BACT
Source: SMAQMD BACT #277 & #278 – Coatings – Wood Products (11/19/21)

BACT #277 for Coatings – Wood Products ≤ 7,404 lbs VOC/year and Facility Emissions ≤ 40,000 lbs VOC/year	
Pollutant	**Standard**
VOC	1. HVLP spray or equivalent application equipment 2. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits (see Tables 1-3 below)
NOx	For heaters: low NOx burner, 30 ppmvd @ 3% O_2 or 0.036 lb/MMBtu
SOx	No standard
PM10	1. Enclosed spray booth with properly maintained dry filters or waterwash. 2. HVLP spray or equivalent application equipment.
PM2.5	1. Enclosed spray booth with properly maintained dry filters or waterwash.
CO	No standard

(A) Compliance with SMAQMD Rule 463 includes the 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 #277 for Coatings – Wood Products ≤ 7,404 lbs VOC/year and Facility Emissions ≤ 40,000 lbs VOC/year	
Pollutant	**Standard**
Organic HAP/VHAP (T-BACT)	1. HVLP spray or equivalent application equipment 2. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits (see Tables 1-3 below). For major sources, emission limits of Tables 1 & 2 to Subpart QQQQ of Part 63 and emission limits of Table 3 to Subpart JJ of Part 63, whichever is more stringent.

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

BACT #278 for Coatings – Wood Products > 7,404 lbs VOC/year and Facility Emissions ≤ 40,000 lbs VOC/year	
Pollutant	**Standard**
VOC	1. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits (see Tables 1-3 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 reduction
NOx	For heaters: low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu
SOx	No standard
PM10	1. Enclosed spray booth with properly maintained dry filters or waterwash. 2. HVLP spray or equivalent application equipment
PM2.5	1. Enclosed spray booth with properly maintained dry filters or waterwash.
CO	No standard

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

T-BACT #278 for Coatings – Wood Products > 7,404 lbs VOC/year and Facility Emissions ≤ 40,000 lbs VOC/year	
Pollutant	**Standard**
Organic HAP/VHAP (T-BACT)	1. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits (see Tables 1-3 below). For major sources, emission limits of Tables 1 & 2 to Subpart QQQQ of Part 63 and emission limits of Table 3 to Subpart JJ of Part 63. 2. VOC control system with ≥ 90% collection efficiency and ≥ 95% destruction efficiency; OR 3. Use of Super Clean Materials (< 5% VOC by weight); OR 4. Use of low-VOC materials resulting in an equivalent emission reduction

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD

Rule 463.

An operator shall not apply **any coating to a wood product** that exceeds the applicable limit specified below:

Table 1: BACT Wood Coating VOC Limits(A)

Coating Category	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter, (lb/gal), [lbs-VOC/lbs-solid)]
Clear Sealers	275 (2.3) [0.36]
Clear topcoat	275 (2.3) [0.35]
Pigmented primers, sealers, & topcoats	275 (2.3) [0.21]
Pigmented topcoats	275 (2.3) [0.25]
Barrier coat – plastic components	275 (2.3) [0.28]
Composite wood edge filler	275 (2.3) [0.31]
Extreme performance coatings	275 (2.3) [0.33]
Fillers	275 (2.3) [0.18]
High-solid stains	350 (2.9) [0.42]
Inks	500 (4.2) [0.96]
Mold-seal coatings	750 (6.3) [4.2]
Multi-colored coatings	275 (2.3) [0.33]

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1136.

Table 1: BACT Wood Coating VOC Limits (continued)(A)

Coating Category	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-solid barrier coat – plastic components	120 (1.00)
Low-solid Stains, Toners, and Washcoats	120 (1.00)

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1136.

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

Table 2: BACT Solvent Cleaning VOC Limits(A)

Type of Solvent Cleaning Operation	VOC Content Limit grams of VOC/liter of material (lb/gal)
Product cleaning during manufacturing process or surface preparation for coating, adhesive, or ink application	25 (0.21)
Repair and maintenance cleaning	25 (0.21)
Cleaning of adhesive and coating application equipment	25 (0.21)
Cleaning of polyester resin application equipment	25 (0.21)

(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 one of the following requirements:

Table 3: BACT Stripper VOC Limits(A)

Stripper Requirements	
VOC Limit	≤ 350 grams VOC/liter; OR
VOC vapor pressure limit	Total vapor pressure of 2 mm HG or less, at 20°C (68°F)

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1136.

RULE REQUIREMENTS:

Rule 463 – Wood Products Coatings (Last amended 9/25/2008)

One of the following methods shall be used when applying wood product coatings to any wood products:

A. Electrostatic spray
B. High-volume low-pressure (HVLP) spray
C. Low-volume low-pressure (LVLP) spray
D. Roll coater, dip coat or flow coat
E. Hand application method, such as brush or roller
F. Air assisted airless, for touch-up and repair only
G. 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 **new wood product**, which has a VOC content exceeding the applicable limits below:

Coating Category (SMAQMD Rule 463 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/lbs-solid)
Clear Topcoats	275 (0.35)
Conversion Varnish	550 (1.20)
Filler	275 (0.18)

Coating Category (SMAQMD Rule 463 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/lbs-solid)
High-solid stain	350 (0.42)
Inks	500 (0.96)
Mold-seal Coating	750 (4.20)
Multi-colored Coating	275 (0.33)
Pigmented Coating	275 (0.25)
Sealer	275 (0.36)

Coating Category (SMAQMD Rule 463 Definition)	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-Solid Stains, Toners, Washcoats	120 (1.00)

VOC content of coatings used for **refinishing, repairing, preserving, or restoring wood products** shall not exceed the following limits:

Coating Category (SMAQMD Rule 463 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lbs-VOC/lbs-solid)
Clear Topcoats	680 (2.5)
Conversion Varnish	550 (1.20)
Filler	500 (0.96)
High-solid stain	700 (2.57)
Inks	500 (0.96)
Mold-seal Coating	750 (4.20)
Multi-colored Coating	680 (2.60)
Pigmented Coating	600 (1.60)
Sealer	680 (2.5)

Coating Category (SMAQMD Rule 463 Definition)	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-Solid Stains, Toners, Washcoats	480 (4.00)

A person shall not use a stripper on wood products unless:

- It contains 350 grams of VOC per liter of material; or
- The VOC composite partial vapor pressure is 2 mm Hg (0.04 psia) or less at 20°C (68°F), as calculated pursuant to Section 402.

Requirements for Surface Preparation and Cleanup Materials:

- Closed containers shall be used for the disposal of cloth or paper used for surface preparation, cleanup, and coating removal.
- VOC-containing materials shall be stored in containers, which are closed when not in use, and shall be disposed of in a manner that the VOC are not emitted into the atmosphere.
- Effective September 25, 2009, a person shall not perform surface preparation or cleanup with a material containing VOC in excess of 25 grams per liter (0.21 pounds per gallon).

Rule 419 – NOx from Miscellaneous Combustion Units (10/25/18)
This Rule applies to any miscellaneous combustion unit or cooking unit with a total rated heat input capacity of 2 MMBtu/hr or greater that is 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.

The requirements of this rule do not apply to combustion equipment where its primary function is to operate as an air pollution control device including, but not limited to, afterburners, catalytic oxidizers, flares, thermal oxidizers, or vapor incinerators.

TABLE 1: Miscellaneous Combustion Units
Emission Limits Expressed As PPMV, corrected to 3% O_2

Equipment Category	**NOx Limit ppmv, corrected to 3% O_2 (lb/MMBtu)**		**CO Limit ppmv, corrected to 3% O_2 (lb/MMBtu)**
Gaseous Fuel-Fired Equipment	**Process Temperature**		**All Temperatures**
	< 1200°F	≥ 1200 °F	
Other Miscellaneous Combustion Unit	30 (0.036)	60 (0.073)	400 (0.30)

South Coast AQMD

BACT

Source: SCAQMD BACT Guidelines (Part D) for Non-Major Polluting Facilities, page 117 & 118 (9/2/2022)

Spray Booth	
VOC	For booths with < 1,170 lbs/month VOC Emissions (14,040 lb/year) 1. Compliance with applicable AQMD Regulation XI Rules For booths with ≥ 1,170 lbs/month VOC Emissions (14,040 lb/year) 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 Compliant Materials (< 50 grams of VOC per liter of material); OR 3. Use of low-VOC materials resulting in an equivalent emission reduction For fully enclosed down-draft type booths, with < 667 lbs/month (8,004 lb/year) VOC Emissions 1. Compliance with applicable AQMD Regulation XI Rules For fully enclosed down-draft type booths, with ≥ 22 lbs/day (8,030 lb/year) 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 Compliant Materials (< 50 grams of VOC per liter of material); OR Use of low-VOC materials resulting in an equivalent emission reduction
NOx	For booths with make-up air unit or a heater Compliance with Rule 1147 (2-5-2021)
SOx	No standard
PM10	Dry filters or water wash
PM2.5	No Standard
CO	No standard

For BACT comparison purposes, daily and monthly thresholds have been converted to annual equivalents based on 365 days/year and 12 months/year.

T-BACT

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

RULE REQUIREMENTS:

Reg XI, Rule 1136 – Wood Products Coatings (Amended 6/14/1996)

A person or facility shall not apply coatings to wood 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 spray
B. Flow coat
C. Dip Coat
D. High-volume, low-pressure (HVLP) spray
E. Paint brush
F. Hand roller
G. Roll coater
H. Other coating application methods as are demonstrated to the Executive Officer to be capable of achieving at least 65 % transfer efficiency, and for which written approval of the Executive officer has been obtained

An operator shall not apply **any coating to a wood product** that exceeds the applicable limit specified below:

Coating Category (SCAQMD Rule 1136 Definition)	**Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter, (lb/gal), [lbs-VOC/lbs-solid)]**
Clear Sealers	275 (2.3) [0.36]
Clear topcoat	275 (2.3) [0.35]
Pigmented primers, sealers, & topcoats	275 (2.3) [0.21]
Pigmented topcoats	275 (2.3) [0.25]
Barrier coat – plastic components	275 (2.3) [0.28]
Composite wood edge filler	275 (2.3) [0.31]
Extreme performance coatings	275 (2.3) [0.33]
Fillers	275 (2.3) [0.18]
High-solid stains	350 (2.9) [0.42]
Inks	500 (4.2) [0.96]
Mold-seal coatings	750 (6.3) [4.2]
Multi-colored coatings	275 (2.3) [0.33]

Coating Category (SCAQMD Rule 1136 Definition)	**Maximum Allowable VOC Content grams/liter (lb/gal)**
Low-solid barrier coat – plastic components	120 (1.00)
Low-solid Stains, Toners, and Washcoats	120 (1.00)

A person shall not use a stripper on wood products unless:

- It contains 350 grams of VOC per liter of material; or
- The VOC composite partial vapor pressure is 2 mm Hg (0.04 psia) or less at 20°C (68°F)

Reg XI, Rule 1132 – Further Control of VOC Emissions from High-Emitting Spray Booth Facilities (Last amended 5/5/2006)
This rule applies to any spray both facilities, except petroleum industry facilities, that uses VOC-containing materials that amount to more than 40,000 pounds (20 tons) per year of VOC emissions in any emission inventory year beginning in 1999.

Standards
A person shall not operate any spray booth facility subject to this rule, unless the VOC emissions from any equipment, activity or operation that applies, or is required by any District rule, regulation or permit to apply, VOC-containing materials in a spray booth are reduced through the use of the following:

(1) An emission control system that has an overall efficiency of at least 65 percent by weight; or
(2) VOC-containing materials that have a VOC content at least 65 percent lower than any applicable rule limit in effect as of January 19, 2001; or
(3) A combination of methods specified in paragraphs (c)(1) and (c)(2), which when individually applied do not meet the specified reduction

RULE REQUIREMENTS:

Reg XI, Rule 1147 – NOx Reductions from Miscellaneous Sources
(Last amended 5/6/2022)
This rule applies to ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, soil and water remediation units and other combustion equipment with nitrogen oxide emissions that require a District permit and are not specifically required to comply with a nitrogen oxide emission limit by other District Regulation XI rules.

However, Reg II, Rule 219 exempts combustion equipment firing natural gas, for which the maximum heat input is 2,000,000 Btu/hr or less. Therefore, in practice, the below standards only apply to booth heaters with a heat input greater than 2,000,000 Btu/hr.

Equipment Category	**NOx Emission Limit PPM @ 3% O_2, dry or pound/MMBtu heat input for ≤ 2.0 MMBtu/hr**	
	Process Temperature	
	< 1,200 °F	**≥ 1,200 °F**
Other Unit or Process Temperature	30 ppm or 0.036 lb/MMBtu	60 ppm or 0.073 lb/MMBtu

CO limit for all units is 1,000 ppmv at 3% O_2.

San Joaquin Valley APCD

BACT
Source: SJVUAPCD BACT Guideline

SJVAPCD does not have an active BACT guideline for this source category. Guideline 4.4.1 for Wood Products Coating Operation – Non-Continuous Batch coating has been rescinded (5/11/22).

RULE REQUIREMENTS:
Rule 4606 – Wood Products and Flat Wood Paneling Products Coating Operations (Amended 10/16/2008)

An operator shall not apply coatings to wood 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. 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.
C. Hand roller
D. Flow coat
E. Roll coater
F. Dip coat
G. Paint brush
H. Detailing or touch-up guns; 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 6.6. Prior written approval from the APCO shall be obtained for each alternative method used.

An operator shall not apply **any coating to a wood product**, which has a VOC content, as applied, that exceeds the applicable limit specified below:

Coating Category (SJVAPCD Rule 4606 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lb/gal)
Clear Topcoats	275 (2.3)
Filler	275 (2.3)
High-Solids Stain	240 (2.0)
Ink	500 (4.2)
Mold-Seal Coating	750 (6.3)
Multi-Colored Coating	275 (2.3)

Coating Category (SJVAPCD Rule 4606 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lb/gal)
Pigmented Coating	275 (2.3)
Sanding Sealer	275 (2.3)

Coating Category (SJVAPCD Rule 4606 Definition)	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-Solids Stain	120 (1.0)
Stripper	350 (2.9)

An operator shall not apply **any coating to flat wood paneling product**, which has a VOC content, as applied, that exceeds the applicable limit specified below:

Coating Category (SJVAPCD Rule 4606 Definition)	Grams of VOC/liter (pounds of VOC/gallon) of coating, excluding water and exempt compounds, as applied	Grams of VOC/liter (pounds of VOC/gallon) of material, as applied
Printed interior panels made of hardwood plywood, or thin particle board	250 (2.1)	350 (2.9)
Natural finish hardwood plywood panels		
Class II finishes on hardwood panels	250 (2.1)	350 (2.9)
Tileboard		
Exterior siding		

An operator shall not use a strippable booth coating with a VOC content in excess of 450 g/l (3.8 lb/gal) as applied, excluding water and exempt compounds.

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

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

San Diego County APCD

BACT
Source: NSR Requirements for BACT, page 55 (Revised Nov. 2023)

Wood Products Coating (<10 gal/day)	
VOC	Use of water-based coatings when compatible with the operation and compliance with all other provisions of Rule 67.11, Wood Products Coating Operations for the rest of the operation
NOx	No standard
SOx	No standard
PM10	Spray booth equipped with overspray filters
PM2.5	Spray booth equipped with overspray filters
CO	No standard

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

RULE REQUIREMENTS:
Regulation 4, Rule 67.11 – Wood Products Coating Operations (Amended 6/7/2012 and made Effective 6/27/2013)

No coatings shall be applied unless one of the following coating application methods is used:
A. Hand application method
B. Dip coat
C. Roll coat
D. Flow coat
E. Electronic spray
F. High-volume low-pressure (HVLP) spray. Facilities using an HVLP spray gun shall have available on site pressure gauges in proper operating condition to measure the air cap pressure or have available manufacturer's technical information regarding the correlation between the handle air inlet pressure and the air cap pressure. If the correlation option is used to demonstrate compliance, a handle air inlet pressure gauge will be required on site in proper operating condition to measure the handle air inlet pressure; or
G. Other coating application methods that are demonstrated to have a transfer efficiency at least equal to one of the above application methods, and which are used in such a manner that the operating parameters under which they were demonstrated to achieve such transfer efficiency are permanent features of the method. Such coating application methods shall be approved in writing by the Air Pollution Control Officer prior to use.

A person shall not apply any coating to a **new wood product** 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:

Coating Category (SDCAPCD Rule 67.11 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lb/gal)
Clear Topcoats	275 (2.3)
Conversion Varnish	550 (4.6)
Filler	275 (2.3)
High-solid stain	350 (2.9)
Inks	500 (4.2)
Medium Density Fiberboard (MDF) Coatings	550 (4.6)
Multi-colored Coating	275 (2.3)
Pigmented Coating	275 (2.3)
Sealer	275 (2.3)
Any Other Coatings	275 (2.3)

Coating Category (SDCAPCD Rule 67.11 Definition)	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-Solids coating, Toners, Washcoats	120 (1.00)

A person shall not apply any coating to a **refinished wood product** 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:

Coating Category (SDCAPCD Rule 67.11 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter (lb/gal)
Clear Topcoats	680 (5.7)
Conversion Varnish	550 (4.6)
Filler	500 (4.2)
High-solid stain	700 (5.8)
Inks	500 (4.2)
Medium Density Fiberboard (MDF) Coatings	680 (5.7)
Multi-colored Coating	680 (5.7)
Pigmented Coating	600 (5.0)
Sealer	680 (5.7)
Any Other Coatings	420 (3.5)

A person shall not apply low-solids coatings to a refinished wood product with a VOC content in excess of the following limits expressed as either grams of VOC per liter of material or pounds of VOC per gallon of material, as applied:

Coating Category (SDCAPCD Rule 67.11 Definition)	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-solid barrier coat – plastic components	700 (5.8)
Low-solid Stains, Toners, and Washcoats	480 (4.0)

A person shall not use VOC containing materials for surface preparation unless the material contains 25 grams or less of VOC per liter of material

A person shall not use VOC containing materials for stripping unless:
- The material contains 200 grams or less of VOC per liter of material; or
- The material has a total VOC vapor pressure of 2 mm Hg or less, at 20°C (68°F)

A person shall not use VOC containing materials for the cleaning of coating application equipment used in operations subject to this rule unless:
- The cleaning material contains 25 grams or less of VOC per liter of material; or
- The cleaning material is flushed or rinsed through the application equipment in a contained manner that will minimize evaporation into the atmosphere; or
- The application equipment or equipment parts are cleaned in a container which is open only when being accessed for adding, cleaning, or removing application equipment or when cleaning material is being added, provided the cleaned equipment or equipment parts are drained to the container until dripping ceases; or
- A system is used that totally encloses the component parts being cleaned during the washing, rinsing, and draining processes.

Bay Area AQMD

BACT

Source: BAAQMD BACT Guideline
Document #161.8.1 (9/13/00)

Spray Booths – Coating of Wood Products	
VOC	1. Coatings with VOC content less than that required by Reg. 8, Rule 32, and emissions controlled to overall capture/destruction efficiency ≥ 90% by weight (Technologically Feasible); or 2. Coatings with VOC content less than that required by Reg. 8, Rule 32 (Achieved in Practice)(A)
NOx	No standard
SOx	No standard
PM10	Dry filters or waterwash, properly maintained

Spray Booths – Coating of Wood Products	
PM2.5	No standard
CO	No standard

(A) Typical technology to meet this BACT is use of coatings with very low VOC contents (such as waterborne coatings, higher solids coatings, UV-cured coatings, polyester or polyurethane coatings, higher solids nitrocellulose lacquers, and solvent-substituted coatings).

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

RULE REQUIREMENTS:
BAAQMD Regulation 8, Rule 32 – Wood Products Coatings (Amended 8/5/2009)

Any person who utilizes spray application equipment to apply coatings to wood products shall use one or more of the following application methods:
A. Airless spray
B. Air assisted airless spray
C. High Volume Low Pressure (HVLP) Spray
D. Electrostatic air spray
E. Detailing or Touch-up Guns
F. Other coating application methods demonstrated to the APCO to be capable of achieving at least 65% transfer efficiency as determined by the test method in 8-32-607, and for which written approval by the APCO has been obtained.

No person shall apply to any **general wood product**, any 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 gram of solids, as applied (after thinning), unless emissions to the atmosphere are controlled to an equivalent level by air pollution abatement equipment with an abatement device efficiency of at least 85% that meets the requirements of Regulation 2, Rule 1.

Coating Category (BAAQMD Reg. 8 Rule 32 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter, (lb/gal), [g-VOC/g-solid)]
Clear Sealer	275 (2.3) [0.36]
Clear Topcoat	275 (2.3) [0.35]
Sanding Sealer	See clear or pigmented sealers
Pigmented Coating	See pigmented sealers or topcoats
Pigmented Primer, Sealer, And Undercoater	275 (2.3) [0.21]
Pigmented Topcoat	275 (2.3) [0.25]
High Solid Stain	350 (2.9) [0.42]
Filler	275 (2.3) [0.18]

Coating Category (BAAQMD Reg. 8 Rule 32 Definition)	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-solid stain(A)	120 (1.0)
Low-solid Stains, Toners, and Washcoats	120 (1.0)

(A) Low-Solids Coatings VOC content is calculated including water and exempt compounds as set forth in Section 8-32-604. High-Solids Coatings VOC content is calculated excluding water and exempt compounds set forth in Section 8-32-605 and 8-32-606.

No person shall apply to any **wood furniture, custom cabinetry or custom architectural millwork**, any 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 gram of solids, as applied (after thinning), unless emissions to the atmosphere are controlled to an equivalent level by air pollution abatement equipment with an abatement device efficiency of at least 85% that meets the requirements of Regulation 2, Rule 1.

Coating Category (BAAQMD Reg. 8 Rule 32 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter, (lb/gal), [g-VOC/g-solid)]
Clear Sealer	275 (2.3) [0.36]
Clear Topcoat	275 (2.3) [0.35]
Single Application Conversion Varnish(A)	550 (4.6) [0.36]
Sanding Sealer	See clear or pigmented sealers
Pigmented Coating	See pigmented sealers or topcoats
Pigmented Primer, Sealer, And Undercoater	275 (2.3) [0.21]
Pigmented Topcoat	275 (2.3) [0.25]
High Solid Stain	350 (2.9) [0.42]
Filler	275 (2.3) [0.18]

(A) If more than one coating application is used, each sealer application must comply with the sealer VOC limits, and each topcoat application must comply with the topcoat VOC limits.

Coating Category (BAAQMD Reg. 8 Rule 32 Definition)	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-solid stain(A)	120 (1.0)
Toner and Wash-coat(A)	120 (1.0)

(A) Low-Solids Coatings VOC content is calculated including water and exempt compounds as set forth in Section 8-32-604. High-Solids Coatings VOC content is calculated excluding water and exempt compounds set forth in Section 8-32-605 and 8-32-606.

No person shall apply to any **custom furniture**, any 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 gram of solids, as applied (after thinning), unless emissions to the atmosphere are controlled to an equivalent level by air pollution abatement equipment with an abatement device efficiency of at least 85% that meets the requirements of Regulation 2,

Rule 1.

Coating Category (BAAQMD Reg. 8 Rule 32 Definition)	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter, (lb/gal), [g-VOC/g-solid)]
Clear Sealer	275 (2.3) [0.36]
Clear Topcoat	550 (4.6) [0.36]
Sanding Sealer	See clear or pigmented sealers
Pigmented Coating	See pigmented sealers or topcoats
Pigmented Primer, Sealer, And Undercoater	275 (2.3) [0.21]
Pigmented Topcoat	275 (2.3) [0.25]
Multi-colored Coating	275 (2.3) [0.33]
High Solid Stain	350 (2.9) [0.42]
Filler	275 (2.3) [0.18]

Coating Category (BAAQMD Reg. 8 Rule 32 Definition)	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-solid stain(A)	120 (1.0)
Toner and Wash-coat(A)	120 (1.0)

(A) Low-Solids Coatings VOC content is calculated including water and exempt compounds as set forth in Section 8-32-604. High-Solids Coatings VOC content is calculated excluding water and exempt compounds set forth in Section 8-32-605 and 8-32-606.

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/or cleanup in connection with coating of wood products, and any person mixing, using or disposing of coating, adhesive or stripper containing organic solvent in connection with coating of wood products shall comply with the following requirements:

A. The person 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 store fresh or spent solvent in closed containers.
C. The person shall not use organic compounds for the cleanup of mixing or storage equipment unless for collecting the cleaning compounds and minimizing their evaporation to the atmosphere is used.
D. The person shall not use organic solvent for the cleanup of spray equipment, including coating lines, with VOC content in excess of 25 g/l (0.21 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.
E. The person shall not leave containers of stripper, coating, adhesive, catalyst, solvent or thinner open to the atmosphere when not in use.

No person shall use a solvent with a VOC content that exceeds 25 g/l (0.21 lbs/gal), as applied, for surface preparation in any operation subject to this Rule unless emissions to the atmosphere are controlled to an equivalent level by an approved emission control system with an overall abatement efficient of at least 85%.

Summary of Achieved in Practice Control Technologies

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

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
VOC	<u>For booths without add-on controls</u> 1. 7,404 lb VOC/year limit, 40,000 lb VOC/year facility limit, HVLP spray or equivalent application equipment, compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent, and stripper limits – [SMAQMD] 2. Compliance with SCAQMD Regulation XI, Rule 1136 – [SCAQMD] 3. Compliance with SDCAPCD Rule 67.11 – [SDCAPCD] 4. Compliance with BAAQMD Regulation 8, Rule 32 – [BAAQMD] 5. Compliance with SJVAPCD Rule 4606 – [SJVAPCD] 6. Dry filters, proper spraying techniques and the use of high solids coating whenever possible – [VA-0300] <u>For booths with add-on controls</u> 1a. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent, and stripper limits, and VOC control system with overall capture/destruction efficiency ≥ 90%; 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 reduction [SMAQMD] 2. Complying with VOC content and transfer efficiency required by BAAQMD Reg. 8, Rule 32, and emissions controlled to overall capture/destruction efficiency ≥ 90% [BAAQMD] 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] 4. HVLP spray equipment, air assisted airless spray equipment or equipment with equivalent or better transfer efficiency; work practices, oxidizer – [IL-0122]
NOx	1. For booth heaters: < 1,200 °F: **3**0 ppm or 0.036 lb/MMBtu ≥ 1,200 °F: **6**0 ppm or 0.073 lb/MMBtu. [SCAQMD, SMAQMD] 2. No Standard – [SDCAPCD, BAAQMD, SJVAPCD, US EPA]
SOx	1. No Standard – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]
PM10	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. Dry filters or waterwash, properly maintained – [SCAQMD, BAAQMD]

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
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 ppm corrected to 3% O_2 – [SMAQMD] 2. For heaters: 1,000 ppm corrected to 3% O_2 – [SCAQMD]
Organic HAP/VHAP (T-BACT)	<u>For booths without add-on controls</u> 1. HVLP spray or equivalent application equipment 2. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits. For major sources, emission limits of Tables 1 & 2 to Subpart QQQQ of Part 63 and emission limits of Table 3 to Subpart JJ of Part 63, whichever is more stringent. [SMAQMD]
Organic HAP/VHAP (T-BACT)	<u>For booths with add-on controls</u> 1. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits. For major sources emission limits of Tables 1 & 2 to Subpart QQQQ of Part 63 and emission limits of Table 3 to Subpart JJ of Part 63, whichever is more stringent. With 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. [SMAQMD]
Inorganic HAP (T-BACT)	Compliance with 40 CFR 63 Subpart HHHHHH for metals – Spray booth filter system with 98% capture efficiency of paint overspray, HVLP spray equipment, electrostatic application, airless spray gun, air-assisted airless spray gun, or an equivalent technology [US EPA]

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

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 without add-on Control < 7,404 lb/year VOC Emissions</u> 1. HVLP spray or equivalent application equipment 2. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits <u>For booths with add-on Control ≥ 7,404 lb/year VOC Emissions</u> 1. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC 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	SMAQMD

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
NOx	For booth heater: < 1200 °F: 30 ppm or 0.036 lb/MMBtu corrected to 3% O_2 ≥ 1200 °F: 60 ppm or 0.073 lb/MMBtu corrected to 3% O_2	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 filters or waterwash 2. HVLP spray or equivalent application equipment	SMAQMD
CO	For heaters: 400 ppm corrected to 3% O_2	SMAQMD
Organic HAP/VHAP	For booths without add-on controls 1. HVLP spray or equivalent application equipment 2. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits. For major sources, emission limits of Tables 1 & 2 to Subpart QQQQ of Part 63 and emission limits of Table 3 to Subpart JJ of Part 63, whichever is more stringent. For booths with add-on controls 1. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits. For major sources emission limits of Tables 1 & 2 to Subpart QQQQ of Part 63 and emission limits of Table 3 to Subpart JJ of Part 63, whichever is more stringent. With 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.	SMAQMD
Inorganic HAP	Compliance with 40 CFR 63 Subpart HHHHHH for metals – Spray booth filter system with 98% capture efficiency of paint overspray, HVLP spray equipment, electrostatic application, airless spray gun, air-assisted airless spray gun, or an equivalent technology	USEPA

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

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

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	25,300
NO_X	35,300
PM10	11,400
SO_X	18,300
CO	300

Cost Effectiveness Analysis Summary

This BACT determination will perform a cost effectiveness analysis in accordance with the updated EPA OAQPS Air Pollution Control Cost Manual. The electricity (11.24 cents/kWh) and natural gas (9.75 dollars/1,000 cubic feet) rates were based on an industrial application as approved by the District. The life of the equipment was based on the EPA cost manual recommendation. The interest rate was based on the previous 6-month average interest rate on United States Treasury Securities (based on the life of the equipment) and addition of two percentage points and rounding up to the next higher integer rate. The labor (Occupation Code 51-8099: Plant and System Operators - Other) and maintenance (Occupation Code 49-

2094: electrical and electronics commercial and industrial equipment repairers) rates were based on data from the Bureau of Labor Statistics.

A. Carbon Adsorber:

As shown in Attachment B, the cost effectiveness for the add on carbon adsorber system to control VOC was calculated to be **$25,392.94/ton**. The following basic parameters were used in the analysis.

Equipment Life = 15 years

Total Capital Investment = $366,297

Direct Annual Cost = $13,274 per year

Indirect Annual Cost = $59,395 per year

Total Annual Cost = $70,828 per year

VOC Removed = 2.789 tons per year

Cost of VOC Removal = $25,392.94 per ton reduced

A detailed calculation of the cost effectiveness for VOC removal with a carbon absorber is shown in Attachment B. **Uncontrolled** VOC emissions of **6,198 lb/year** or greater is the cost-effective threshold for control equipment using carbon absorption control technology.

B. Thermal Oxidizer:

Equipment Life = 20 years

Direct Cost = $1,034,666

Direct Annual Cost = $77,753 per year

Indirect Annual Cost = $183,111 per year

Total Annual Cost = $260,864 per year

VOC Removed = 10.256 tons per year

Cost of VOC Removal = $25,436 per ton reduced

A detailed calculation of the cost effectiveness for VOC removal with a thermal oxidizer is shown in Attachment B. **Uncontrolled** VOC emissions of **20,824 lb/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 6,198 lb per year or greater must be reached in order for the carbon adsorption control option to be cost effective. Uncontrolled VOC emission level of 20,824 lb per year or greater must be reached in order for a thermal oxidizer to be cost effective. The emissions level for the cost effectiveness of controls is based on the District cost effective limit for VOC of $25,300 per ton controlled.

With EPA's cost data, the highest allowable uncontrolled emission rate to not require add-on control devices will be updated to 6,198 lb/year based on the cost of carbon adsorption.

C. SELECTION OF BACT AND T-BACT:

Based on the above analysis, BACT for VOC, NOx, SOx, PM10, PM2.5 and CO will be the most stringent standards of what is currently achieved in practice. Add-on control thresholds of 6,198 lbs VOC/year per unit and 40,000 lbs VOC/year per facility are based on the carbon adsorber cost effectiveness analysis and SCAQMD's Rule 1132 40,000 lb per year threshold for add-on control, respectively.

T-BACT for Wood Product Coatings has been separated into T-BACT #347 for units without add-on control and T-BACT #347 for units with add-on control.

BACT #347 – Wood Products Coatings < 6,198 lbs VOC/year and facilities ≤ 40,000 lbs VOC/year		
Pollutant	**Standard**	**Source**
VOC	1. < 6,198 lb VOC/year limit 2. HVLP spray or equivalent application equipment 3. Compliance with SMAQMD Rule 463(A) and BACT coating, solvent, and stripper VOC limits (see Tables 1-3 below).	SMAQMD, SCAQMD, SJVAPD
NOx	For booth heaters: < 1,200 °F: 30 ppm @ 3% O_2 or 0.036 lb/MMBtu ≥ 1,200 °F: 60 ppm @ 3% O_2 or 0.073 lb/MMBtu	SMAQMD, SCAQMD
SOx	No standard	SMAQMD
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 filters or waterwash 2. HVLP spray or equivalent application equipment	SMAQMD
CO	For heaters: 400 ppmvd @ 3% O2 or 0.30 lb/MMBtu	SMAQMD

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

T-BACT #347 – Wood Products Coatings < 6,198 lbs VOC/year and facilities ≤ 40,000 lbs VOC/year		
Pollutant	**Standard**	**Source**
Organic HAP/VHAP (T-BACT)	1. HVLP spray or equivalent application equipment 2. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits. For major sources, emission limits of Tables 1 & 2 to Subpart QQQQ of Part 63 and emission limits of Table 3 to Subpart JJ of Part 63, whichever is more stringent.	SMAQMD

T-BACT #347 – Wood Products Coatings < 6,198 lbs VOC/year and facilities ≤ 40,000 lbs VOC/year		
Pollutant	**Standard**	**Source**
Inorganic HAP (T-BACT)	Compliance with 40 CFR 63 Subpart HHHHHH for metals – Spray booth filter system with 98% capture efficiency of paint overspray, HVLP spray equipment, electrostatic application, airless spray gun, air-assisted airless spray gun, or an equivalent technology	US EPA

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

BACT #348 – Wood Products Coatings ≥ 6,198 lb VOC/year and facilities > 40,000 lbs VOC/year		
Pollutant	**Standard**	**Source**
VOC	1. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent, and stripper VOC limits, and VOC control system with overall capture/destruction efficiency ≥ 90%; OR 2. Use of Super Clean Materials (< 5% VOC by weight); OR 3. Use of low-VOC materials resulting in an equivalent emission reduction as option #1 and option #2.	SMAQMD
NOx	For booth heaters: < 1,200 °F: 30 ppm @ 3% O_2 or 0.036 lb/MMBtu ≥ 1,200 °F: 60 ppm @ 3% O_2 or 0.073 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% O_2 or 0.30 lb/MMBtu	SMAQMD

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

T-BACT #348 – Wood Products Coatings ≥ 6,198 lb VOC/year and facilities > 40,000 lbs VOC/year		
Pollutant	**Standard**	**Source**
Organic HAP/VHAP (T-BACT)	1. Compliance with SMAQMD Rule 463(A) and SMAQMD BACT coating, solvent cleaning, and stripping VOC limits. For major sources emission limits of Tables 1 & 2 to Subpart QQQQ of Part 63 and emission limits of Table 3 to Subpart JJ of Part 63, whichever is more stringent. With 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.	SMAQMD, SCAQMD, SJVAPCD, BAAQMD, US EPA (NV-0049)
Inorganic HAP (T-BACT)	Compliance with 40 CFR 63 Subpart HHHHHH for metals – Spray booth filter system with 98% capture efficiency of paint overspray, HVLP spray equipment, electrostatic application, airless spray gun, air-assisted airless spray gun, or an equivalent technology	US EPA

(A) Compliance with SMAQMD Rule 463 includes the use of exemptions of this rule. BACT VOC content limits are exempt if the operation qualifies for VOC content limit exemptions of SMAQMD Rule 463.

An operator shall not apply **any coating to a wood product** that exceeds the applicable limit specified below:

Table 1: BACT Wood Coating VOC Limits(A)(B)

Coating Category	Maximum Allowable VOC Content Excluding Water and Exempt Compounds grams/liter, (lb/gal), [lbs-VOC/lbs-solid)]
Clear Sealers	275 (2.3) [0.36]
Clear topcoat	275 (2.3) [0.35]
Pigmented primers, sealers, & topcoats	275 (2.3) [0.21]
Pigmented topcoats	275 (2.3) [0.25]
Barrier coat – plastic components	275 (2.3) [0.28]
Composite wood edge filler	275 (2.3) [0.31]
Extreme performance coatings	275 (2.3) [0.33]
Fillers	275 (2.3) [0.18]
High-solid stains	350 (2.9) [0.42]
Inks	500 (4.2) [0.96]
Mold-seal coatings	750 (6.3) [4.2]
Multi-colored coatings	275 (2.3) [0.33]

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1136.
(B) Conversion Varnishes per SMAQMD Rule 463 would fall under Clear or Pigmented Sealer/Topcoat and/or Extreme Performance Coatings.

Table 1: BACT Wood Coating VOC Limits (continued)[(A)]

Coating Category	Maximum Allowable VOC Content grams/liter (lb/gal)
Low-solid barrier coat – plastic components	120 (1.00)
Low-solid Stains, Toners, and Washcoats	120 (1.00)

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1136.

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

Table 2: BACT Solvent Cleaning VOC Limits[(A)]

Type of Solvent Cleaning Operation	VOC Content Limit grams of VOC/liter of material (lb/gal)
Product cleaning during manufacturing process or surface preparation for coating, adhesive, or ink application	25 (0.21)
Repair and maintenance cleaning	25 (0.21)
Cleaning of adhesive and coating application equipment	25 (0.21)
Cleaning of polyester resin application equipment	25 (0.21)

(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 one of the following requirements:

Table 3: BACT Stripper VOC Limits[(A)]

Stripper Requirements	
VOC Limit	≤ 350 grams VOC/liter; OR
VOC vapor pressure limit	Total vapor pressure of 2 mm HG or less, at 20°C (68°F)

(A) VOC limits are based on SCAQMD Regulation XI, Rule 1136.

APPROVED BY: *Brian F Krebs* **DATE:** 06-20-2024

Attachment A

Review of BACT Determinations published by EPA

List of BACT determinations published in EPA's RACT/BACT/LAER Clearinghouse (RBLC) for Wood Products/Furniture Surface Coating (Process Code 41.025):

Wood Products/Furniture Surface Coating (Process Code 41.025)(A)							
RBLC#	**Permit Date(A)**	**Throughput**	**Process/ Equipment**	**Pollutant**	**Standard**	**Control Technology**	**Case-By-Case Basis**
IN-0280	12/6/2017	1500 units/hr	Top Coating Cabinet Operation	VOC	4.5 lb/gal as applied and add-on control with 83% overall control efficiency	RTO	BACT-PSD
IL-0122	12/25/16	N/A	Wood Furniture Coating	VOC	98% destruction efficiency	HVLP spray equipment, air assisted airless spray equipment or equipment with equivalent or better transfer efficiency; work practices; oxidizer with 98% destruction efficiency	BACT-PSD
VA-0300	12/15/2006	41.025	Spray Booths for Cabinets	VOC	N/A	Proper spraying techniques and the use of high solids coating whenever possible	BACT-PSD
				PM	N/A	Dry filters, proper spray techniques, and work practice standards of 40 CFR Subpart JJ. Each filter shall be equipped with a device to continuously measure the differential pressure drop across the filter.	BACT-PSD
				FPM10(D)	N/A		BACT-PSD

(A) Due to the large number of entries only determinations made (based on Permit Date) entered since 01/01/2006 are included in the above table.

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

Attachment B

Cost Effectiveness Determination for Carbon Adsorbers and Thermal Oxidizer