SMAQMD BACT CLEARINGHOUSE

CATEGORY Type: **COATING - PLASTIC**

BACT Category: Minor Source

BACT Determination Number: 304	**BACT Determination Date:** 7/28/2022

Equipment Information

Permit Number: 27221

EXPIRED

Equipment Description: COATING LINE

Unit Size/Rating/Capacity: ≤ 7,404 lbs VOC/year – Excluding Pleasure Craft and Business Machine Coatin

Equipment Location:

151 BLUE RAVINE RD FOLSOM, CA

BACT Determination Information

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

ROCs	**Standard:**	Compliance with District Rule 468, except where noted in footnote (A)
	Technology Description:	See BACT Document for full details
	Basis:	Achieved in Practice
NOx	**Standard:**	For heaters, low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu
	Technology Description:	
	Basis:	Achieved in Practice
SOx	**Standard:**	No standard
	Technology Description:	
	Basis:	
PM10	**Standard:**	1.Enclosed paint booth with dry filters or water wash
	Technology Description:	See BACT Document for full details
	Basis:	Achieved in Practice
PM2.5	**Standard:**	1.Enclosed paint booth with dry filters or water wash
	Technology Description:	See BACT Document for full details
	Basis:	Achieved in Practice
CO	**Standard:**	
	Technology Description:	
	Basis:	
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: (A)The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in the SMAQMD Rule 468): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L. SMAQMD Rule 468 exemptions also apply (including Small Source exemption, Section 111, for

SMAQMD BACT CLEARINGHOUSE

CATEGORY Type: **COATING - PLASTIC**

BACT Category: Minor Source

BACT Determination Number: 305	**BACT Determination Date:** 7/28/2022

Equipment Information

Permit Number: N/A -- Generic BACT Determination

EXPIRED

Equipment Description: COATING LINE

Unit Size/Rating/Capacity: > 7,404 pounds per year – Excluding Pleasure Craft and Business Machine Co

Equipment Location:

BACT Determination Information

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

ROCs	**Standard:**	1.Compliance with District Rule 468, except where noted in footnote (A) and VOC control system with > 90% overall efficiency, or
	Technology Description:	See BACT Document for full details
	Basis:	Cost Effective
NOx	**Standard:**	For heaters, low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu
	Technology Description:	
	Basis:	Achieved in Practice
SOx	**Standard:**	
	Technology Description:	
	Basis:	
PM10	**Standard:**	1.Enclosed paint booth with dry filters or water wash
	Technology Description:	See BACT Document for full details
	Basis:	Achieved in Practice
PM2.5	**Standard:**	1.Enclosed paint booth with dry filters or water wash
	Technology Description:	See BACT Document for full details
	Basis:	Achieved in Practice
CO	**Standard:**	
	Technology Description:	
	Basis:	
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: (A)The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in the SMAQMD Rule 468): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L. SMAQMD Rule 468 exemptions also apply (including Small Source exemption, Section 111, for

777 12th Street, Ste. 300

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

EXPIRED

DETERMINATION NO.:	304 & 305
DATE:	February 28, 2022
ENGINEER:	Jeffrey Quok

Category/General Equip Description:	Plastic Parts Coating Operation – Excluding Pleasure Craft and Business Machine Coating Operations
Equipment Specific Description:	Paint Spray Booth
Equipment Size/Rating:	≤ 7,404 lbs VOC/year (BACT #304) >7,404 lbs VOC/year (BACT #305)
Previous BACT Det. No.:	188 & 189

This BACT determination will be made for plastic parts coating operations, except those involved in pleasure craft and business machine coating operations. Pleasure craft and business machine coating operations will be covered under a separate BACT. This BACT will apply to all plastic parts coating operations that are subject to Rule 468.

BACT/T-BACT ANALYSIS

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

The following control technologies are currently employed as BACT/T-BACT for plastic parts coating operations by the following agencies and air pollution control districts:

US EPA

BACT

Source: EPA RACT/BACT/LAER Clearinghouse
RBLC ID: IN-0154 (1/13/2013) & IN-0267 (5/18/2017)

Plastic Parts & Products Surface Coating (Process Code 41.016)	
VOC	1. For spray booths with an exhaust flow rate greater than or equal 30,000 acfm, use an air pollution control device when it is cost-effective; otherwise, use low VOC materials achieved in practice and high transfer efficiency equipment. [95% overall control] 2. For spray booths with an exhaust flow rate less than 30,000 acfm, use low VOC materials achieved in practice and high-transfer efficiency equipment. [4.35 lb/gallon weighted daily average ($DAVG_{ww}$)](A)

Plastic Parts & Products Surface Coating (Process Code 41.016)	
NOx	No standard
SOx	No standard
PM10	Use of HVLP spray guns, electrostatics spray guns, and electrostatic rotary atomizers for spray coating operations. Good work practices.
PM2.5	No standard
CO	No standard

(A) Calculated as follows:

DAVGvw = $\sum_{i=1}^{n}(\text{Ai x Bi})/\text{C}$

Where:
A = daily gallons of each coating used (minus water and exempt solvents)
B = lbs. VOC/gal. coating (minus water and exempt solvents)
C = total daily gallon coatings used (minus water and exempt solvents)
N = number of all coatings used

T-BACT

There are no T-BACT standards published in the clearinghouse for this category, but the NESHAP standards (see 40 CFR, Part 63 standards below) represent Maximum Achievable Control Technology (MACT) or Generally Available Control Technology (GACT) for HAPs and can therefore be considered T-BACT.

RULE REQUIREMENTS

Control Techniques Guidelines for Miscellaneous Metal Parts and Plastic Parts Coatings (EPA-453/R- 08-003)

Although not a promulgated rule, this guideline identifies Reasonably Available Control Measures and Reasonably Available Control Technology. These guidelines establish achieved in practice control measures that are used by state and local agencies when developing rules for their State Implementation Plans and are used by U.S. EPA when approving those rules. District Rule 468 (Adopted 03/22/2018) was adopted to meet these guidelines.

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 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 Resources Board (CARB)

BACT

Source: CARB BACT Clearinghouse
CARB BACT Guidelines Search

There are no applicable BACT determinations posted on CARB's BACT clearinghouse.

The CARB BACT Guidelines search contains SJVAPCD BACT Guideline 4.5.4. See the SJVAPCD BACT summary for full BACT review.

T-BACT

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

RULE REQUIREMENTS

There are no statewide rule requirements for coating of plastic parts.

Sacramento Metropolitan AQMD

BACT
Source: SMAQMD BACT Clearinghouse

BACT #188: Plastic Parts Coating Operation - Excluding Pleasure Craft and Business Machine Coating Operations ≤ 4,700 pounds per year	
VOC	Compliance with District Rule 468, except where noted in footnote (A)
NOx	No standard
SOx	No standard
PM10	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent
PM2.5	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent
CO	No standard

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

BACT #189: Plastic Parts Coating Operation - Excluding Pleasure Craft and Business Machine Coating Operations > 4,700 pounds per year	
VOC	1. Compliance with District Rule 468, except where noted in footnote (A) **and** VOC control system with ≥ 90% overall efficiency, or 2. Use of low-VOC materials resulting in an equivalent emission reduction.
NOx	No standard
SOx	No standard
PM10	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent
PM2.5	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent
CO	No standard

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

T-BACT
SMAQMD BACT Clearinghouse

BACT #188: Plastic Parts Coating Operation - Excluding Pleasure Craft and Business Machine Coating Operations ≤ 4,700 pounds per year	
Organic HAP/VHAP & Inorganic HAP	Compliance with NESHAP HHHHHH where applicable.

BACT #189: Plastic Parts Coating Operation - Excluding Pleasure Craft and Business Machine Coating Operations > 4,700 pounds per year	
Organic HAP/VHAP & Inorganic HAP	Compliance with NESHAP HHHHHH where applicable.

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

Rule 419 – NOx from Miscellaneous Combustion Units (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	
Oven, Dehydrator, Dryer, Heater, or Kiln	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 (2/5/2021)

Spray Booth – Other Types	
VOC	VOC Emissions < 14,040 lb/year (1,170 lb/month) (A) A. Compliance with SCAMQD Rule 1145 VOC Emissions ≥ 14,040 lb/year (1,170 lb/month) (A) A. Compliance with SCAQMD Rule 1145, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, or B. Use of Super Compliant Materials (< 5% VOC by weight): or C. Use of Low-VOC Materials Resulting in an Equivalent Emission Reduction
NOx	If booth has a make-up air unit or a heater; compliance with Rule 1147
SOx	No standard
PM10	Dry filters or water wash
PM2.5	No Standard
CO	No standard

(A) Monthly emissions have been annualized to be consistent with District methodology for determining cost effectiveness for add-on control (Cost per ton per year of emissions reduced).

T-BACT

The above BACT determination did not address T-BACT.

RULE REQUIREMENTS

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

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

Reg XI, Rule 1147 – NOx Reductions from Miscellaneous Sources
(Last amended 7/7/2017)
This rule applies to ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, soil and water remediation units and other combustion equipment with nitrogen oxide emissions that require a District permit and are not specifically required to comply with a nitrogen oxide emission limit by other District Regulation XI rules.

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

San Joaquin Valley APCD

BACT
Source: SJVAPCD BACT Guideline 4.5.4 (12/16/1999)

Plastic Parts and Products Coating	
VOC	The use of HVLP spray guns, an enclosed gun cleaner, and low-VOC coatings (2.8 lb VOC/gal, as applied, less water and exempt solvents)
NOx	No standard
SOx	No standard
PM10	Enclosed paint booth with dry filters and use of HVLP spray guns
PM2.5	No standard
CO	No standard

*Note: SJVAPCD Rule 4603 was amended to include the coating of plastic parts on 09/17/2009. The current limit for a general one-component coating is 2.3 lb/gal and for a two-component coating is 3.5 lb/gal. BACT Guideline 4.5.4 did not specify if it applied to a one or two component coating.

T-BACT
The above BACT determination did not address T-BACT

RULE REQUIREMENTS:
Rule 4603 – Surface Coating of Metal Parts and Products, Plastic Parts and Products, And Pleasure Crafts (Last amended 09/17/2009)

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

San Diego County APCD

BACT

Source: NSR Requirements for BACT (6/2011) Page 3-13

General Surface Coating < 10 gallons of coating/day	
VOC	Compliance with SDAPCD Rule 66.1 – Miscellaneous Surface Coating Operation and Other Processes Emitting Volatile Organic Compounds
NOx	No standard
SOx	No standard
PM10	Spray booth equipped with overspray filters
PM2.5	No standard
CO	No standard

T-BACT

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

RULE REQUIREMENTS

Regulation 4, Rule 66.1 – Miscellaneous Surface Coating Operations and Other Processes Emitting Volatile Organic Compounds (Last Amended 05/11/2016)

This rule is applicable to all surface coating, solvent cleaning or other operations or processes that may result in emissions of VOCs and are not subject to or exempt from another District Rule. SDAPCD does not have a plastic parts coating rule.

This rule requires the following for Surface Coating Operations:
1. VOC emissions from the operation must be less than 5 tons per year, or
2. VOC emissions are reduced by air pollution control device that meets a capture and control efficiency of at least 85% by weight, or
3. Coatings that meet the following limits:

Coating	VOC Content less water and exempt compounds grams/liter, (lb/gal)	
	Air-dried	**Baked**
General	420 (3.5)	360 (3.0)

This rule requires the following for Surface Preparation and Solvent Cleaning Operations:
A. the total VOC vapor pressure of cleaning material is 8 mm Hg at 20°C (68°F) or less, or
B. the VOC content of cleaning material complies with the following limits expressed as either grams of VOC per liter of material (g/L) or pounds of VOC per gallon of material (lb/gal), as used:

Surface Preparation and Cleaning Solvent	VOC Content as applied grams/liter, (lb/gal)
General	50 (0.42)

Bay Area AQMD

BACT

Source: BAAQMD BACT Guideline 84.1.1 & 84.2.1 (8/30/1991)

Misc. Solvent & Surface Coating Operations: Flow Coater, Dip Tank and Roller Coater	
VOC	VOC Emissions < 13,140 lb/year (< 36 lb/day uncontrolled) (A) Not determined VOC Emissions ≥ 13,140 lb/year (≥ 36 lb/day uncontrolled) (A) Coating with Lower VOC Content than Required by Applicable Rules, and Emissions from Coating Area, Flash Off Area, Drying Area, and Oven Vented to Control Device Achieving ≥ 90% Overall Efficiency
NOx	No standard
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

(A) Daily emissions have been annualized to be consistent with District methodology for determining cost effectiveness for add-on control (Cost per ton per year of emissions reduced).

T-BACT

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

RULE REQUIREMENTS

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

VOC Content of Coatings for Miscellaneous Plastic Parts and Coatings

Coating Category	VOC Content, less water grams/liter, (lb/gal)
General	340 (2.8)
Flexible Coatings	
Flexible Primer	490 (4.1)
Color Topcoat	450 (3.8)
Base Coat/clear coat (combined system)	540 (4.5)

Coating Category	VOC Content, less water grams/liter, (lb/gal)
Specialty Coatings	
Camouflage	420 (3.5)
Conductive	325 (2.7)
Metallic Topcoat	420 (3.5)
Extreme Performance	750 (6.2)
High Gloss	420 (3.5)
Optical	800 (6.7)

Surface Preparation and Cleaning Solvent	VOC Content as applied grams/liter, (lb/gal)
General	50 (0.42)

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

Rules for SMAQMD, SCAQMD, and SJVAPCD were adopted to comply with each District's respective portion of the State Implementation Plan (SIP). Since these rules are based on similar guidelines, a rule comparison has been added under Section A.2. SDAPCD and BAAQMD rule limits were not included in this table since coating categories are not the same. SDAPCD and BAAQMD rule limits can be found in previous analysis above.

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

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

Table 2: VOC Content of Coatings for Transportation Plastic Parts

Coating Category	**VOC Content less water and exempt compounds, grams/liter**			
	SMAQMD Rule 468		**SJVAPCD Rule 4603**	
Exterior Parts	**Air-Dried**	**Baked**	**Air-Dried**	**Baked**
Flexible Primer	580	540	580	540
Non-Flexible Primer	580	420	580	420

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

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

Exemptions:

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

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

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

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

After research plastic coating facilities SMAQMD has found that VOC control systems ≥ 90% overall efficiency haven't been achieved in practice for plastic coating facilities. SMAQMD, SCAQMD, and BAAQMD do not have any plastic coating facilities with VOC control systems ≥ 90% overall efficiency. Therefore, these standards will be removed from the Achieved in Practice Control Technologies and instead be evaluated in the Technologically Feasible and Cost Effective section.

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
$VOC_{Controlled}$	1. VOC Emissions ≥ 256.8 tons/year and Booth ≥ 30,000 acfm (B) [USEPA] A. VOC Control System with ≥ 95% Overall Control Efficiency 2. VOC Emissions ≥ 10,000 lbs/year [SDAPCD] A. VOC emissions are reduced by air pollution control device that meets a capture and control efficiency of at least 85% by weight or B. Compliance with SDAPCD Reg 4, Rule 66.1 VOC limits
$VOC_{Uncontrolled}$	1. Compliance with District Rules and Regulations (including exemptions) (See above discussion and rule comparison) [SMAQMD, SCAQMD, SJVAPCD] 2. Compliance with BAAQMD Rules and Regulations [BAAQMD] 3. Compliance with SDAPCD Rules and Regulations [SDAPCD] 4. 4.3 lb/gallon daily average [USEPA]
NOx	1. For heaters, low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu [SMAQMD, SCAQMD Rule 1147] 2. No Standard – [SCAQMD, SDCAPCD, BAAQMD, SJVAPCD]
SOx	No standard
PM10	1. Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent [SJVAPCD, SCAMQD, SDAPCD] 2. Use of HVLP spray guns, electrostatics spray guns, and electrostatic rotary atomizers for spray coating operations. Good work practices. [USEPA]
PM2.5	1. Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent [SJVAPCD, SCAMQD, SDAPCD]
CO	No standard
Organic HAP/VHAP & Inorganic HAP (T-BACT)	1. Compliance with NESHAP HHHHHH [USEPA]

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

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

USE OF PM10 STANDARD FOR PM2.5

Emissions of PM10 are created during spray application of coatings. Overspray aerosols from these operations are usually controlled by increasing the transfer efficiency of the coating to the substrate and using a spray booth with overspray filters. Since PM2.5 is a subset of PM10, and the technology used to control PM10 also controls PM2.5, the achieved in practice standard for PM10 will also be used for PM2.5.

T-BACT

For plastic parts coatings, toxic emissions may be from either organic HAPs (ethylbenzene, methylene chloride) found in carrier solvents, strippers, and surface prep or clean-up solvents; or from inorganic HAPs found in pigments (cadmium, chromium, lead). Depending on the organic HAP, VOC control technologies, (oxidizer, carbon adsorption), may not be technologically feasible. Additionally, VOC controls are not effective for inorganic metals. The above NESHAPs address both organic and inorganic HAPs and are therefore considered T-BACT for this source category.

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 emitting ≤ 4,700 pounds per year (uncontrolled)</u> 1. Compliance with District Rule 468 (including exemptions), except where noted in footnote (A) <u>For Booths emitting ≥ 10,000 lbs/year</u> 1. VOC emissions are reduced by air pollution control device that meets a capture and control efficiency of at least 85% by weight or 2. Compliance with SDAPCD Reg 4, Rule 66.1 VOC limits	SMAQMD SDAPCD
NOx	For heaters, low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu	SMAQMD, SCAQMD
SOx	No standard	
PM10	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent	SJVAPCD, SCAMQD, SMAQMD, SDAPCD
PM2.5	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent	SJVAPCD, SCAMQD, SMAQMD, SDAPCD
CO	No standard	
Organic HAP/VHAP & Inorganic HAP (T-BACT)	Compliance with NESHAP HHHHHH where applicable.	USEPA, SMAQMD

(A) The following coating categories listed in Rule 468, Table 1, must meet the following standards listed

in SCAQMD Rule 1145 (unless they meet an applicable exemption in the rule): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L. SMAQMD Rule 468 exemptions also apply (including Small Source exemption, Section 111, for stationary sources with total actual emissions less than 2.7 tons of VOC per 12-month rolling period prior to an emission control system.)

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 Alternatives
VOC	1. VOC Emissions > 4,700 lbs/year [SMAQMD] A. Compliance with District Rule 468 (including exemptions), except where noted in footnote (A) **and** VOC control system with ≥ 90% overall efficiency, or B. Use of low-VOC materials resulting in an equivalent emission reduction. 2. VOC Emissions > 13,140 lb/year [BAAQMD] A. Coating with Lower VOC Content than Required by Applicable BAAQMD Rules, and Emissions from Coating Area, Flash Off Area, Drying Area, and Oven Vented to Control Device Achieving ≥ 90% Overall Efficiency 3. VOC Emissions ≥ 14,040 lb/year [SCAQMD] A. Compliance with SCAQMD Rule 1145, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, or B. Use of Super Compliant Materials (< 5% VOC by weight): or C. Use of Low-VOC Materials Resulting in an Equivalent Emission Reduction 4. Carbon Adsorber 5. 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

(A) The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in the rule): General One-

Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L. SMAQMD Rule 468 exemptions also apply (including Small Source exemption, Section 111, for stationary sources with total actual emissions less than 2.7 tons of VOC per 12-month rolling period prior to an emission control system.)

SMAQMD, BAAQMD, and SCAQMD's previous BACT Determinations listed VOC control systems with ≥ 90% overall efficiency as achieved in practice. However, upon further research it was found that SMAQMD, BAAQMD, and SCAQMD have not permitted plastic coating facilities with VOC control systems with ≥ 90% overall efficiency. Therefore, this BACT Determination will consider this standard as technologically feasible. VOC control systems with ≥ 90% overall efficiency will be analyzed by evaluating carbon adsorbers and thermal oxidizers to determine the cost effective threshold below.

Cost Effective Determination:

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

Maximum Cost per Ton of Air Pollutants Controlled

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

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

Cost Effectiveness Analysis Summary

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. The EPA has updated the cost manual for incinerators/oxidizers in 11/2017 and carbon adsorbers in 10/2018. Therefore, this BACT determination will revisit this limit in accordance with the updated EPA OAQPS Air Pollution Control Cost Manual. The electricity (13.80 cents/kWh) and natural gas (8.04 dollars/1,000 cubic feet) rates were based on a commercial application as approved by the District. The life of the equipment was based on the EPA cost manual recommendation. The interest rate was based on the previous 6-month average interest rate on United States Treasury Securities (based on the life of the equipment) and addition of two percentage points and rounding up to the next higher integer rate. The labor (Occupation Code 51-8099: 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.

Carbon Adsorber:

As shown in Attachment C, the cost effectiveness for the add on carbon adsorber system to control VOC was calculated to be **$17,503.69/ton** (see attached Paint Spray Booth for Plastic Coating Cost Effectiveness Analysis). The following basic parameters were used in the analysis.

Equipment Life = 15 years

Total Capital Investment = $307,618

Direct Annual Cost = $13,549 per year

Indirect Annual Cost = $46,994 per year

Total Annual Cost = $58,344 per year

VOC Removed = 3 tons per year

Cost of VOC Removal = $17,509.23 per ton reduced

A detailed calculation of the cost effectiveness for VOC removal with a carbon absorber is shown in Attachment C. Uncontrolled VOC emissions of 7,404 lb/year or greater is the cost-effective threshold for control equipment using carbon absorption control technology

Thermal Oxidizer:

Equipment Life = 20 years

Direct Cost = $193,478

Direct Annual Cost = $73,514 per year

Indirect Annual Cost = $134,493 per year

Total Annual Cost = $208,007 per year

VOC Removed = 12.1 tons per year

Cost of VOC Removal = $17,657 per ton reduced

A detailed calculation of the cost effectiveness for VOC removal with a thermal oxidizer is shown in Attachment C. Uncontrolled VOC emissions of 23,799 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 7,404 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 24,799 lb per year or greater must be reached in order for a thermal oxidizer to be cost effective. The emissions levels for the cost effectiveness of controls is based on the District cost effective limit for VOC of $17,500 per ton controlled.

With EPA's new cost data, the highest allowable uncontrolled emission rate to not require add-on control devices will be updated to 7,404 lb/year based on the cost of carbon adsorption.

C. SELECTION OF BACT:

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

BACT #304 for Plastic Parts Coating Operation ≤ 7,404 pounds per year		
Pollutant	**Standard**	**Source**
VOC	Compliance with District Rule 468 (including exemptions), except where noted in footnote (A)	SMAQMD, SCAQMD
NOx	For heaters, low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu	SMAQMD, SCAQMD
SOx	No standard	
PM10	1. Enclosed paint booth with dry filters or water wash 2. HVLP spray guns or equivalent	SJVAPCD, SCAMQD, SDAPCD
PM2.5	1. Enclosed paint booth with dry filters or water wash 2. HVLP spray guns or equivalent	SJVAPCD, SCAMQD, SDAPCD
CO	No standard	

(A) The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in SMAQMD Rule 468): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L. SMAQMD Rule 468 exemptions also apply (including Small Source exemption, Section 111, for stationary sources with total actual emissions less than 2.7 tons of VOC per 12-month rolling period prior to an emission control system.)

BACT #305 for Plastic Parts Coating Operation > 7,404 pounds per year		
Pollutant	**Standard**	**Source**
VOC	1. Compliance with District Rule 468 (including exemptions), except where noted in footnote (A) **and** VOC control system with ≥ 90% overall efficiency, or 2. Use of low-VOC materials resulting in an equivalent emission reduction.	SMAQMD (Technologically Feasible and Cost Effective)
NOx	For heaters, low NOx burner, 30 ppmvd @ 3% O2 or 0.036 lb/MMBtu	SMAQMD, SCAQMD
SOx	No standard	

BACT #305 for Plastic Parts Coating Operation > 7,404 pounds per year		
Pollutant	**Standard**	**Source**
PM10	1. Enclosed paint booth with dry filters or water wash 2. HVLP spray guns or equivalent	SJVAPCD, SCAMQD, SMAQMD, SDAPCD
PM2.5	1. Enclosed paint booth with dry filters or water wash 2. HVLP spray guns or equivalent	SJVAPCD, SCAMQD, SMAQMD, SDAPCD
CO	No standard	

(A) The following coating categories listed in Rule 468, Table 1, must meet the following standards listed in SCAQMD Rule 1145 (unless they meet an applicable exemption in the SMAQMD Rule 468): General One-Component Coatings – 120 g/L; General Multi-Component Coatings – 120 g/L; Electric Dissipating Coating and Shock Free Coatings – 360 g/L; Extreme Performance Coatings, One Component – 120 g/L; Optical Coatings – 50 g/L; All Other Coatings not specified in Rule 468, Section 301 – 120 g/L. SMAQMD Rule 468 exemptions also apply (including Small Source exemption, Section 111, for stationary sources with total actual emissions less than 2.7 tons of VOC per 12-month rolling period prior to an emission control system.)

T-BACT #304 & #305 for Plastic Parts Coating Operation		
Pollutant	**Standard**	**Source**
Organic HAP/VHAP & Inorganic HAP (T-BACT)	Compliance with NESHAP HHHHHH where applicable.	USEPA

APPROVED BY: *Brian F Krebs* **DATE:** 07-28-2022

Attachment A

Review of BACT Determinations published by EPA

List of BACT determinations published in EPA's RACT/BACT/LAER Clearinghouse (RBLC) for Plastic Parts & Products Surface Coatings:

RBLC	Permit Date	Process Code [(A)]	Process/Equipment	Pollutant	Standard	Control Technology	Case-By-Case Basis
IN-0311	12/27/2018	41.016	Spray Coating Line	VOC	50 tons per 12 Months and 6.8 lb VOC/gal Coating Daily Volume Weighted Average	N/A	Other Case-By-Case
IN-0274	08/21/2017	41.016	Fiberglass Reinforced Plastic Part Coating Line	VOC	230 tons per 12 Months and 4.9 lb VOC/gal Coating	N/A	Other Case-By-Case
IN-0267	05/18/2017	41.016	Robot Paint Spray System	VOC	77.35 tons per 12 Months, 4.35 lb VOC/gal Coating Daily Volume Weighted Average, and High Transfer Efficiency Equipment	N/A	Other Case-By-Case
IN-0258	02/01/2017	41.016	Spray Coating Line	VOC	90 tons per 12 Months and 6.8 lb VOC/gal Coating Daily Volume Weighted Average	N/A	Other Case-By-Case
IN-0275	10/26/2016	41.016	Plastic Parts Surface Coating Line	VOC	95% Control Efficiency, 100 PPMV	Regenerative Thermal Oxidizer	Other Case-By-Case
IN-0205	10/27/2014	41.016	Assembly Operations	VOC	96.61 tons per 12 Months and 6.5 lb VOC/gal Coating and Solvents	HVLP Spray Applicators & Work Practices	Other Case-By-Case

RBLC	Permit Date	Process Code (A)	Process/Equipment	Pollutant	Standard	Control Technology	Case-By-Case Basis
IN-0195	05/19/2014	41.016	Plastic Bumper Coating Line	VOC	0.71 lb/gal - primer coating, 1.38 lb/gal - basecoat coating, 4.09 lb/gal - clearcoat coating, good work practices	N/A	BACT-PSD
IN-0176	05/14/2014	41.016	Plastic Parts Surface Coating Line	VOC	154.25 tons per 12 Months and 4.0 lb VOC/gal Coating	HVLP Spray Applicators	Other Case-By-Case
IN-0159	04/23/2013	41.016	Surface Coating Line	VOC	207 tons per 12 Months and 4.0 lb VOC/gal Coating	N/A	Other Case-By-Case
IN-0154	01/03/2013	41.016	Plastic Parts Surface Coating Line	VOC	95% Control Efficiency, 12 PPMV 3 hours	Regenerative Thermal Oxidizer with Permanent Total Enclosure	Other Case-By-Case

(A) Process Code 41.016 includes plastic parts & products surface coatings.

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

Facility Information

RBLC ID:	IN-0267 (final)	**Date Determination Last Updated:**	11/17/2017
Corporate/Company Name:	CHIYODA USA CORPORATION	**Permit Number:**	133-37625-00019
Facility Name:	CHIYODA USA CORPORATION	**Permit Date:**	05/18/2017 (actual)
Facility Contact:	TODD STEVENS 7656539098	**FRS Number:**	Not Found
Facility Description:	STATIONARY PLASTIC AUTOMOTIVE TRIM MOLDING AND SURFACE COATING FACILITY	**SIC Code:**	3089
Permit Type:	B: Add new process to existing facility	**NAICS Code:**	326199
Permit URL:	HTTP:PERMITS.AIR.IDEM.IN.GOV/37625F.PDF		
EPA Region:	5	**COUNTRY:**	USA
Facility County:	PUTNAM		
Facility State:	IN		
Facility ZIP Code:	46135		
Permit Issued By:	INDIANA DEPT OF ENV MGMT, OFC OF AIR (Agency Name) MR. MATT STUCKEY(Agency Contact) (317) 233-0203 mstuckey@idem.in.gov		
Other Agency Contact Info:	PERMIT WRITER: BRANDON MILLER 317-234-5374 BMILLER@IDEM.IN.GOV SECTION CHIEF: IRYN CALILUNG 317-233-5692		
Permit Notes:			

Process/Pollutant Information

PROCESS NAME:	ROBOT PAINT SPRAY SYSTEM (PT541)
Process Type:	41.016 (Plastic Parts & Products Surface Coating (except 41.015))
Primary Fuel:	
Throughput:	0.01 GALLON/PART
Process Notes:	(G) ONE (1) ROBOT PAINT SPRAY SYSTEM, IDENTIFIED AS PT541, CONSTRUCTED IN 2016, AMENDED IN 2016, AND APPROVED IN 2017 FOR MODIFICATION TO INCREASE THE MAXIMUM CAPACITY, COATING PLASTIC AUTOMOTIVE

COMPONENTS, AND CONSISTING OF THE FOLLOWING: (1) ONE (1) PRIMER SPRAY BOOTH, IDENTIFIED AS PB-01, CONSTRUCTED IN 2016, AMENDED IN 2016, AND APPROVED IN 2017 FOR MODIFICATION TO INCREASE THE MAXIMUM CAPACITY, USING HIGH VOLUME, LOW PRESSURE (HVLP) SPRAY GUNS TO COAT PLASTIC PARTS, WITH A MAXIMUM APPLICATION RATE OF 0.012 GALLONS OF COATING PER PART AND 3,425 PARTS PER DAY, WITH PARTICULATE EMISSIONS CONTROLLED WITH A WATER WASH SYSTEM, AND EXHAUSTING TO STACK PS-01. (2) ONE (1) BASECOAT SPRAY BOOTH, IDENTIFIED AS BC-01, CONSTRUCTED IN 2016, AMENDED IN 2016, AND APPROVED IN 2017 FOR MODIFICATION TO INCREASE THE MAXIMUM CAPACITY, USING ELECTROSTATIC BELL SPRAY GUNS TO COAT PLASTIC PARTS, WITH A MAXIMUM APPLICATION RATE OF 0.029 GALLONS OF COATING PER PART AND 3,425 PARTS PER DAY, WITH PARTICULATE EMISSIONS CONTROLLED WITH A WATER WASH SYSTEM, AND EXHAUSTING TO STACKS PS-01 AND PS-02. (3) ONE (1) MICA SPRAY BOOTH, IDENTIFIED AS MC-01, CONSTRUCTED IN 2016, AMENDED IN 2016, AND APPROVED IN 2017 FOR MODIFICATION TO INCREASE THE MAXIMUM CAPACITY, USING ELECTROSTATIC BELL SPRAY GUNS TO COAT PLASTIC PARTS, WITH A MAXIMUM APPLICATION RATE OF 0.029 GALLONS OF COATING PER PART AND 3,425 PARTS PER DAY, WITH PARTICULATE EMISSIONS CONTROLLED WITH A WATER WASH SYSTEM, AND EXHAUSTING TO STACK PS-02. (4) ONE (1) CLEAR COAT SPRAY BOOTH, IDENTIFIED AS CC-01, CONSTRUCTED IN 2016, AMENDED IN 2016, AND APPROVED IN 2017 FOR MODIFICATION TO INCREASE THE MAXIMUM CAPACITY, USING ELECTROSTATIC BELL SPRAY GUNS TO COAT PLASTIC PARTS, WITH A MAXIMUM APPLICATION RATE OF 0.021 GALLONS OF COATING PER PART AND 3,425 PARTS PER DAY, WITH PARTICULATE EMISSIONS CONTROLLED WITH A WATER WASH SYSTEM, AND EXHAUSTING TO STACK PS-02.

POLLUTANT NAME:	Volatile Organic Compounds (VOC)
CAS Number:	VOC
Test Method:	Unspecified
Pollutant Group(s):	(Volatile Organic Compounds (VOC))
Emission Limit 1:	77.3500 TONS OF VOC 12 CONSECUTIVE MONTH PERIODS
Emission Limit 2:	4.3500 POUNDS OF VOC PER GALLON DAILY VOLUME WEIGHTED AVERAGE
Standard Emission:	

Did factors, other than air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis:	OTHER CASE-BY-CASE
Other Applicable Requirements:	NESHAP
Control Method:	(N)
Est. % Efficiency:	
Cost Effectiveness:	11094 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	EMISSION LIMIT 2: DAILY VOLUME-WEIGHTED AVERAGE VOC CONTENT OF ALL COATINGS USED SHALL NOT EXCEED 4.35 POUNDS OF VOC PER GALLON OF COATING, EXCLUDING WATER. LIMIT 3: SPRAY APPLICATION METHOD SHALL BE DONE WITH HVLP SPRAY APPLICATORS, ELECTROSTATIC SPRAY APPLICATORS, OR ROTARY ELECTROSTATIC SPRAY APPLICATORS LIMIT 4: GOOD MANAGEMENT AND WORK PRACTICES, INCLUDING BUT NOT LIMITED TO (I) MINIMIZATION OF SOLVENTS TO CLEAN SPRAY APPLICATION AREAS; (II) USE OF MASKING TECHNIQUES TO MINIMIZE THE AMOUNT OF SOLVENT CONTAINING VOC TO CLEAN THE SPRAY BOOTH WALLS, FLOORS, AND ASSOCIATED EQUIPMENT; (III) WORKING WITH THE SUPPLIERS TO GENERALLY LOWER THE VOC CONTENT OF COATINGS USED IN THE PAINT SPRAY SYSTEM; AND (IV) EDUCATING PLANT STAFF THAT WORK IN THE PAINT SHOP AND INDIVIDUAL COATING OPERATIONS ON PROPER SPRAY APPLICATION TECHNIQUES, CLEANING PROCEDURES AND MANAGEMENT OF NEW COATING MATERIALS, AS WELL AS USED COATING MATERIALS. STATE BACT COST PROHIBITIVE: THERMAL OXIDIZER (PS-01 STACK ONLY) = $30,545/TON THERMAL OXIDIZER (PS-02 STACK ONLY) = $21,039/TON THERMAL OXIDIZER (BOTH STACKS) = $21,330/TON CONCENTRATOR (BOTH STACKS) = $11,094/TON SUBJECT TO 40 CFR 63, SUBPART PPPP

Facility Information

RBLC ID:	IN-0154 (final)	**Date Determination Last Updated:**	05/04/2016
Corporate/Company Name:	GREENVILLE TECHNOLOGY, INC. - ANDERSON	**Permit Number:**	095-32281-00136
Facility Name:	GREENVILLE TECHNOLOGY, INC. - ANDERSON	**Permit Date:**	01/03/2013 (actual)
Facility Contact:	LES SIEGLER 9375481471 LES_SIEGLER@GTIOH.COM	**FRS Number:**	110055148022
Facility Description:	PLASTIC AUTOMOBILE PARTS MANUFACTURING PLANT	**SIC Code:**	3714
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	336322
Permit URL:	HTTP://PERMITS.AIR.IDEM.IN.GOV/32281F.PDF		
EPA Region:	5	**COUNTRY:**	USA
Facility County:	MADISON		
Facility State:	IN		
Facility ZIP Code:	46013		
Permit Issued By:	INDIANA DEPT OF ENV MGMT, OFC OF AIR (Agency Name) MR. MATT STUCKEY(Agency Contact) (317) 233-0203 mstuckey@idem.in.gov		
Other Agency Contact Info:	PERMIT WRITER: BRIAN WILLIAMS 317-234-5375 BWILLIAM@IDEM.IN.GOV SECTION CHIEF: IRYN CALILUNG 317-233-5692 ICALILUN@IDEM.IN.GOV		
Permit Notes:			

Process/Pollutant Information

PROCESS NAME:	PLASTIC PARTS SURFACE COATING LINE
Process Type:	41.016 (Plastic Parts & Products Surface Coating (except 41.015))
Primary Fuel:	
Throughput:	8.30 GAL/H OF COATING
Process Notes:	SURFACE COATING LINE CONSISTS OF PAINT BOOTH, WHICH IS EQUIPPED WITH TWO (2) ROBOTIC HVLP SPRAY GUNS, FLASH OFF TUNNEL, AND NATURAL GAS-FIRED CURE OVEN RATED AT 0.8 MMBTU/HR. THE PAINT BOOTH, FLASH OFF

TUNNEL, AND CURE OVEN ARE CONTAINED WITHIN A PERMANENT TOTAL ENCLOSURE. THE PAINT BOOTH ALSO USES A MAXIMUM OF 1 GALLON OF CLEAN UP SOLVENT PER HOUR.

POLLUTANT NAME:	Volatile Organic Compounds (VOC)
CAS Number:	VOC
Test Method:	Unspecified
Pollutant Group(s):	(Volatile Organic Compounds (VOC))
Emission Limit 1:	95.0000 % OVERALL CONTROL EF 3 HOURS
Emission Limit 2:	12.0000 PPMV 3 HOURS
Standard Emission:	

Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis:	OTHER CASE-BY-CASE
Other Applicable Requirements:	
Control Method:	(A) REGENERATIVE THERMAL OXIDIZER WITH PERMANENT TOTAL ENCLOSURE
Est. % Efficiency:	95.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	STATE BACT

Attachment B

BACT Determinations from Air Districts

ACTIVE SMAQMD BACT CLEARINGHOUSE

CATEGORY: **COATING-PLASTIC PARTS**

BACT Size: Minor Source **PAINT SPRAY BOOTH**

BACT Determination Number:	188	**BACT Determination Date:**	2/20/2019

Equipment Information

Permit Number: 25995
Equipment Description: PAINT SPRAY BOOTH
Unit Size/Rating/Capacity: ≤ 4,700 lb VOC/year -Exc. Plsr. Craft & Bus. Mchn.
Equipment Location: T.M. COBB CO
8490 ROVANA CIR.
SACRAMENTO, CA

BACT Determination Information

ROCs	**Standard:**	
	Technology Description:	Compliance with District Rule 468, except as noted in footnote (A) of the BACT table in the BACT evaluation
	Basis:	Achieved in Practice
NOx	**Standard:**	
	Technology Description:	
	Basis:	
SOx	**Standard:**	
	Technology Description:	
	Basis:	
PM10	**Standard:**	
	Technology Description:	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equiivalent
	Basis:	Achieved in Practice
PM2.5	**Standard:**	
	Technology Description:	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equiivalent
	Basis:	Achieved in Practice
CO	**Standard:**	
	Technology Description:	
	Basis:	
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: This BACT is for plastic parts coating operations and exlcudes pleasure craft and busniess machine coating operations. VOC: Reference BACT evaluation for footnote (A) requirements.

T-BACT was determined to be compliance with NESHAP HHHHHH where applicable.

District Contact: Felix Trujillo, Jr. Phone No.: (916) 874 - 7357 email: ftrujillo@airquality.org

ACTIVE SMAQMD BACT CLEARINGHOUSE

CATEGORY: **COATING - PLASTIC PARTS**

BACT Size: Minor Source BACT **PAINT SPRAY BOOTH**

BACT Determination Number: 189	**BACT Determination Date:** 2/20/2019

Equipment Information

Permit Number: 25995
Equipment Description: PAINT SPRAY BOOTH
Unit Size/Rating/Capacity: > 4,700 lb VOC/year -Exc. Plsr. Craft & Bus. Mchn.
Equipment Location: T.M. COBB CO
8490 ROVANA CIR.
SACRAMENTO, CA

BACT Determination Information

ROCs	**Standard:**	
	Technology Description:	1.Compliance with District Rule 468, except where noted in footnote (A) of the BACT table in the BACT evaluation and VOC control system with ≥ 90% efficiency, or 2.Use of low-VOC materials resulting in an equivalent emission reduction
	Basis:	Achieved in Practice
NOx	**Standard:**	
	Technology Description:	
	Basis:	
SOx	**Standard:**	
	Technology Description:	
	Basis:	
PM10	**Standard:**	
	Technology Description:	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent
	Basis:	Achieved in Practice
PM2.5	**Standard:**	
	Technology Description:	Enclosed paint booth with dry filters or water wash and use of HVLP spray guns or equivalent
	Basis:	Achieved in Practice
CO	**Standard:**	
	Technology Description:	
	Basis:	
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: This BACT is for plastic parts coating operations and excludes pleasure craft and business machine coating operations. VOC: Reference BACT evaluation for footnote (A) requirements.

T-BACT was determined to be compliance with NESHAP HHHHHH where applicable.

District Contact: Felix Trujillo, Jr. Phone No.: (916) 874-7357 email: ftrujillo@airquality.org

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

10-20-2000 Rev. 0
2-1-2019 Rev 1
2-5-2021 Rev. 2

Equipment or Process: Spray Booth

	Criteria Pollutants					
Subcategory/ Rating/Size	**VOC**	**NOx**	**SOx**	**CO**	**PM_{10}**	**Inorganic**
Fully-enclosed, Down-Draft Type, < 667 Lbs/Month of VOC Emissions (2-5-2021)	Compliance with Applicable Regulation XI Rules (10-20-2000)	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147 (2-5-2021)			Dry Filters or Waterwash (1990)	
Other Types, < 1170 Lbs/Month of VOC Emissions	Compliance with Applicable Regulation XI Rules (10-20-2000)	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147 (2-5-2021)			Same as Above (1990)	
Fully-enclosed, Down-Draft Type, ≥ 22 Lbs/Day of VOC Emissions (2-5-2021)	- Compliance with Applicable Regulation XI Rules, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, or - 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 (10-20-2000)	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147 (2-5-2021)			Same as Above (1990)	

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

Other Types, ≥ 1170 Lbs/Month of VOC Emissions	- Compliance with Applicable Regulation XI Rules, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, or - 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 (10-20-2000)	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147 (2-5-2021)			Same as Above (1990)	
Enclosed with automated spray nozzles for wood cabinets, < 1170 Lbs/Month of VOC Emissions (2-5-2021)	Compliance with Rule 1136 or use of Rule 1136 compliant UV/EB or water-based coatings.	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147				

Note: The sum of all VOC emissions from all spray booths within the same subcategory applied for in the previous two years at the same facility are considered toward the emission threshold.

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

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 4.5.4*

Last Update: 12/16/1999

Plastic Parts and Products Coating

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	The use of HVLP spray guns, an enclosed gun cleaner, and low-VOC coatings (2.8 lb VOC/gal, as applied, less water and exempt solvents)	1. Thermal oxidation with an enclosed booth (100% capture efficiency). 2. Catalytic oxidation with an enclosed booth (100% capture efficiency). 3. Carbon adsorption with an enclosed booth (100% capture efficiency). 4. The use of HVLP spray guns, an enclosed gun cleaner, and low-VOC coatings (1.1 lb VOC/gal, as applied, less water and exempt solvents)	
PM10	Enclosed paint booth with dry filters and use of HVLP spray guns		

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

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

SDAPCD BACT

GENERAL SURFACE COATING (<10 gallons of coating/day)
(No Specific Coating Category Rule Applies)
Fee Schedule 27D

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	(N/A)	(N/A)	Not Determined
BACT Control Option	Compliance with with Rule 66.1, Miscellaneous Surface Coating Operation and Other Processes Emitting Volatile Organic Compounds	(N/A)	(N/A)	Spray booth equipped with overspray filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

(This table does not apply to operations applying, on average, 10 or more gallons of coating per day.)

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Best Available Control Technology (BACT) Guideline

Source Category

Source:	*Flow Coater, Dip Tank and Roller Coater*	Revision:	*1*
		Document #:	*84.1.1*
Class:	*< 36 lb/day (Uncontrolled)*	Date:	*08/30/91*

Determination

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	TYPICAL TECHNOLOGY
POC	1. *Coating w/ lower VOC content than applicable BAAQMD rules, and emissions from coating area, drying area, and oven vented to control device w/ overall capture/ destruction efficiency ≥90%*[b] 2. *n/d*	1. *Collection System Vented to Carbon Adsorber or Thermal Incinerator or Catalytic Incinerator*[b] 2. *n/d*
NOx	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
SO_2	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
CO	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
PM_{10}	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
NPOC	1. *Coating w/ lower solvnet content than applicable BAAQMD rules, and emissions from coating area, drying area, and oven vented to control device w/ overall capture/destruction efficiency ≥90%*[b] 2. *n/d*	1. *Collection System Vented to Carbon Adsorber*[b] 2. *n/d*

References

b. BAAQMD

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Best Available Control Technology (BACT) Guideline

Source Category

Source:	*Flow Coater, Dip Tank and Roller Coater*	Revision:	*1*
		Document #:	*84.2.1*
Class:	*Emissions ≥36 lb/day (Uncontrolled)*	Date:	*08/30/91*

Determination

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	TYPICAL TECHNOLOGY
POC	1. *Coating w/ lower VOC content than applicable BAAQMD rules, and emissions from coating area, drying area, and oven vented to control device w/ overall capture/ destruction efficiency ≥90%*[b] 2. *Coating w/ VOC content complying w/ applicable BAAQMD rules, and emissions from coating area, drying area, and oven vented to control device w/ overall capture/destruction efficiency ≥90%*[b]	1. *Collection System Vented to Carbon Adsorber or Thermal Incinerator or Catalytic Incinerator*[b] 2. *Collection System Vented to Carbon Adsorber or Thermal Incinerator or Catalytic Incinerator*[b]
NOx	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
SO_2	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
CO	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
PM_{10}	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
NPOC	1. *Coating w/ lower solvent content than applicable BAAQMD rules, and emissions from coating area, drying area, and oven vented to control device w/ overall capture/ destruction efficiency ≥90%*[b] 2. *Coating w/ solvent content complying w/ applicable BAAQMD rules, and emissions from coating area, drying area, and oven vented to control device w/ overall capture/destruction efficiency*	1. *Collection System Vented to Carbon Adsorber*[b] 2. *Collection System Vented to Carbon Adsorber*[b]

Attachment C

Cost Effectiveness Determination for Carbon Adsorption and Thermal Oxidizers

COST EFFECTIVENESS ANALYSIS FOR CARBON ADSORPTION

Data Inputs

Select the type of carbon adsorber system: Fixed-Bed Carbon Adsorber with Steam Regeneration

RESET

For fixed-bed carbon adsorbers, provide the following information:

Select the type of operation: Continuous Operation

Select the type of material used to fabricate the carbon adsorber vessels: Stainless Steel, 304

Select the orientation for the adsorber vessels: Horizontal

Enter the design data for the proposed Fixed-Bed Carbon Adsorber with Steam Regeneration

Number of operating hours per year (Θ_s)	2,080	hours/year	
Waste Gas Flow Rate (Q)	10,000	acfm (at atmospheric pressure and 77°F)	
VOC Emission Rate (m_{voc})	3.560	lbs/hour	
Required VOC removal efficiency (E)	90	percent	
Superficial Bed Velocity (v_b)	75.00	ft/min	
Estimated equipment life of adsorber vessels and auxiliary Equipment (n)	15	Years*	* 15 years is a default equipment life. User should enter actual value, if known.
Estimated Carbon life (n)	5	Years	
Total Number of carbon beds (N_{total})	3	Beds*	* 3 beds is the default. User should enter actual number of beds, if known.
Number of carbon beds adsorbing VOC when system is operating (N_A)	2	Beds*	* 2 beds is the default. User should enter actual number of beds, if known.
Total time for adsorption (Θ_A)	12	hours*	* 12 hours is a default value. User should enter actual value, if known.
Total time for desorption (Θ_D)	5	hours*	* 5 hours is a default value. User should enter actual value, if known.
Estimated Carbon Replacement Rate (CRR)	379	lbs/hour*	* 379 lbs./hour is a default value. User should enter actual value, if known.

Enter the Characteristics of the VOC/HAP:

Name of VOC/HAP	Toluene		
Partial Pressure of Toluene in waste gas stream	0.0104	psia	
Parameter "k" for Toluene	0.551	**Note:**	
Parameter "m" for Toluene	0.110	Typical values of "k" and "m" for some common VOCs are shown in Table A.	

Enter the cost data for the carbon adsorber:

Desired dollar-year	2022			
CEPCI* for 2022	567.5	CEPCI value for 2022	390.6	1999
Annual Interest Rate (i)	4	percent (Current bank prime rate)		

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

Electricity (P_{elec})	$0.1380	per kWh	
Steam (P_s)	$5.00	per 1,000 lbs*	* $5.00/1,000 lbs is a default value. User should enter actual value, if known.
Cooling Water (P_{cw})	$3.55	per 1,000 gallons of water*	* $3.55/1,000 gallons is a default value. User should enter actual value, if known.
Operator Labor Rate	$27.48	per hour*	* $27.48/hour is a default value. User should enter actual value, if known.
Maintenance Labor Rate	$30.23	per hour*	* $30.23/hour is a default value. User should enter actual value, if known. If the rate is not known, use 1.10 x operator labor rate.
Carbon Cost (CC)	$4.20	per lb	* $4.20/lb is a default value based on 2018 market price. User should enter actual value, if known.
Re-Sale Value of Recovered VOC (P_{voc})	$0.33	per lb*	* $0.33/lb is a default value for recovered toluene based on 2018 data. User should enter actual value of
Disposal/Treatment Cost for Recovered VOC (D_{voc})	$0.00	per lb*	* $0/lb is a default value for disposal and/or treatment of recovered VOC/HAP. User should enter actual value,

If known, enter any additional costs for site preparation and building construction/modification:

Site Preparation (SP) =	$0	* Default value. User should enter actual value, if known.
Buildings (Bldg) =	$0	* Default value. User should enter actual value, if known.
Equipment Costs for auxiliary equipment (e.g., ductwork, dampers, and stack) (EC_{aux}) =	$32,000	* Default value. User should enter actual value, if known.
Contingency Factor (CF)	10.0 percent*	* 10 percent is a default value. The contingency factor should be between 5 and 15 percent.

Cost Estimate

Capital Costs

Estimated capital costs for a Fixed-Bed Carbon Adsorber with Steam Regeneration with the following characteristics:

VOC Controlled/Recovered = Toluene
Adsorber Vessel Orientation = Horizontal
Operating Schedule = Continuous Operation

Total Capital Investment (TCI) (in 2020 dollars)

Parameter	Equation	Cost
Costs for Each Carbon Adsorber Vessel (C_v) =	$271 \times F_m \times S^{0.778}$ =	$25,175
Total Cost for All Carbon Adsorber Vessels and Carbon(EC_{Adsorb}) =	$5.82 \times Q^{-0.133} \times [C_c + (N_A + N_D) \times C_v]$ =	$131,885
Auxiliary Equipment (EC_{aux}) =	(Based on design costs or estimated using methods provided in Section 2)	$32,000
Total Purchased Equipment Costs for Carbon Adsorber (A) =	= $EC_{Adsorb} + EC_{aux}$ =	$163,885
Instrumentation =	0.10 × A =	Included in A
Sales taxes =	0.03 × A =	$4,917
Freight =	0.05 × A =	$8,194
	Total Purchased Equipment Costs (B) =	$176,995

Direct Installation Costs (in 2020 dollars)

Parameter	Equation	Cost
Foundations and Supports =	0.08 × B =	$14,160
Handling and Erection =	0.14 × B =	$24,779
Electrical =	0.04 × B =	$7,080
Piping =	0.02 × B =	$3,540
Insulation =	0.01 × B =	$1,770
Painting =	0.01 × B =	$1,770
Site Preparation (SP) =		$0
Buildings (Bldg) =		$0
	Total Direct Costs (DC) = B + (0.3 × B) + SP + Bldg =	$230,094

Total Indirect Installation Costs (in 2020 dollars)			
Parameter	**Equation**	**Cost**	
Engineering =	0.10 × B =	$17,700	
Construction and field expenses =	0.05 × B =	$8,850	
Contractor fees =	0.10 × B =	$17,700	
Start-up =	0.02 × B =	$3,540	
Performance test =	0.01 × B =	$1,770	
	Total Indirect Costs (IC) =	$49,559	
Contingency Cost (C) =	CF(IC+DC)=	$27,965	
Total Capital Investment (TCI) =	**DC + IC + C = (1.28 × B) + SP + Bldg. + C =**	**$307,618**	**in 2020 dollars**

Annual Costs

Direct Annual Costs			
Parameter	**Equation**	**Cost**	
Annual Electricity Cost =	$Q_{Elec} \times P_{elec}$ =	$738	
Annual Steam Cost (C_s) =	3.50 x m_{voc} x Θ_s x P_s =	$130	
Annual Cooling Water Cost (C_{cs}) =	3.43 x C_s/P_s x P_{wc} =	$316	
Operating Labor Costs:	Operator = 0.5 hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$3,572	
	Supervisor = 15% of Operator	$536	
Maintenance Costs:	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$3,930	
	Materials = 100% of maintenance labor	$3,930	
Carbon Replacement Costs:	Labor = CRF_{carbon} x (Labor Rate × M_c)/CRR =	$7	
	Carbon = CRF_{carbon} x CC x M_c x 1.08 =	$392	
Direct Annual Costs (DAC) =		**$13,549**	**in 2020 dollars**

Indirect Annual Costs			
Parameter	**Equation**	**Cost**	
Overhead	= 60% of sum of operator, supervisor, maintenance labor Plus maintenance materials	$7,181	
Administrative Charges	= 2% of TCI	$6,152	
Property Taxes	= 1% of TCI	$3,076	
Insurance	= 1% of TCI	$3,076	
Capital Recovery	$= CRF_{Adsorber} \times (TCI - [(1.08 \times CC \times M_c) + (LR \times M_c/CRR)] =$	$27,508	
Indirect Annual Costs (IAC) =		**$46,994**	**in 2020 dollars**

Recovered Solvent Credit/Disposal Costs			
Disposal Cost			
Parameter	**Equation**	**Cost**	
VOC Disposal/Treatment Costs ($Disposal_{cost}$)	$= m_{voc} \times \Theta_s \times D_{voc} \times E =$	$0	
VOC Recovery Credit			
Parameter	**Equation**	**Cost**	
Annual Recovery Credit for Condensate (RC)	$= m_{voc} \times \Theta_s \times P_{voc} \times E =$	$2,199	
Total Annual Cost (TAC) =	**$DAC + IAC + C + Disposal_{Cost} - RC =$**	**$58,344**	**in 2020 dollars**

Cost Effectiveness

Cost Effectiveness			
Parameter	**Equation**	**Cost**	
Total Annual Cost =	TAC =	$58,344	per year in 2020 dollars
Annual Quantity of VOC Removed/Recovered =	$W_{voc} = m_{voc} \times \Theta_s \times E =$	3	tons/year
Cost Effectiveness =	Total Annual Cost (TAC) / Annual Quantity of VOC Removed/Recovered =	$17,509.23	per ton of pollutants removed/recovered in 2020 dollars

COST EFFECTIVENESS ANALYSIS FOR THERMAL INCINERATION

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

RESET

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Toluene	40	11,000	4,274	92.13

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	2,080	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	20,000	scfm*	* 20,000 scfm is a default volumetric flow rate. User should enter actual value, if known.
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	20,900	acfm*	* 20,900 acfm is a default volumetric flow rate. User should enter actual value, if known.
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	77	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	99	percent*	* 99 percent is a default control efficiency. User should enter actual value, if known.
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2022			
CEPCI* for 2022	541.7	Enter the CEPCI value for 2022	541.7	2016 CEPCI
Annual Interest Rate (i)	4	Percent		
Electricity ($Cost_{elect}$)	0.138	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.00804	$/scf		
Operator Labor Rate	$27.48	per hour		
Maintenance Labor rate	$30.23	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

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

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2020 dollars)			
Incinerator + auxiliary equipment[a] (A) = Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2020 CEPI/2016 CEPCI) =	$546,548	in 2020 dollars
Instrumentation[b] =	0.10 × A =	$54,655	
Sales taxes =	0.03 × A =	$16,396	
Freight =	0.05 × A =	$27,327	
	Total Purchased equipment costs (B) =	$644,926	in 2020 dollars

Footnotes

a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.

b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2020 dollars)			
Foundations and Supports =	0.08 × B =	$51,594	
Handlong and Errection =	0.14 × B =	$90,290	
Electrical =	0.04 × B =	$25,797	
Piping =	0.02 × B =	$12,899	
Insulation for Ductwork =	0.01 × B =	$6,449	
Painting =	0.01 × B =	$6,449	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$193,478	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$838,404	in 2020 dollars

Total Indirect Installation Costs (in 2020 dollars)			
Engineering =	0.10 × B =	$64,493	
Construction and field expenses =	0.05 × B =	$32,246	
Contractor fees =	0.10 × B =	$64,493	
Start-up =	0.02 × B =	$12,899	
Performance test =	0.01 × B =	$6,449	
	Total Indirect Costs (IC) =	$180,579	
Continency Cost (C) =	CF(IC+DC)=	$101,898	
Total Capital Investment =	**DC + IC +C =**	**$1,120,882**	**in 2020 dollars**

Direct Annual Costs		
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$22,227
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$39,319
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$3,572
	Supervisor = 15% of Operator	$536
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$3,930
	Materials = 100% of maintenance labor	$3,930
Direct Annual Costs (DC) =		**$73,514 in 2020 dollars**

Indirect Annual Costs		
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$7,181
Administrative Charges	= 2% of TCI	$22,418
Property Taxes	= 1% of TCI	$11,209
Insurance	= 1% of TCI	$11,209
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$82,476
Indirect Annual Costs (IC) =		**$134,493 in 2020 dollars**

Total Annual Cost =	**DC + IC =**	**$208,007 in 2020 dollars**

Cost Effectiveness

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

Total Annual Cost (TAC) =	$208,007	per year in 2020 dollars
VOC/HAP Pollutants Destroyed =	11.8	tons/year
Cost Effectiveness =	$17,657	per ton of pollutants removed in 2020 dollars