

SECTION 3.4

AUTO REFINISHING

(Revised February 2020)

EMISSION INVENTORY SOURCE CATEGORY

Cleaning and Surface Coatings/Coatings and Related Process Solvents

EMISSION INVENTORY CODES (CES CODES) AND DESCRIPTION

230-218-9000-0000 (46789) Auto Refinishing

Overview

The methodology below briefly summarizes the estimated emissions of volatile organic compounds (VOC) resulting from coatings and solvents used in automotive refinishing operations based on the 2005 Staff Report for the Proposed Suggested Control Measure for Automotive Coatings (CARB 2005), resulting from information in the 2002 Automotive Coatings Survey conducted by CARB. Emissions are related to application of primer to fill surface imperfections, provide corrosion protection and provide a bond for subsequent topcoats, which can be solid colors or metallic, applied in a single stage or in a multi-stage system of basecoat and clear coats. The most common types of topcoats include acrylic lacquers, acrylic enamels and polyurethane. Specialty coatings occasionally are used for unusual performance requirements. Automotive refinishing operations occur at auto body repair and paint shops (including some mobile operations), new car dealerships, production auto body, fleet operator, truck and heavy duty equipment repair and paint shops. These operations comprise the majority of emission sources, in addition to unregulated, noncompliant automobile refinishing activities.

CARB's 2002 Automotive Coatings Survey

Emissions from automotive refinishing are estimated from the survey of automotive coatings that CARB conducted in 2002. In June 2002, CARB mailed survey questionnaires to companies that potentially sold automotive coatings products in California in 2001. A total of 17 companies submitted data. The survey collected data on the VOC contents of products, which were then used to estimate VOC emissions from automotive coatings. Estimated emissions from automotive coatings were 7,631 tons per year or approximately 20.7 tpd in 2001, based on the survey data.

Activity Data

The activity data for automotive refinishing is typically based on the amount of product applied, derived from the amount of product sold in California. However, automotive refinishing products are generally sold as components, and the users blend the ready-to-spray mixtures. For example, a color coating may be a combination of up to ten individual toners plus hardeners, reducers, and specialty additives. As such, the survey could not determine the volume applied of any single mixture. For an estimate of the emissions from each coating category, the survey assumed that an equal amount of base material was used in every formulation that could be made with that base material.

Emission Factors

The emissions factor was collected as grams of VOC per liter of refinish product. Per the survey, this information is confidential, as it contains proprietary information related to product development.

Control Factors

CARB applied control factors to reflect emission reductions due to rules and regulations that have affected emissions in this category. These control factors were calculated according to the latest control profiles in CARB's California Emission Projection Analysis Model (CEPAM). Based on the survey base year 2001, the applicable 2017 control factors are reflected in Table 1.

Table 1: 2017 TOG Control Factors for EIC 23021890000000

District	Control Factor
BA	0.535905680600214
PLA	0.754147812971342
SAC	0.454132606721163
SB	0.382555470543229
SC	0.640614990390775
SJU	0.714285714285714
VEN	0.56785917092561
All Others	1

Notes: (1) Control factors reflect any reduction in emissions since 2001 according to the latest CEPAM forecasting model. (2) Control factors applied to all counties within the District. (3) TOG control factors are also applied to VOC and ROG. (4) District submitted inventories will supersede estimations based off CARB's 2002 Automotive Coatings Survey.

Speciation

CARB speciated emissions for VOC according to the latest speciation fractions in the California Emissions Inventory Development and Reporting System (CEIDARS).

Table 2: EIC 23021890000000 Organic Speciation Profile (CARB, refNum 23 2007)

EIC	Organic Gas Profile	ROG Fraction of TOG	VOC Fraction of TOG
23021890000000	1448	0.9679	0.9679

Temporal Activity

Auto refinishing was assumed to be an eight-hour day, five days a week operation, with the activity being uniform throughout the year.

Daily Activity Code: 58 – MAX ACTIVITY 7 AM TO 12 PM; REDUCED ACT 12 PM TO 6 PM (AUTO REFINISHING)

Weekly Activity Code: 22 – UNIFORM ACTIVITY ON WEEK DAYS; REDUCED ACTIVITY ON WEEKENDS

Monthly Activity: The monthly activity is assumed to be uniform throughout the year (Table 3).

Table 3: Percent Activity for Each Month (Uniform)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%

References

CARB, California Air Resources Board. 2005. *Staff Report for the Proposed Suggested Control Measure for Automotice Coatings*. <https://ww3.arb.ca.gov/coatings/autorefin/scm/sreport/sreport.pdf>.

CARB, California Air Resources Board. 2007. *refNum 23*.
<https://ww3.arb.ca.gov/ei/speciate/r21t40/rf23doc/refnum23.htm>.

Appendix

Table A.1 below shows the 2017 unreconciled emissions for each geographic area. Unreconciled emissions were grown and controlled from the values derived from CARB's 2002 Automotive Coatings Survey. However, District submitted inventories supersedes estimations based off the survey. The following Districts submitted their own inventories: Bay Area AQMD, Sacramento Metropolitan AQMD, Santa Barbara AQCD, South Coast AQMD, San Luis Obispo County APCD, and Ventura APCD.

Table A.1: 2017 TOG, ROG, and VOC Unreconciled Emissions for EIC 23021890000000

Air Basin	District	County	TOG (TPY)	ROG (TPY)	VOC (TPY)
MOUNTAIN COUNTIES	AMADOR COUNTY APCD	AMADOR	8.03	7.71	7.71
MOJAVE DESERT	ANTELOPE VALLEY AQMD	LOS ANGELES	69.24	66.45	66.45
SAN FRANCISCO BAY AREA	BAY AREA AQMD	ALAMEDA	189.88	183.79	183.79
SAN FRANCISCO BAY AREA	BAY AREA AQMD	CONTRA COSTA	100.55	97.33	97.33
SAN FRANCISCO BAY AREA	BAY AREA AQMD	MARIN	38.25	37.02	37.02
SAN FRANCISCO BAY AREA	BAY AREA AQMD	NAPA	15.74	15.24	15.24
SAN FRANCISCO BAY AREA	BAY AREA AQMD	SAN FRANCISCO	69.76	67.52	67.52
SAN FRANCISCO BAY AREA	BAY AREA AQMD	SAN MATEO	112.77	109.15	109.15
SAN FRANCISCO BAY AREA	BAY AREA AQMD	SANTA CLARA	204.50	197.93	197.93
SAN FRANCISCO BAY AREA	BAY AREA AQMD	SOLANO	37.45	36.25	36.25
SAN FRANCISCO BAY AREA	BAY AREA AQMD	SONOMA	52.13	50.45	50.45
SACRAMENTO VALLEY	BUTTE COUNTY AQMD	BUTTE	45.01	43.20	43.20
MOUNTAIN COUNTIES	CALAVERAS COUNTY APCD	CALAVERAS	9.77	9.37	9.37
SACRAMENTO VALLEY	COLUSA COUNTY APCD	COLUSA	4.91	4.71	4.71
MOJAVE DESERT	EASTERN KERN APCD	KERN	29.89	28.68	28.68
LAKE TAHOE	EL DORADO COUNTY AQMD	EL DORADO	6.77	6.50	6.50
MOUNTAIN COUNTIES	EL DORADO COUNTY AQMD	EL DORADO	34.24	32.86	32.86
SACRAMENTO VALLEY	FEATHER RIVER AQMD	SUTTER	20.42	19.60	19.60
SACRAMENTO VALLEY	FEATHER RIVER AQMD	YUBA	15.62	14.99	14.99
SACRAMENTO VALLEY	GLENN COUNTY APCD	GLENN	6.40	6.14	6.14
GREAT BASIN VALLEYS	GREAT BASIN UNIFIED APCD	ALPINE	0.30	0.29	0.29

Air Basin	District	County	TOG (TPY)	ROG (TPY)	VOC (TPY)
GREAT BASIN VALLEYS	GREAT BASIN UNIFIED APCD	INYO	4.47	4.29	4.29
GREAT BASIN VALLEYS	GREAT BASIN UNIFIED APCD	MONO	3.21	3.08	3.08
SALTON SEA	IMPERIAL COUNTY APCD	IMPERIAL	42.61	40.89	40.89
LAKE COUNTY	LAKE COUNTY AQMD	LAKE	13.63	13.08	13.08
NORTHEAST PLATEAU	LASSEN COUNTY APCD	LASSEN	7.94	7.62	7.62
MOUNTAIN COUNTIES	MARIPOSA COUNTY APCD	MARIPOSA	3.85	3.69	3.69
NORTH COAST	MENDOCINO COUNTY AQMD	MENDOCINO	20.28	19.46	19.46
NORTHEAST PLATEAU	MODOC COUNTY APCD	MODOC	2.18	2.09	2.09
MOJAVE DESERT	MOJAVE DESERT AQMD	RIVERSIDE	3.89	3.73	3.73
MOJAVE DESERT	MOJAVE DESERT AQMD	SAN BERNARDINO	89.16	85.57	85.57
NORTH CENTRAL COAST	MONTEREY BAY AIR RESOURCES DISTRICT	MONTEREY	94.84	91.02	91.02
NORTH CENTRAL COAST	MONTEREY BAY AIR RESOURCES DISTRICT	SAN BENITO	13.20	12.67	12.67
NORTH CENTRAL COAST	MONTEREY BAY AIR RESOURCES DISTRICT	SANTA CRUZ	56.15	53.89	53.89
NORTH COAST	NORTH COAST UNIFIED AQMD	DEL NORTE	6.51	6.25	6.25
NORTH COAST	NORTH COAST UNIFIED AQMD	HUMBOLDT	29.78	28.58	28.58
NORTH COAST	NORTH COAST UNIFIED AQMD	TRINITY	3.02	2.90	2.90
MOUNTAIN COUNTIES	NORTHERN SIERRA AQMD	NEVADA	21.97	21.09	21.09
MOUNTAIN COUNTIES	NORTHERN SIERRA AQMD	PLUMAS	4.55	4.37	4.37
MOUNTAIN COUNTIES	NORTHERN SIERRA AQMD	SIERRA	0.84	0.81	0.81
NORTH COAST	NORTHERN SONOMA COUNTY APCD	SONOMA	12.17	11.68	11.68
LAKE TAHOE	PLACER COUNTY APCD	PLACER	1.85	1.78	1.78
MOUNTAIN COUNTIES	PLACER COUNTY APCD	PLACER	4.32	4.15	4.15
SACRAMENTO VALLEY	PLACER COUNTY APCD	PLACER	54.77	52.56	52.56
SACRAMENTO VALLEY	SACRAMENTO METROPOLITAN AQMD	SACRAMENTO	143.25	138.65	138.65
SAN DIEGO COUNTY	SAN DIEGO COUNTY APCD	SAN DIEGO	756.71	726.22	726.22
SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY APCD	FRESNO	156.37	150.07	150.07
SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY APCD	KERN	125.14	120.09	120.09
SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY APCD	KINGS	26.47	25.41	25.41

Air Basin	District	County	TOG (TPY)	ROG (TPY)	VOC (TPY)
SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY APCD	MADERA	23.80	22.84	22.84
SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY APCD	MERCED	38.85	37.29	37.29
SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY APCD	SAN JOAQUIN	110.44	105.99	105.99
SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY APCD	STANISLAUS	79.48	76.28	76.28
SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY APCD	TULARE	72.81	69.87	69.87
SOUTH CENTRAL COAST	SAN LUIS OBISPO COUNTY APCD	SAN LUIS OBISPO	63.76	61.71	61.71
SOUTH CENTRAL COAST	SANTA BARBARA COUNTY APCD	SANTA BARBARA	16.34	15.73	15.73
SACRAMENTO VALLEY	SHASTA COUNTY AQMD	SHASTA	39.42	37.83	37.83
NORTHEAST PLATEAU	SISKIYOU COUNTY APCD	SISKIYOU	10.56	10.14	10.14
SOUTH COAST	SOUTH COAST AQMD	LOS ANGELES	1251.41	1211.24	1211.24
SOUTH COAST	SOUTH COAST AQMD	ORANGE	519.82	503.13	503.13
MOJAVE DESERT	SOUTH COAST AQMD	RIVERSIDE	0.00	0.00	0.00
SALTON SEA	SOUTH COAST AQMD	RIVERSIDE	318.97	308.73	308.73
SOUTH COAST	SOUTH COAST AQMD	RIVERSIDE	948.21	917.77	917.77
SOUTH COAST	SOUTH COAST AQMD	SAN BERNARDINO	402.45	389.53	389.53
SACRAMENTO VALLEY	TEHAMA COUNTY APCD	TEHAMA	13.80	13.25	13.25
MOUNTAIN COUNTIES	TUOLUMNE COUNTY APCD	TUOLUMNE	11.69	11.22	11.22
SOUTH CENTRAL COAST	VENTURA COUNTY APCD	VENTURA	127.45	123.46	123.46
SACRAMENTO VALLEY	YOLO-SOLANO AQMD	SOLANO	31.79	30.51	30.51
SACRAMENTO VALLEY	YOLO-SOLANO AQMD	YOLO	46.10	44.24	44.24