SECTION 3.4

AUTO REFINISHING

(Updated February 1990; Reissued October 1997)

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

METHODS AND SOURCES

This category is used to inventory the 1987 total organic gas (TOG) emissions that result from auto refinishing operations in California. Emissions are due to the solvents contained in auto refinishing products such as refinish paints, enamels and lacquers, refinish primers and undercoatings.

The number of gallons of products used in auto refinishing was based on 1982 national production data reported by the Bureau of Census.[1] To update the production data to 1983, industry growth based on the increase in vehicle registration was used. Growth factors used for forecasting were then applied to estimate emissions for 1987.

The growth factor which was used to estimate 1983 activity was based on the increase of vehicle registration in the United States [2] and was determined as follows:

$$\text{Growth Factor} = \frac{\text{163.9 million vehicles in U.S. 1983}}{\text{159.5 million vehicles in U.S. 1982}} = 1.028$$

Then, California's fraction of the nationwide usage was determined by using the ratio of the vehicle registration in California[4] to the vehicle registration in the United States, [5] as follows:

$$\frac{\text{17.5 million vehicles in CA 1983}}{\text{163.9 million vehicles in US 1983}} (100) = 10.68\%$$

The growth factor and the California fraction are used in determining the usage of auto refinishing goods for 1983 in California as shown in Table I. It was assumed that the amount produced is equivalent to the amount used.

Table 1

USAGE OF AUTO REFINISHING PRODUCTS

Type of Coating	U.S. Production 1982 (gal x 10^6)	Growth Factor	U. S. Production 1983 (gal x 10^6)	CA Usage (gal x10^6)
Refinish paints and enamels except lacquers.....	25.8	1.028	26.5	2.83
Refinish primers and under coatings.....	9.6	1.028	9.9	1.05
Refinish lacquers.....	7.6	1.028	7.81	0.83
			Total	4.71

The composite emission factor of 5.275 lb/gal, which was used in the estimation of auto refinishing emissions for the 1979 inventory, was also used for the 1983 inventory. [4,5] Amounts of auto refinish products were apportioned to the counties based on 1983 Department of Finance population estimates.[6]

Emission estimates for 1983 were updated to 1987(Table 2) by using growth factors ranging from 0.340 to 2.453. The range represents the variability in growth among counties. These growth factors are used for forecasting by the Emissions Inventory Branch, ARB, and are assumed to be representative of the automotive services increase.[7]

ASSUMPTIONS

1. The 1982 production of refinish products from the Bureau of Census can be updated to 1983 by using a growth factor based on the increase of vehicle registration in the U.S. Usage of auto refinish products was assumed to be equal to the amount produced.

2. Distribution of refinish products usage in California can be made by using the ratio of California vehicle registration in the state to the national figure.

3. Distribution of refinish products usage to the counties can be made by population proportioning based on the Department of Finance population estimates for 1983.

COMMENTS AND RECOMMENDATIONS

National data from the Bureau of Census is used to estimate emissions from auto refinishing establishments. More accurate data may be obtained through a survey of auto refinishing shops in a county or district. This survey should determine whether the auto refinishing shops have add-on control devices which would decrease their emissions. Where such data are available, they will be evaluated for incorporation into the inventory.

TEMPORAL VARIATIONS

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

SAMPLE CALCULATIONS

1. Estimate Usage

The statewide usage estimate is apportioned to counties by taking the ratio of the population of the county to that of the state. Using Sacramento County as an example, calculations are as follows:

Population at the end of 1983 (from reference no. 3):

California = 24,958,978

Sacramento County = 839,949

$$\text{Amount of auto refinish products used in 1983 in Sacramento County} = (\text{Amount of auto refinish products used in CA in 1983}) \times \frac{(\text{Population of Sacramento County in 1983})}{(\text{Population of CA in 1983})}$$

$$\text{Amount of auto refinish products used in 1983 in Sacramento County} = (4{,}710{,}000 \text{ gallons}) \times \frac{(839{,}949 \text{ people})}{(24{,}958{,}978 \text{ people})}$$

$$= 158{,}506 \text{ gallons of refinish products}$$

2. Estimate Emissions

TOG emissions from the use of refinish products in 1983 in Sacramento County = (Amt. of refinish products used in Sacramento County) x (Composite emission factor)

= (158,506 gal/year) x (5.275 lb/gal)

= 836,120 lb/year

= 418.1 tons/year of TOG.

REFERENCES

1. Bureau of the Census, U.S. Department of Commerce, 1982 Census of Manufacturers, Paint and Allied Products (MC-I-28ECP) (July, 1984).

2. Personal Communication with Linda Conner, Motor Vehicles Manufacturers Association, Detroit, MI Jan 8, 1985. (313) 872-4311

3. California Department of Motor Vehicles, Estimated Fees Paid Registration by County, 1983. (March 1984).

4. Air Resources Board, State of California, Methods for Assessing Area Source Emissions in California (December 1982).

5. Results of the 1977 ARB Survey of Producers of Auto Refinish Products were obtained from Terone Preston, ARB, Chemical Strategy Development Section.

6. California Department of Finance Population estimates, for the fiscal year 1982/83.

7. Air Resources Board, Technical Support Division, Emission Inventory Branch Forecasting Section. Growth Scenario TND85, Control Scenario CS1985 (February 23, 1990).

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Table II
1987 Area Source Emissions
Activity:Services & Commerce
Process: Surface Coating
Entrainment: Coating Material-Evap
Dimn: Auto Body
CES: 46789
Process Rate Unit: 1000 Gallons of Coating

AB	County	Process Rate	TOG Emis. (Tons / Year)	CO Emis. (Tons / Year)	NOX Emis. (Tons / Year)	SOX Emis. (Tons / Year)	PM Emis. (Tons / Year)
GBV	ALPINE	0	0.20	0.00	0.00	0.00	0.00
	INYO	4	10.39	0.00	0.00	0.00	0.00
	MONO	2	5.95	0.00	0.00	0.00	0.00
LC	LAKE	10	26.82	0.00	0.00	0.00	0.00
LT	EL DORADO	5	16.79	0.00	0.00	0.00	0.00
	PLACER	2	5.49	0.00	0.00	0.00	0.00
MC	AMADOR	4	12.40	0.00	0.00	0.00	0.00
	CALAVERAS	5	13.95	0.00	0.00	0.00	0.00
	EL DORADO	15	39.09	0.00	0.00	0.00	0.00
	MARIPOSA	2	6.07	0.00	0.00	0.00	0.00
	NEVADA	14	37.85	0.00	0.00	0.00	0.00
	PLACER	3	8.55	0.00	0.00	0.00	0.00
	PLUMAS	3	10.79	0.00	0.00	0.00	0.00
	SIERRA	1	1.67	0.00	0.00	0.00	0.00
	TUOLUMNE	9	25.60	0.00	0.00	0.00	0.00
NC	DEL NORTE	4	10.99	0.00	0.00	0.00	0.00
	HUMBOLDT	24	64.59	0.00	0.00	0.00	0.00
	MENDOCINO	15	41.40	0.00	0.00	0.00	0.00
	SONOMA	12	32.88	0.00	0.00	0.00	0.00
	TRINITY	2	7.60	0.00	0.00	0.00	0.00
NCC	MONTEREY	66	176.25	0.00	0.00	0.00	0.00
	SAN BENITO	5	16.37	0.00	0.00	0.00	0.00
	SANTA CRUZ	48	127.82	0.00	0.00	0.00	0.00
NEP	LASSEN	4	12.80	0.00	0.00	0.00	0.00
	MODOC	2	5.40	0.00	0.00	0.00	0.00
	SISKIYOU	9	23.93	0.00	0.00	0.00	0.00
SC	LOS ANGELES	1754	4627.39	0.00	0.00	0.00	0.00
	ORANGE	513	1353.09	0.00	0.00	0.00	0.00
	RIVERSIDE	123	324.27	0.00	0.00	0.00	0.00
	SAN BERNARDINO	186	489.59	0.00	0.00	0.00	0.00
CC	SAN LUIS OBISPO	39	104.86	0.00	0.00	0.00	0.00
	SANTA BARBARA	65	172.22	0.00	0.00	0.00	0.00
	VENTURA	137	362.02	0.00	0.00	0.00	0.00
SD	SAN DIEGO	201	531.00	0.00	0.00	0.00	0.00
SED	IMPERIAL	22	59.56	0.00	0.00	0.00	0.00
	KERN	14	37.49	0.00	0.00	0.00	0.00
	LOS ANGELES	49	128.80	0.00	0.00	0.00	0.00
	RIVERSIDE	48	125.66	0.00	0.00	0.00	0.00
	SAN BERNARDINO	44	116.93	0.00	0.00	0.00	0.00
SF	ALAMEDA	203	827.82	0.00	0.00	0.00	0.00
	CONTRA COSTA	122	498.59	0.00	0.00	0.00	0.00
	MARIN	38	153.66	0.00	0.00	0.00	0.00
	NAPA	18	71.54	0.00	0.00	0.00	0.00
	SAN FRANCISCO	122	495.67	0.00	0.00	0.00	0.00
	SAN MATEO	103	418.29	0.00	0.00	0.00	0.00
	SANTA CLARA	237	964.69	0.00	0.00	0.00	0.00
	SOLANO	36	148.92	0.00	0.00	0.00	0.00
	SONOMA	12	40.51	0.00	0.00	0.00	0.00
SJV	FRESNO	127	335.82	0.00	0.00	0.00	0.00
	KERN	88	232.51	0.00	0.00	0.00	0.00
	KINGS	17	45.82	0.00	0.00	0.00	0.00
	MADERA	16	45.11	0.00	0.00	0.00	0.00
	MERCED	34	88.89	0.00	0.00	0.00	0.00
	SAN JOAQUIN	86	228.45	0.00	0.00	0.00	0.00
	STANISLAUS	67	178.27	0.00	0.00	0.00	0.00
	TULARE	54	143.47	0.00	0.00	0.00	0.00
SV	BUTTE	35	94.13	0.00	0.00	0.00	0.00
	COLUSA	3	7.94	0.00	0.00	0.00	0.00
	GLENN	4	13.41	0.00	0.00	0.00	0.00
	PLACER	24	63.61	0.00	0.00	0.00	0.00
	SACRAMENTO	194	511.34	0.00	0.00	0.00	0.00
	SHASTA	29	77.17	0.00	0.00	0.00	0.00
	SOLANO	14	38.40	0.00	0.00	0.00	0.00
	SUTTER	12	32.09	0.00	0.00	0.00	0.00
	TEHAMA	8	23.30	0.00	0.00	0.00	0.00
	YOLO	28	76.55	0.00	0.00	0.00	0.00
	YUBA	10	26.98	0.00	0.00	0.00	0.00
TOTAL		5206	15057.47	0.00	0.00	0.00	0.00

Fraction of Reactive Organic Gases (FROG): 1.0000
(Reactive Organic Gases (ROG) Emissions = TOG X FROG)
Fraction of PM10 (FRPM10): .9600
(PM10 Emissions = PM X FRPM10)