SECTION 3.6

COATINGS AND RELATED PROCESS SOLVENTS
THINNING AND CLEANING SOLVENTS

(Updated September 1991; Reissued October 1997)

> **EMISSION INVENTORY SOURCE CATEGORY**
> Cleaning and Surface Coatings / Coatings and Related Process Solvents
>
> **EMISSION INVENTORY CODES (CES CODES) AND DESCRIPTION**
> **230-240-8300-0000 (83295)** Industrial Coatings - Thinning and Cleaning Solvents

METHODS AND SOURCES

This category is used to inventory the total organic gas (TOG) emissions from thinning solvents used with industrial surface coatings. The industrial thinning and cleaning solvent category includes the use of thinners used for dopes, lacquers, and oleoresinous thinners.

Emission estimates for 1983, described below, were updated to 1987 and then to 1989 (Table I) by using growth factors ranging from 0.964 to 2.338. These growth factors are used for forecasting by the Emission Inventory Branch, ARB, and are assumed to be representative of the manufacturing and maintenance industries growth.[1]

The emission estimate for this category is based on production data from the 1982 Census of Manufacturers, Paint and Allied Products.[2] The 1982 national use of thinning and cleaning solvents was updated to 1983 by using the percent increase of product coatings used in manufacturing.[3] The California portion of the thinning solvents was estimated by multiplying the national industrial thinning solvent usage by the ratio of California population to that of the nation.

The production data from the 1982 Census of Manufacturers for thinning and cleaning solvents includes usage related to architectural coatings. The amount of solvents for architectural coatings was subtracted from the total thinning and cleaning solvent production data in order to get production data representative of only industrial coating thinning and cleaning solvent.

The distribution of industrial thinning solvent usage among Bureau of Economic Analysis (BEA) districts is based on the BEA economic index for manufacturing.[4]   Each BEA district value is further distributed to counties by population.

ASSUMPTIONS

1.   The 1982 production data from the Bureau of the Census represent the amount of thinning solvents consumed nationwide in 1982. In order to update the 1982 data to 1983, a growth factor based on the percentage increase of product coatings used in manufacturing was applied.

2.   The amount of industrial thinners used in California can be estimated by applying the ratio of California population to that of the nation.

COMMENTS AND RECOMMENDATIONS

Better data on industrial thinning and cleanup solvent usage could be obtained from a survey of manufacturers.

DIFFERENCES BETWEEN 1987 AND 1989 EMISSION ESTIMATES

There is a decrease in emissions from 1987 and 1989. This was primarily due to including the 10-25 tons per year sources in the point source inventory. Another reason for lower emissions is that some of the Air Pollution Control Districts or Air Quality Management Districts submitted to ARB their emission estimates for this category, which were lower overall.

SAMPLE CALCULATIONS

1.   To estimate usage of industrial thinning and cleanup solvent in California:

(1983 nationwide usage of industrial thinners)
   =   (1982 number of gallons of industrial thinners produced nationwide)
      x (growth factor)

   = $(5.37 \times 10^7 \text{ gallons})(1.098)$ = 5.896×10^7 gallons

(1983 number of gallons of industrial thinners used in California)
   = $(5.896 \times 10^7 \text{ gallons})$ x (population of CA/USA)

   = $(5.896 \times 10^7 \text{ gallons})$ x (0.101) = 5.955×10^6 gallons

Since the architectural thinning and cleaning solvents are included in the estimate for industrial thinners, the staff of ARB subtracted out the architectural thinning and cleaning solvents.

(Net 1983 number of gallons of industrial thinners used in California)
        = (1983 number of gallons of industrial thinners used in California)
          - (1983 number of gallons of architectural thinners used in California)

  = $(5.955 \times 10^6$ gallons) - $(2.287 \times 10^6$ gallons) = 3.668×10^6 gallons

2. The estimate of emissions can be made using the emission factor of 6400 pounds per thousand gallons.[5]

(TOG emissions (tons) from industrial thinners in California)
= (net 1983 number of gallons of industrial thinners used in California)
x (emission factor) / (2000 lbs/ton)

= $(3.668 \times 10^6$ gallons) (6400 lbs/1000 gallons) / (2000 lbs/ton)

= 11,738 tons of TOG

3. The emissions are distributed among counties by economic and population data.

The index for each BEA district is compared to the 1983 index for the state. For example, District 176 includes Mendocino, Vallejo, Fairfield, Napa, Santa Rosa, Bay Area, Salinas, San Benito, Seaside, and Monterey.

BEA Economic Area	1978	1985	1983 Calculated	% 1983 of State
District 176 Index	3,988,757	5,368,657	4,974,400	25.93

The total California emissions are 11, 738 tons/year TOG for 1983 industrial thinning and cleanup solvent. Therefore, for District 176:

      25.93% x 11,738 tons/year = 3,044 tons/year

The value for District 176 is distributed among the counties based on population. Contra Costa county contains 11.32% of the population in District 176; therefore, 11.32% x 3,044 tons/year = 344 tons/year TOG for Contra Costa county in 1983.

REFERENCES

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

2.   Bureau of the Census, U.S. Department of Commerce, <u>1982 Census of Manufacturers, Paint and Allied Products</u>, (M7 7C-I 28E) (June 1984).

3.   Bureau of the Census, U.S. Department of Commerce, <u>Current Industrial Reports - Paint, Varnish, and Lacquer</u>, (M28F (84) - 1) (January 1984).

4.   Bureau of Economic Analysis, U.S. Department of Commerce, <u>Population, Personal Income, and Earnings by State, Projections to 2000</u> (October 1977).

5.   California Air Resources Board, <u>Consideration of Model Organic Solvent Rule Applicable to Architectural Coatings</u> (June 1977).

PREPARED BY

Robert Weller
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Table I
1989 Area Source Emissions
Activity: Manufacturing & Industrial
Process: Solvent Use
Entrainment: Solvent-Evap
Dimn: Thinning Cleaning
CES: 83295
Process Rate Unit: 1000 Gallons of Solvent Consumed

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	3	12.40	0.00	0.00	0.00	0.00
	MONO	3	9.90	0.00	0.00	0.00	0.00
LC	LAKE	8	27.70	0.00	0.00	0.00	0.00
LT	EL DORADO	1	4.10	0.00	0.00	0.00	0.00
	PLACER	0	2.40	0.00	0.00	0.00	0.00
MC	AMADOR	0	0.20	0.00	0.00	0.00	0.00
	CALAVERAS	1	5.40	0.00	0.00	0.00	0.00
	EL DORADO	0	0.80	0.00	0.00	0.00	0.00
	MARIPOSA	1	2.40	0.00	0.00	0.00	0.00
	NEVADA	0	0.40	0.00	0.00	0.00	0.00
	PLACER	1	3.70	0.00	0.00	0.00	0.00
	PLUMAS	2	8.80	0.00	0.00	0.00	0.00
	SIERRA	0	0.50	0.00	0.00	0.00	0.00
	TUOLUMNE	2	7.90	0.00	0.00	0.00	0.00
NC	DEL NORTE	4	14.20	0.00	0.00	0.00	0.00
	HUMBOLDT	26	87.00	0.00	0.00	0.00	0.00
	MENDOCINO	13	45.90	0.00	0.00	0.00	0.00
	SONOMA	9	35.00	0.00	0.00	0.00	0.00
	TRINITY	3	10.90	0.00	0.00	0.00	0.00
NCC	MONTEREY	54	173.50	0.00	0.00	0.00	0.00
	SAN BENITO	4	11.20	0.00	0.00	0.00	0.00
	SANTA CRUZ	53	168.50	0.00	0.00	0.00	0.00
NEP	LASSEN	3	10.40	0.00	0.00	0.00	0.00
	MODOC	1	4.30	0.00	0.00	0.00	0.00
	SISKIYOU	6	19.60	0.00	0.00	0.00	0.00
SC	LOS ANGELES	0	0.00	0.00	0.00	0.00	0.00
	RIVERSIDE	0	0.00	0.00	0.00	0.00	0.00
	SAN BERNARDINO	0	0.00	0.00	0.00	0.00	0.00
SCC	SAN LUIS OBISPO	42	142.50	0.00	0.00	0.00	0.00
	SANTA BARBARA	55	176.80	0.00	0.00	0.00	0.00
	VENTURA	0	0.00	0.00	0.00	0.00	0.00
SD	SAN DIEGO	0	0.00	0.00	0.00	0.00	0.00
SED	IMPERIAL	9	35.00	0.00	0.00	0.00	0.00
	KERN	1	1.80	0.00	0.00	0.00	0.00
	LOS ANGELES	0	0.00	0.00	0.00	0.00	0.00
	RIVERSIDE	6	19.60	0.00	0.00	0.00	0.00
	SAN BERNARDINO	44	145.00	0.00	0.00	0.00	0.00
SJV	FRESNO	26	84.50	0.00	0.00	0.00	0.00
	KERN	3	11.50	0.00	0.00	0.00	0.00
	KINGS	5	14.30	0.00	0.00	0.00	0.00
	MADERA	4	17.30	0.00	0.00	0.00	0.00
	MERCED	7	26.20	0.00	0.00	0.00	0.00
	SAN JOAQUIN	14	46.40	0.00	0.00	0.00	0.00
	STANISLAUS	16	52.20	0.00	0.00	0.00	0.00
	TULARE	18	60.70	0.00	0.00	0.00	0.00
SV	BUTTE	7	24.70	0.00	0.00	0.00	0.00
	COLUSA	0	0.00	0.00	0.00	0.00	0.00
	GLENN	1	3.20	0.00	0.00	0.00	0.00
	PLACER	7	27.90	0.00	0.00	0.00	0.00
	SACRAMENTO	0	0.00	0.00	0.00	0.00	0.00
	SHASTA	18	60.30	0.00	0.00	0.00	0.00
	SOLANO	10	35.20	0.00	0.00	0.00	0.00
	SUTTER	2	7.00	0.00	0.00	0.00	0.00
	TEHAMA	5	18.20	0.00	0.00	0.00	0.00
	YOLO	4	14.50	0.00	0.00	0.00	0.00
	YUBA	1	6.00	0.00	0.00	0.00	0.00
TOTAL		503	1698.10	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)