



2008 Area Source Emissions Inventory Methodology

450 – WOOD PROCESSING LOSSES

I. Purpose

This document describes the Area Source Methodology used to estimate emissions of fine particulate matter less than 10 microns (PM₁₀) from woodworking operations such as sawing, planing, routing, shaping, lathing and sanding in the San Joaquin Valley Air Basin. An area source category is a collection of similar emission units within a geographic area (i.e., a County). An area source category collectively represent individual sources that are small and numerous, and that may not have been inventoried as specific point, mobile, or biogenic sources. The California Air Resources Board (CARB) has grouped these individual sources with other like sources into area source categories. These source categories are grouped in such a way that they can be estimated collectively using one methodology.

II. Applicability

The emission calculations from this Area Source Methodology apply to facilities that are identified by the following Category of Emission Source (CES) code and Reconciliation Emission Inventory Code (REIC):

Table 1. Emission inventory codes.

CES	REIC	Description
47043	450-995-0230-0000	Wood Processing Losses

III. Point Source Reconciliation

Emissions from the area source inventory and point source inventory are reconciled against each other to prevent double counting. This is done using relationships created by the California Air Resources Board (CARB) between the area source REIC and the point sources' Standard Industry Classification (SIC) code and emissions process Source Category Code (SCC) combinations. The area sources in this methodology reconcile against processes in our point source inventory with the SIC/SCC combinations listed in Appendix A.

IV. Methodology Description

This methodology is used to inventory emissions of particulate matter less than 10 microns in diameter (PM₁₀) from the sawing, planing, routing, shaping, lathing, sanding or other processing of wood to create wood products.

The total number of wood processing facilities in each county in the District was queried from the United States Census Bureau's *County Business Patterns* online database. From this pool of wood processing operations, the number of permitted facilities that report their emissions through the District's point source inventory was subtracted. The number of remaining non-permitted facilities was then used to estimate area source emissions for this source category. Emissions were estimated by assuming that each non-permitted facility operated just below levels requiring District permits (2 lbs of PM₁₀ per day).

V. Activity Data

The NAICS codes of businesses that may process wood as a normal part of their operations are presented in Appendix B. The number of businesses (employer plus non-employer) in each county in the air district associated with these NAICS codes was obtained from United States Census Bureau's *County Business Patterns* online database, and are presented in the table below.

Table 2. Number of businesses with woodworking NAICS codes¹ (employer and non-employer) operating in the District (US Census Bureau, 2008).

County	Total Sources	Permitted Sources	Non-Permitted Sources
Fresno	68	12	56
Kern	41	7	34
Kings	2	0	2
Madera	15	4	11
Merced	19	2	17
San Joaquin	55	28	27
Stanislaus	45	17	28
Tulare	35	10	25
Total	280	80	200

¹NAICS 321 (Wood Product Manufacturing) and 3221 (Pulp, Paper, and Paperboard Mills).

VI. Emission Factors

The only pollutant emitted by the sources estimated in this methodology is particulate matter. It is assumed that all significant sources of emissions within this source category are under District permit, and their emissions reported annually through the point source inventory. It is further assumed that all non-permitted facilities emit at levels below the District's permitting threshold, which is 2 lbs of pollutant per day. Therefore, an emission factor of 2 lbs of PM₁₀ per day per non-permitted woodworking operation will be assumed.

VII. Emissions Calculations

A. Assumptions

1. Each non-permitted woodworking operation emits 2 pounds of PM₁₀ per day.
2. Woodworking facilities operate five days per week, 52 weeks per year (260 days per year)

B. Sample Calculations

Emissions of PM₁₀ from non-permitted woodworking operations are calculated as follows:

$$\frac{\text{tons } PM_{10}}{\text{year}} = \text{No. operations} \times \frac{2 \text{ lbs } PM_{10}}{\text{day}} \times \frac{260 \text{ days}}{\text{year}} \times \frac{1 \text{ ton}}{2,000 \text{ lbs}}$$

For PM₁₀ emissions from non-permitted woodworking operations in Fresno County:

Given:

1. There were 56 non-permitted woodworking operations in Fresno County in 2008.

Calculate Emissions:

$$\frac{\text{Tons } PM_{10}}{\text{Year}} = 56 \text{ Operations} \times \frac{2 \text{ lbs } PM}{\text{Operation} - \text{day}} \times \frac{260 \text{ days}}{\text{Year}} \times \frac{1 \text{ ton}}{2,000 \text{ lbs}}$$

$$\frac{\text{Tons } PM_{10}}{\text{Year}} = 14.56$$

VIII. Temporal Variation

A. Daily

CARB Code 9. 9 hours per day.

B. Weekly

CARB Code 5. 5 days per week - uniform activity on week days; none on Saturday and Sunday.

C. Monthly

Uniform monthly activity: 8.33% of annual activity per month.

IX. Spatial Variation

Area source emissions for this source category may be spatially allocated to grid cells within each county based on industrial employment data from the COGs (industrial employment in a grid cell divided by the total industrial employment in the county).

X. Growth Factor

Growth factors are developed by either the District's Strategies and Incentives Department or CARB for each EIC. These factors are used to estimate emissions in future years. The growth factor associated with this emissions category may be obtained from the District's Strategies and Incentives Department.

XI. Control Level

Control levels are developed by either the District's Strategies and Incentives Department or CARB for each EIC. Control levels are used to estimate emissions reductions in future years due to implementation of District rules. These control levels take into account the effect of control technology, compliance and exemptions at full implementation of the rules.

Woodworking operations are not subject to a source specific prohibitory rule. Control levels associated with this emissions category may be obtained from the District's Strategies and Incentives Department.

XII. CARB Chemical Speciation

CARB has developed particulate matter speciation profiles in order to calculate particulate matter (PM), particulate matter with a diameter less than or equal to 10 microns (PM₁₀) or particulate matter with a diameter less than or equal to 2.5 microns (PM_{2.5}) given any one of the three values. For each speciation profile, the fraction of PM that is PM₁₀ and PM_{2.5} is given. The particulate matter profile codes can also be used to lookup associated toxics. CARB's speciation profiles for wood products processing losses are presented in the table below.

Table 3. CARB particulate matter speciation profiles for 450-995-0230-0000.

Profile Description	CARB PM Profile#	Fractions	
		PM ₁₀	PM _{2.5}
Unspecified	900	0.7	0.42

XIII. Assessment Of Methodology

This methodology conservatively estimates area source emissions from woodworking operation using the following assumptions:

1. The NAICS codes presented in Appendix A accurately represent businesses within this source category.
2. The number of woodworking businesses in the District are accurately tabulated by the United States Census Bureau's *County Business Patterns* online database.
3. All significant sources of emissions within this source category are under District permit, and their emissions are reported annually through the point source inventory.
4. All non-permitted facilities emit at levels below the District's permitting threshold, which is 2 lbs of pollutant per day.

This methodology does not estimate wood processing emissions from the logging of timber or from residential/commercial construction. Area source emissions from wood chipping and grinding operations at landfills, composting facilities, biomass plants and farms are also not included. Process rates and emission factors could not be identified to estimate area source emissions from these sources at this time.

XIV. Emissions

Following is the 2008 area source emissions inventory for REIC 450-995-0230-0000 estimated by this methodology. Emissions are reported for each county in the District.

Table 4. Area source emissions for REIC 450-995-0230-0000 (2008).

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC	PM ₁₀	PM _{2.5} ⁽¹⁾
Fresno	-	-	-	-	14.56	N/A
Kern	-	-	-	-	8.84	N/A
Kings	-	-	-	-	0.52	N/A
Madera	-	-	-	-	2.86	N/A
Merced	-	-	-	-	4.42	N/A
San Joaquin	-	-	-	-	7.02	N/A
Stanislaus	-	-	-	-	7.28	N/A
Tulare	-	-	-	-	6.50	N/A
TOTAL	-	-	-	-	52.00	N/A

(1) At this time, the District does not calculate PM_{2.5} emissions. PM_{2.5} emissions can be estimated using the speciation profiles found in Section XII.

Following is the 2008 point source emissions inventory for REIC 450-995-0230-0000 as reported to the District by our permit holders. Emissions are reported for each county in the District.

Table 5. Point source emissions for REIC 450-995-0230-0000 (2008).

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC	PM ₁₀	PM _{2.5} ⁽¹⁾
Fresno	-	-	-	-	19.48	N/A
Kern	-	-	-	-	0.37	N/A
Kings	-	-	-	-	1.85	N/A
Madera	-	-	-	-	0.00	N/A
Merced	-	-	-	-	0.11	N/A
San Joaquin	-	-	-	-	32.87	N/A
Stanislaus	-	-	-	-	7.68	N/A
Tulare	-	-	-	-	17.07	N/A
TOTAL	-	-	-	-	79.43	N/A

(1) At this time, the District does not calculate PM_{2.5} emissions. PM_{2.5} emissions can be estimated using the speciation profiles found in Section XII.

Following is the 2008 total unreconciled (point source plus area source) emissions inventory for REIC 450-995-0230-0000. Emissions are reported for each county in the District.

Table 6. Total emissions for REIC 450-995-0230-0000 (2008).

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC	PM ₁₀	PM _{2.5} ⁽¹⁾
Fresno	-	-	-	-	34.04	N/A
Kern	-	-	-	-	9.21	N/A
Kings	-	-	-	-	2.37	N/A
Madera	-	-	-	-	2.86	N/A
Merced	-	-	-	-	4.53	N/A
San Joaquin	-	-	-	-	39.89	N/A
Stanislaus	-	-	-	-	14.96	N/A
Tulare	-	-	-	-	23.57	N/A
TOTAL	-	-	-	-	131.43	N/A

(1) At this time, the District does not calculate PM_{2.5} emissions. PM_{2.5} emissions can be estimated using the speciation profiles found in Section XII.

Following is the net change in total unreconciled emissions between this update (2008 inventory year) and the previous update (2007 inventory year) for REIC 450-995-0230-0000. The change in emissions are reported for each county in the District.

Table 7. Net emissions change for REIC 450-995-0230-0000 (2008-2007).

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC	PM ₁₀	PM _{2.5} ⁽¹⁾
Fresno	-	-	-	-	11.61	N/A
Kern	-	-	-	-	8.80	N/A
Kings	-	-	-	-	0.52	N/A
Madera	-	-	-	-	2.85	N/A
Merced	-	-	-	-	4.34	N/A
San Joaquin	-	-	-	-	8.26	N/A
Stanislaus	-	-	-	-	2.14	N/A
Tulare	-	-	-	-	1.16	N/A
TOTAL	-	-	-	-	39.68	N/A

(1) At this time, the District does not calculate PM_{2.5} emissions. PM_{2.5} emissions can be estimated using the speciation profiles found in Section XII.

XV. Revision History

2008. This is a new District methodology.

XVI. Update Schedule

In an effort to provide inventory information to CARB and other District programs and maximize limited resources, the District has developed an update cycle based on emissions within the source category as shown in the following table:

Table 8. Area source update frequency criteria.

Total Emissions (tons/day)	Update Cycle (years)
<=1	4
>1 and <= 2.5	3
>2.5 and <=5	2
>5	1

Since PM₁₀ emissions are less than 1 ton per day, this area source estimate will be updated every four years.

Table 9. Wood processing losses methodology update frequency.

REIC	Frequency (years)	Source of Emissions (Point Source Inventory / Data Gathering)
450-995-0230-0000	4	Point Source Inventory / Data Gathering

XVII. References

1. United States Census Bureau. 2008. County business patterns online database. <http://www.census.gov/econ/cbp/index.html>. Accessed December 2010.

XVIII. Appendix

Appendix A. Inventory Reconciliation Codes

Appendix B. Woodworking NAICS and SIC Codes

Appendix A. Inventory Reconciliation Codes

Table 10. EIC, SCC and SIC codes that reconcile to REIC 450-995-0230-0000.

EIC	SCC	SCC Description	SIC
450-450-0230-0000	30700899	WOOD PRODUCTS – SAWMILL OPERATION – NOT CLASSIFIED – OTHER	2611
450-452-5610-0000	31299999	MACHINERY – MISCELLANEOUS – NOT CLASSIFIED – OTHER	2657
	30700101	PULP & PAPER – KRAFT PULPING – DIGESTOR/BLOW TNK – GENERAL	2436
	30700701	WOOD PRODUCTS – PLYWOOD/PARTBOARD – VENEER DRYERS – GENERAL	2436
	30700702	WOOD PRODUCTS – PLYWOOD/PARTBOARD – SAND OPERATIONS – GENERAL	2431, 2436, 2493
	30700703	WOOD PRODUCTS – PLYWOOD/PARTBOARD – PRT BRD DRY OPER – GENERAL	2084, 2436, 2493, 2499
	30700705	WOOD PRODUCTS – PLYWOOD/PARTBOARD – HARDBOARD – COE DRYER	2493
	30700706	WOOD PRODUCTS – PLYWOOD/PARTBOARD – HARDBOARD – PREDRYER	2493
	30700707	WOOD PRODUCTS – PLYWOOD/PARTBOARD – HARDBOARD – PRESSING	2493
450-454-5620-0000	30700710	WOOD PRODUCTS – PLYWOOD/PARTBOARD – PLYWOOD/PARTICLEBRD – SAWING	2431, 2451, 2452, 2493, 2599, 2672, 9221
	30700727	WOOD PRODUCTS – PLYWOOD/PARTBOARD – PLYWOOD – VENER LAYNG&GLUE SPR	2431, 2452
	30700798	WOOD PRODUCTS – PLYWOOD/PARTBOARD – NOT CLASSIFIED – OTHER	2439, 2499, 2599, 5031
	30700799	WOOD PRODUCTS – PLYWOOD/PARTBOARD – NOT CLASSIFIED – OTHER	2421, 2431, 2436, 2439, 2493, 2499, 2521, 2522, 2541, 2599
	30700101	PULP & PAPER – KRAFT PULPING – DIGESTOR/BLOW TNK – GENERAL	2421
450-456-0230-0000	30700801	WOOD PRODUCTS – SAWMILL OPERATION – LOG DEBARKING – GENERAL	1751, 2411, 2421, 2426, 2431, 2434, 2435, 2441, 2451, 2452, 2491, 2493, 2499, 2511, 2512, 2517, 2521, 2591, 2599, 2655
	30700802	WOOD PRODUCTS – SAWMILL OPERATION – LOG SAWING – GENERAL	2421, 5211, 9223

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EIC	SCC	SCC Description	SIC
450-456-0230-0000	30700803	WOOD PRODUCTS - SAWMILL OPERATION - SAWDUST HANDLING - GENERAL	722, 1521, 2421, 2431, 2434, 2449, 2493, 2499, 2512, 2541, 2599, 2631, 2653, 3089, 3444, 3732, 3999, 4231, 5031, 5211, 5541, 8322, 8661, 9199, 9223, 9711
	30700804	WOOD PRODUCTS - SAWMILL OPERATION - SAWING - CYCLONE EXHAUST	173, 2421, 2431, 2439, 2451, 2452, 2499, 2671
	30700805	WOOD PRODUCTS - SAWMILL OPERATION - PLANING & TRIMMING - CYCLONE EXHAUST	2421, 2429, 2431, 2439
	30700806	WOOD PRODUCTS - SAWMILL OPERATION - SANDING - CYCLONE EXHAUST	2421, 2511
	30700807	WOOD PRODUCTS - SAWMILL OPERATION - SANDERDUST - CYCLONE EXHAUST	2421, 2493, 3272, 4953
	30700808	WOOD PRODUCTS - SAWMILL OPERATION - OTHER CYCLONES - CYCLONE EXHAUST	2046, 2421, 2431, 2434, 2441, 2493, 2511, 3553, 5099, 5541
	30700820	WOOD PRODUCTS - SAWMILL OPERATION - SAWMILL - CHIPPING & SCREENING	2421, 5093, 5099, 9199
	30700821	WOOD PRODUCTS - SAWMILL OPERATION - SAWMILL - CHIP STORAGE PILES	2421, 2493
	30700822	WOOD PRODUCTS - SAWMILL OPERATION - SAWMILL - CHIP TRNSFR/CNVYNG	2421, 2493
	30700896	WOOD PRODUCTS - SAWMILL OPERATION - NOT CLASSIFIED - OTHER	2421, 5541, 5712, 9711
	30700897	WOOD PRODUCTS - SAWMILL OPERATION - NOT CLASSIFIED - OTHER	2421, 2439, 2499
	30700898	WOOD PRODUCTS - SAWMILL OPERATION - NOT CLASSIFIED - OTHER	1521, 2421, 2431, 2434, 2449, 2451, 2452, 2499, 5031, 5541, 9711
	30700899	WOOD PRODUCTS - SAWMILL OPERATION - NOT CLASSIFIED - OTHER	2411, 2421, 2429, 2431, 2434, 2439, 2441, 2449, 2452, 2491, 2493, 2499, 2511, 2519, 2521, 2531, 2541, 2599, 3612, 4812, 5031, 5084, 5199, 5211

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EIC		SCC	SCC Description	SIC
450-456-0230-0000	30702002		WOOD PRODUCTS - FURNITURE MFG - MACHINE ROOM -	1521, 2421, 2431, 2434, 2499, 2531, 3442, 3792, 5211, 8221, 9223
	30702003		WOOD PRODUCTS - FURNITURE MFG - SANDING -	2431, 2511
	30702004		WOOD PRODUCTS - FURNITURE MFG - WOOD HOG -	2431, 4911, 4953, 5031, 9223
	30702098		WOOD PRODUCTS - FURNITURE MFG - NOT CLASSIFIED - OTHER	2431, 2499, 2511, 2512, 2591, 9223
	30702099		WOOD PRODUCTS - FURNITURE MFG - NOT CLASSIFIED - OTHER	2421, 2431, 2434, 2439, 2499, 2511, 2512, 2519, 2521, 2531, 2599, 2851, 3211, 3444, 3471, 3553, 3792, 3931, 3993, 4212, 4911, 4941, 4953, 5021, 5093, 5171, 7349, 7641, 7812, 8211, 8222, 8661, 9223, 9661, 9711
	30703001		WOOD PRODUCTS - MISCELLANEOUS - WOODWASTE STORAGE - BIN VENT	1521, 2421, 2431, 2493, 2521, 2599, 4911, 9223
	30703002		WOOD PRODUCTS - MISCELLANEOUS - WOODWASTE STORAGE - BIN LOADOUT	2411, 2421, 2429, 2431, 2436, 2439, 2493, 2499, 2599, 2875, 3479, 4911, 4931, 4953, 5093, 9199
	30703096		WOOD PRODUCTS - MISCELLANEOUS - SANDING/PLANING - OTHER	2499, 2519, 2531
	30703097		WOOD PRODUCTS - MISCELLANEOUS - SANDING/PLANING - OTHER	3792
	30703098		WOOD PRODUCTS - MISCELLANEOUS - SANDING/PLANING - OTHER	851, 1521, 2421, 2431, 2434, 2435, 2499, 2519, 2541, 8221, 8661, 8733, 9711
	30703099		WOOD PRODUCTS - MISCELLANEOUS - SANDING/PLANING - OTHER	2421, 2431, 2439, 2499, 2511, 3221, 3449, 5211, 9223, 9711
	30704001		WOOD PRODUCTS - MISCELLANEOUS - STORAGE BINS - WOOD/BARK	2431, 2493, 2499, 4491, 4953, 8733
	30704002		WOOD PRODUCTS - MISCELLANEOUS - STOCKPILES - WOOD/BARK	2493, 4911, 4931, 5093
	30704003		WOOD PRODUCTS - MISCELLANEOUS - UNLOADING - WOOD/BARK	2411, 2499, 4491, 4911, 4931, 5099

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EIC	SCC	SCC Description	SIC
	30704004	WOOD PRODUCTS - MISCELLANEOUS - LOADING - WOOD/BARK	2421, 4911, 4953
	30704005	WOOD PRODUCTS - MISCELLANEOUS - CONVEYORS - WOOD/BARK	1442, 2421, 2499, 4911, 5099
450-456-0230-0000	30788801	WOOD PRODUCTS - FUGITIVE EMISSION - NOT CLASSIFIED - OTHER	2421, 2431, 2491, 2519, 2521, 2821, 4953, 5099, 7992, 8221
	30788802	WOOD PRODUCTS - FUGITIVE EMISSION - NOT CLASSIFIED - OTHER	2491, 4911, 4931
	30788805	WOOD PRODUCTS - FUGITIVE EMISSION - NOT CLASSIFIED - OTHER	3732
	30788898	WOOD PRODUCTS - FUGITIVE EMISSION - NOT CLASSIFIED - OTHER	2431, 2493, 2499, 2599
	30799998	WOOD PRODUCTS - MISCELLANEOUS - NOT CLASSIFIED - OTHER	2421, 2499, 9711
450-456-5620-0000	30700703	WOOD PRODUCTS - PLYWOOD/PARTBOARD - PRT BRD DRY OPER - GENERAL	2451, 2452
	30700798	WOOD PRODUCTS - PLYWOOD/PARTBOARD - NOT CLASSIFIED - OTHER	3792
	30700799	WOOD PRODUCTS - PLYWOOD/PARTBOARD - NOT CLASSIFIED - OTHER	3792
	30700710	WOOD PRODUCTS - PLYWOOD/PARTBOARD - PLYWOOD/PARTICLEBRD - SAWING	2671, 5031
	30700725	WOOD PRODUCTS - PLYWOOD/PARTBOARD - PLYWOOD - VENEER CUTTING	2621
450-995-0230-0000	30700798	WOOD PRODUCTS - PLYWOOD/PARTBOARD - NOT CLASSIFIED - OTHER	2531
	30700799	WOOD PRODUCTS - PLYWOOD/PARTBOARD - NOT CLASSIFIED - OTHER	4931
	30700801	WOOD PRODUCTS - SAWMILL OPERATION - LOG DEBARKING - GENERAL	2672
	30700899	WOOD PRODUCTS - SAWMILL OPERATION - NOT CLASSIFIED - OTHER	3952
	30702001	WOOD PRODUCTS - FURNITURE MFG - ROUGH - END -	2451
	30703099	WOOD PRODUCTS - MISCELLANEOUS - SANDING/PLANING - OTHER	3732, 5541
	30788801	WOOD PRODUCTS - FUGITIVE EMISSION - NOT CLASSIFIED - OTHER	3479, 9199

Appendix B.

Table 11. NAICS and corresponding SIC codes for industries that manufacture wood or wood products.

NAICS	NAICS Description	SIC
321113	Sawmills	2421
321912	Cut Stock, Resawing Lumber, and Planing	2421
321918	Other Millwork (including Flooring)	2421
321920	Wood Container and Pallet Manufacturing	2421
321999	All Other Miscellaneous Wood Product Manufacturing	2421
321113	Sawmills	2426
321912	Cut Stock, Resawing Lumber, and Planing	2426
321918	Other Millwork (including Flooring)	2426
321113	Sawmills	2429
321920	Wood Container and Pallet Manufacturing	2429
321999	All Other Miscellaneous Wood Product Manufacturing	2429
321911	Wood Window and Door Manufacturing	2431
321918	Other Millwork (including Flooring)	2431
321211	Hardwood Veneer and Plywood Manufacturing	2435
321212	Softwood Veneer and Plywood Manufacturing	2436
321213	Engineered Wood Member (except Truss) Manufacturing	2439
321214	Truss Manufacturing	2439
321920	Wood Container and Pallet Manufacturing	2441
321920	Wood Container and Pallet Manufacturing	2448
321920	Wood Container and Pallet Manufacturing	2449
321991	Manufactured Home (Mobile Home) Manufacturing	2451
321992	Prefabricated Wood Building Manufacturing	2452
321114	Wood Preservation	2491
321219	Reconstituted Wood Product Manufacturing	2493
321920	Wood Container and Pallet Manufacturing	2499
321999	All Other Miscellaneous Wood Product Manufacturing	2499
322110	Pulp Mills	2611
322121	Paper (except Newsprint) Mills	2611
322122	Newsprint Mills	2611
322130	Paperboard Mills	2611
322121	Paper (except Newsprint) Mills	2621
322122	Newsprint Mills	2621
322130	Paperboard Mills	2631
321999	All Other Miscellaneous Wood Product Manufacturing	3131
321999	All Other Miscellaneous Wood Product Manufacturing	3999