

Development of Revised Emission Estimates for Important VOC Area Sources in Texas

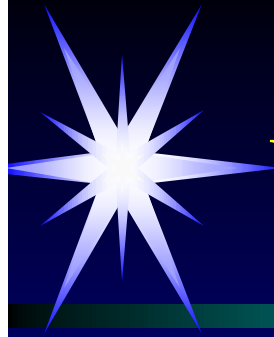
Stephen Roe, Holly Chelf, Michael Caldwell and Randy Strait

E.H. Pechan & Associations, Inc.

and

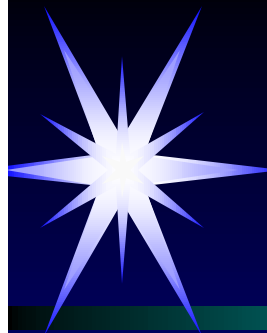
Melinda Torres and Karla Smith-Hardison

Texas Natural Resource Conservation Commission



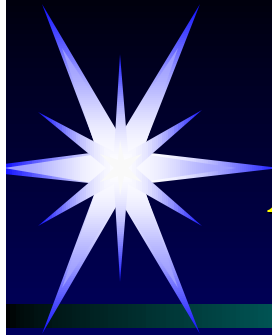
VOC Area Source Categories

- Architectural & Industrial Maintenance (AIM) Coatings;
- Commercial & Consumer Products;
- Auto Refinishing;
- Industrial Surface Coatings; and
- Traffic Markings.



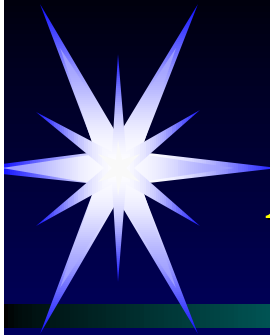
General Approach

- Use EIIP alternative methods or enhancements to these methods;
- Incorporate new information on the VOC content of solvents and coatings; and
- Disaggregate source categories to allow for better spatial allocation and speciation.



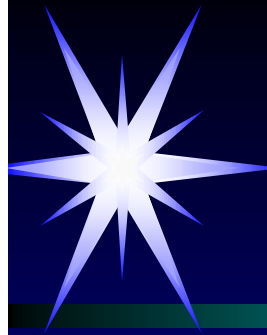
AIM Coatings

- Disaggregate into 12 source categories;
- Develop emission factors from CARB survey data; and
- Develop activity data as described by the EIIP: coatings consumption at the national level divided by population (architectural) or manufacturing employment (industrial).



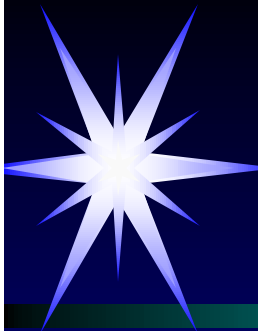
AIM Coatings (cont.)

2401001000	Overall Architectural and Industrial Maintenance (AIM) Category
2401001001	Flat Paints
2401001005	Nonflat Paints – Low and Medium Gloss
2401001006	Nonflat Paints – High Gloss
2401001010	Primers, Sealers, and Undercoaters
2401001011	Quick Dry – Primers, Sealers, and Undercoaters
2401001015	Stains – Semitransparent
2401001020	Quick Dry – Enamels
2401001025	Lacquers – Clear
2401001050	All Other Architectural Categories
2401001060	Thinning and Clean – Up of Solvent – Based Architectural Coatings
2401100000	Industrial Maintenance Coatings
2401100001	Thinning and Clean-Up of Solvent-Based Industrial Maintenance Coatings



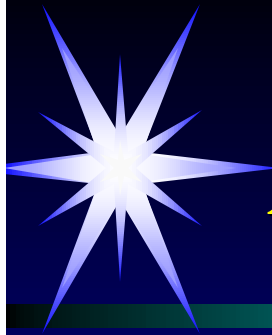
Consumer and Commercial Products

- Similar to the AIM coatings approach:
 - Disaggregate into 7 source categories;
 - Per capita emission factors derived from a 1997 CARB survey.



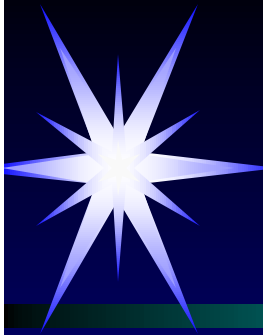
Consumer and Commercial Products (cont.)

2460000000	Overall Consumer and Commercial Products
2460100000	Personal Care Products
2460200000	Household Products
2460400000	Automotive Aftermarket Products
2460500000	Coatings and Related Products
2460600000	Adhesives and Sealants
2460800000	FIFRA-Regulated Products
2460900000	Miscellaneous Products



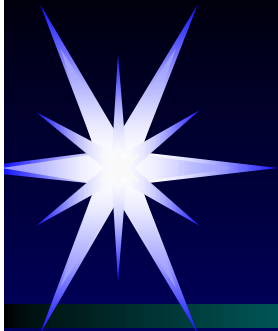
Auto Refinishing

- Disaggregate into surface prep solvents, primers, top coats, clean-up solvents;
- Based on a TNRCC study, develop emission factors specific to shop size (revenue);
- Procure and utilize a business database of auto refinishing shops in Texas as activity data; and
- Based on draft EIIP guidance: assume that surface prep = 2% total emissions; clean-up = 8% total emissions.



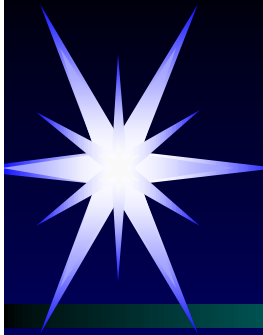
Industrial Surface Coatings

- Develop employment-based emission factors for 14 source categories using:
 - National coatings shipments data by industry from U.S. Department of Commerce;
 - VOC content data from National Paint and Coatings Association; and
 - Bureau of Census national employment data.
- Apply county-level employment data; and
- Back out point source emissions.



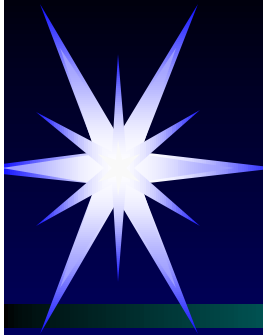
Industrial Surface Coatings Categories

Source Category (SCC)	NAICS Codes
Factory finished wood (2401015000)	32192; 33711; 321113; 321211; 321212; 321213; 321214; 321219; 321911; 321912; 321918; 321991; 321992; 321999; 337215
Wood furniture (2401020000)	337122; 337129; 337211; 337212; 337215
Metal furniture and fixtures (2401025000)	337121; 337124; 337214; 337127; 339111
Paper, foil and film (2401030000)	3222; 326111; 326112; 326113
Metal containers (2401040000)	332431; 332439
Sheet, strip and coil (2401045000)	332812
Machinery and equipment (2401055000)	333; 332997; 332991; 33271
Large appliances (2401060000)	333414; 335211; 335212; 335221; 335222; 335224; 335228
Electronic and other electrical (2401065000)	331319; 331422; 331491; 335921; 335929; 335311
Motor vehicles (2401070000)	336111; 336112; 33612; 336211; 336992
Aircraft (2401075000)	336411; 336413
Marine (2401080000)	336611; 336612
Railroad (2401085000)	33651
Miscellaneous manufacturing (2401090000)	all 31-33, except those listed above



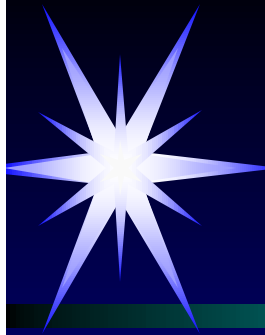
Traffic Markings

- Annual average paint consumption for each of several formulations from TXDOT;
- VOC content for each formulation used to estimate emissions;
- 1999 state highway lane-miles data used for county allocation;
- City/county roads paints estimated as 25% of total paint purchases (highways 65%);



Traffic Markings (cont.)

- VOC content for city/county paints - 1.3 lb VOC/gallon (Federal limit for traffic markings);
- County and city road lane-miles used for state to county allocation;
- Paint used on private roads and parking lots - 10% of total state purchases;
- VOC content for private roads/parking lots - 3.8 lb VOC/gallon (Federal limit for zone markings); and
- County population data used for state to county allocation.



Results

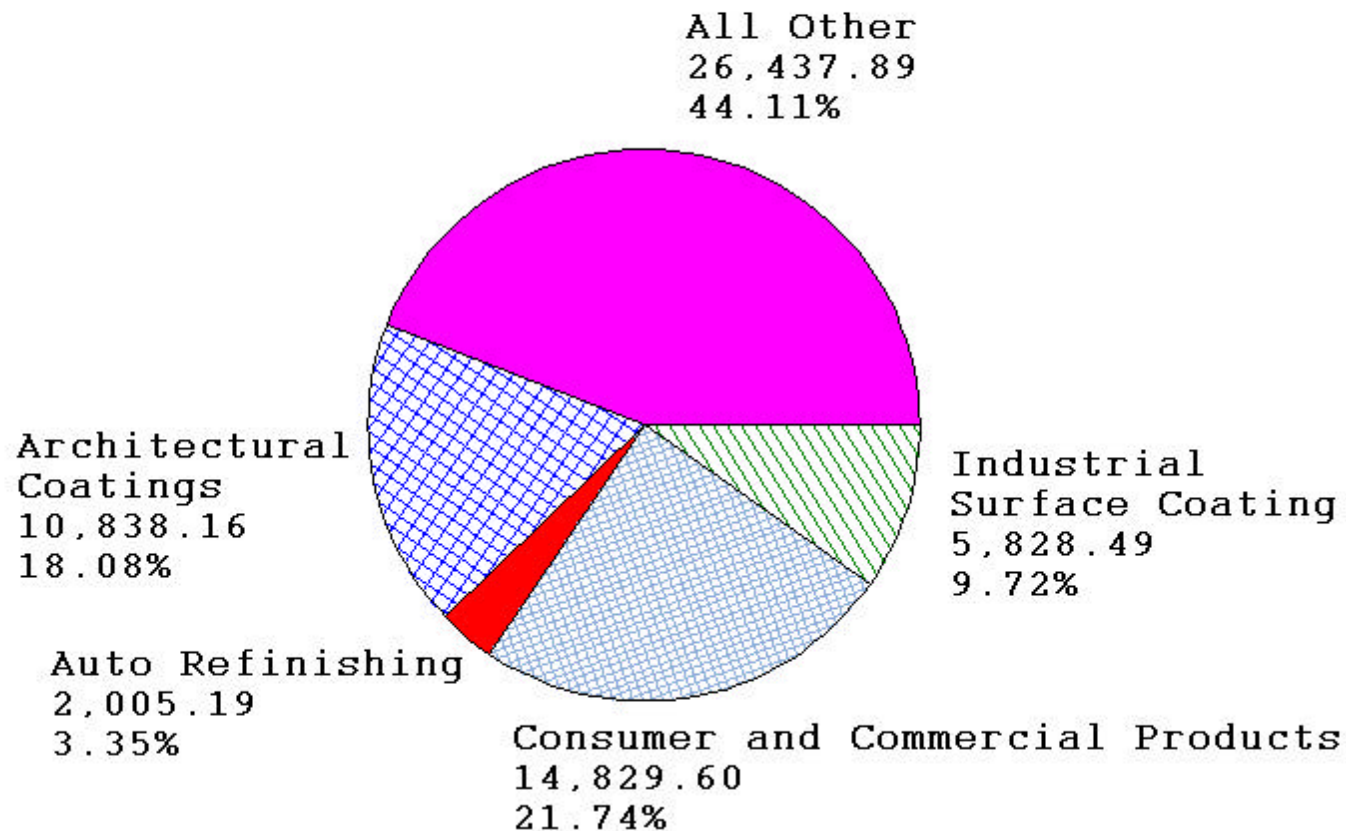
- Overall decrease of 26% in annual VOC emissions;
- Significant decreases in AIM, auto refinishing, several industrial surface coatings categories;
- 20% - 33% reductions in Texas non-attainment areas; and
- Improved spatial allocation and potential for improved speciation.



Revised 1999 VOC Estimates

Area Sources	TNRCC Original	TNRCC Revised	Difference	% Change
Architectural Coatings	49,528	30,224	-19,304	-39.0
Auto Refinishing	9,163	3,054	-6,110	-66.7
Consumer and Commercial Products	67,768	66,482	-1,286	-1.9
IS -Aircraft	1,979	2,656	676	34.2
IS -Electronic and other Electrical	216	231	15	6.9
IS -Factory Finished Wood	540	381	-158	-29.3
IS -Large Appliances	1,460	545	-915	-62.7
IS -Machinery and Equipment	2,688	1,763	-925	-34.4
IS -Marine	1,200	201	-999	-83.3
IS -Metal Containers	5,900	2,766	-3,134	-53.1
IS -Metal Furniture and Fixtures	4,233	1,775	-2,458	-58.1
IS -Miscellaneous Manufacturing	2,056	2,273	217	10.6
IS -Motor Vehicles	6,923	870	-6,053	-87.4
IS -Paper, Foil and Film	2,529	1,704	-826	-32.7
IS -Railroad	1,699	2,066	367	21.6
IS -Sheet, Strip and Coil	5,462	2,283	-3,179	-58.2
Industrial Maintenance Coatings	2,033	1,583	-450	-22.1
State Total	165,376	120,855	-44,521	-26.9

1999 TNRCC Original Emissions
VOC TONS/YEAR
Houston/Galveston Non-Attainment Region



1999 TNRCC Revised Emissions
VOC TONS/YEAR
Houston/Galveston Non-Attainment Region

