

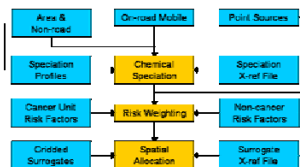
The Bay Area Air Quality Management District (BAAQMD) is carrying out the Community Air Risk Evaluation (CARE) program to characterize and reduce health risks from toxic air contaminants (TACs) emitted in the San Francisco Bay Area. In support of the CARE program's goals, screening level graded emission inventories of TACs were prepared. These screening-level inventories were assembled up-down from readily available information and processed as early as possible from which subsequent programs will build more refined estimates of emissions. The screening level emission inventories of TACs were prepared by acquiring and processing existing and available data. These data included (1) a county-level area and non-road mobile source inventory of year-2000 emissions of TOC and PM₁₀; (2) graded road mobile source inventories of year-2000 summer and winter emissions of CO, NO_x, and lead; (3) stationary sources' annual emissions of TACs from a wide range of industrial processes; (4) annual emissions of TACs from various types of combustion facilities; (5) chemical species profile; (6) CSO database; (7) source-specific rates of PM₁₀-PM_{2.5} and (8) inhalation unit risk factors. The resultant inventories are intended to aid in the identification and prioritization of further inventory development but should be considered suitable for initial exposure assessment and preliminary risk-based decision making. This report provides background information concerning future research efforts.

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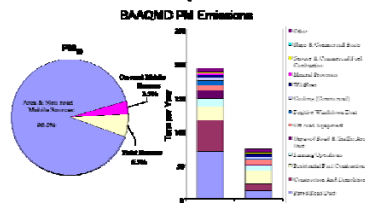
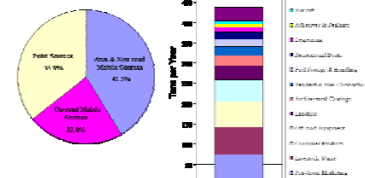
Emission Inventory Conference, New Orleans, Louisiana, May 16, 2006



1. Begin with existing criteria pollutant emission inventories (total organic gases—TOG and PM₁₀)
2. Apply available chemical speciation profiles
3. Spatially allocate emissions
4. Apply available cancer and non-cancer unit risk factors
5. Develop gridded toxics emissions map displays

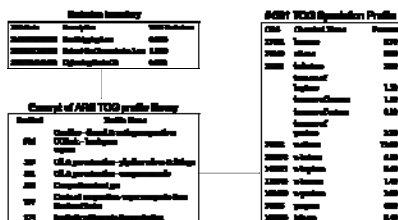


- **Non-road mobile and area sources**
County-level, TOG and PM₁₀
- **On-road mobile sources**
Gridded, TOG and PM₁₀, summer and winter weekday
- **Point sources**
Individual sources, toxic air contaminants (TACs)



Goal: Disaggregate emissions of TOG, PM₁₀, and PM_{2.5} into individual pollutant species

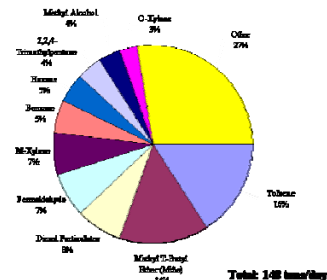
1. Apply speciation profiles to emissions
2. Gather chemical speciation profile libraries
3. Assign each source category the best matching speciation profile
4. Calculate speciated emissions



$$E_{i,c} = E_c * f_{i,p}$$

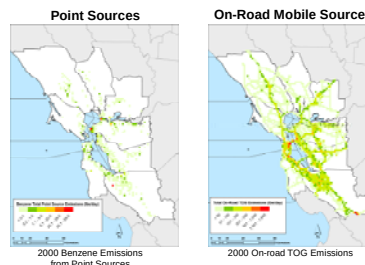
$E_{i,c}$ = Emissions of species i from source c in lbs/day
 E_c = Emissions of TOG, PM₁₀, or PM_{2.5} from source c in lbs/day
 $f_{i,p}$ = Fraction of TOG, PM₁₀, or PM_{2.5} as species i from assigned source profile p , no units

Average Daily TAC Emissions by Species



Goal: Assign total county-wide emissions to individual model grid cells

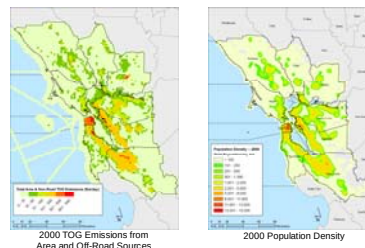
- Point sources – assign individual facility locations to grid cells
- On-road mobile – transportation model (DTIM) is already gridded
- Area/off-road mobile – acquire spatially resolved surrogate data and apply spatial allocation factors (SAFs)



Area and Off-Road Sources

For each emission category to be spatially allocated

1. Choose a potential surrogate
 - What available data set would best spatially represent the activity of this category?
2. Collect surrogate data
 - If data are not available, new surrogates must be chosen.
3. Preprocess surrogate data
 - Convert data to the proper format.
4. Process surrogate fractions
 - Calculate the fraction of activity associated with each grid cell (SAF).
5. Calculate emissions
 - Multiple county emissions by SAF to get emissions by grid cell.
6. Perform quality assurance
 - Minimize emissions and check totals for consistency and reasonableness.

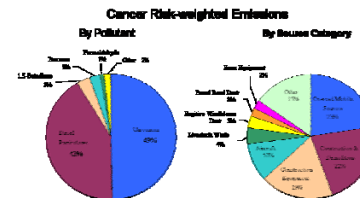


Goal: Normalize emissions based on their risks to public health

Method: Apply unit risk factors for cancer risk and reference concentrations for chronic and acute non-cancer risk

Sources of Inhalation Unit Risk Factors (URFs)

- CARB-Approved Risk Assessment Health Values
- U.S. EPA Office of Environmental Health Hazard Assessment (OEHA)
- U.S. EPA Integrated Risk Information System (IRIS)
- Risk Assessment Information System



Conclusions

The TAC inventories represent the first step of inventory improvement for the CARE program. These screening-level inventories are useful for prioritizing further inventory development activities and conducting preliminary exposure modeling runs (see figure below). A more technically rigorous approach to inventory development is a "bottom-up" approach. Bottom-up inventory development involves gathering observations of emissions or supporting data directly from emissions sources.



Acknowledgments

STI would like to thank the Bay Area Air Quality Management District for the opportunity to work on this project.