

Facility/Process Specific Analysis (CEFS/GIS Program)

Need for Process Specific Emissions

- To Develop Gridded Inventories for Input to Photochemical Models
- Support Special Studies such as Trend Analysis by Facility

Gridded (Modeling) Inventories

- Are Spatially and Temporally Resolved
- Have Emissions Located within Grid Cells (typically 2 kilometers square)
 - The region to be modeled is divided into uniform grid cells
- Contain Day/Hour-Specific Emissions
 - Emissions approximate episode being modeled (for example: the 24 hours in an August weekday in 1997)

Gridded (Modeling) Inventories

- How are Emissions Spatially Allocated?
 - **Point Sources:** Emission process locations are identified in the inventory by UTM coordinates stored in CEIDARS
 - **Area and Off-Road Mobile Sources:** Region-level emissions are further resolved by assigning spatial surrogates (e.g. population, land use segments, housing units, etc.)

Gridded (Modeling) Inventories

- How are Emissions Spatially Allocated?
 - **On-Road Mobile Sources:**
 - Running exhaust emissions are distributed by roadway links within each grid cell
 - Trip emissions are assigned to the centroid of each traffic zone--the position of the centroid determines the grid cell assignment

Gridded (Modeling) Inventories

- How are Emissions Temporally Allocated?
 - Two Methods are available
 - Method used is determined by the availability of day and hour-specific data
 - Data are stored in the Temporal Module in CEFS

Day/Hour Specific Data Not Available

$$\text{DEMS} = \frac{\text{EMS}}{365} * \frac{\text{MT}}{(1/12)} * \frac{\text{DF}}{(1/7)} * 907.18474$$

Where:

DEMS = Emissions of a particular day of the month (kg/day)

EMS = Annual Emissions (tons/year)

MT (Monthly Throughput) = Monthly activity fraction

or

Operating days per month

$$= \frac{\text{Operating days per month}}{\text{Operating days for all twelve months}}$$

Operating days for all twelve months

DF (Day Factor) = decoded weekly operating cycle (DPWK)

907.18474 = conversion factor (tons to kilograms)

Day/Hour Specific Data Not Available

$$\text{HEMS} = \frac{\text{DEMS}}{\text{HOURS}}$$

Where:

HEMS = Emissions per hour of the particular day (kg/hour)

DEMS = Emissions of a particular day of the month (kg/day)

HOURS = decoded daily operating cycle (HPDY)

Examples of Operating Cycle Codes:

For DPWK = 7, DAYFACTOR = 0.14286

For DPWK = 5, DAYFACTOR = 0.20000 for a weekday

DAYFACTOR = 0.00000 for a weekend day

For HPDY = 8, HOURS = 8 for hours 8 to 16 and HOURS = 0 for
hours 1 to 7 and 17 to 24

Day/Hour Specific Data Are Available

$$\text{DEMS} = [\text{EMS} * \text{MT} / 4 * \text{DAYFRAC}] - \text{DAYADJ}$$

Where:

DEMS = Emissions of a particular day of the month (kg/day)

MT (Monthly Throughput) = Monthly activity fraction

or

Operating days per month

= -----

Operating days for all twelve months

DAYFRAC = The fraction of weekly activity occurring on that day

DAYADJ = Factor to adjust for the actual number of days in the month

Day/Hour Specific Data Are Available

$$\text{HEMS} = \text{DEMS} * \text{HOURFRAC}$$

Where:

HEMS = Emissions per hour of the particular day (kg/hour)

DEMS = Emissions of the particular day of the month (kg/day)

HOURFRAC = The fraction of daily activity occurring in that hour

CEFS/GIS Program Output

- Projected Day/Hour Specific Emissions
 - Point source emissions are by facility/device/process and include UTM coordinates and stack parameters
 - Area source emissions include spatial surrogate parameters (i.e. how emissions are distributed geographically)

Bakersfield (Kern County) Study Area

Combined PM10 Emissions from Agricultural Tilling, Point Sources and Road Dust

