

Fact Sheet - The Hazardous Air Pollutant Exposure Model

Overview of HAPEM

The HAPEM model has been designed to predict the "apparent" inhalation exposure for specified population groups and air toxics. Through a series of calculation routines, the model makes use of census data, human activity patterns, ambient air quality levels, climate data, and indoor/outdoor concentration relationships to estimate an expected range of "apparent" inhalation exposure concentrations for groups of individuals. Two versions of the model are currently available; HAPEM5 and HAPEM6. Further technical details about the HAPEM model please refer to the 1996 NATA section on HAPEM4. Other exposure and risk models can be found at the FERA (Fate, Exposure, and Risk Analysis) web site.

Features in HAPEM5

The Hazardous Air Pollutant Exposure Model, Version 5 (HAPEM5) includes a number of new features. Some of these new features are designed to provide exposure estimates that better characterize the variability across the population. Others provide more recent data for improved accuracy in exposure estimates. Several aspects of HAPEM5 have also been modified to make it easier to apply. These new features are summarized here, and detailed in other portions of this User's Guide.

- Microenvironment factors are now characterized with probability distributions instead of point estimates, to better reflect the variability found in measurement studies. Default files are provided for each of three categories of HAPs: gaseous, particulate, and semi-volatile.
- New algorithms have been added for creating annual average activity patterns from daily activity pattern data, using cluster analysis and a Markov chain selection process. These new algorithms require two new input files. Default files are provided.
- The default population file has been updated with 2000 US Census data.
- The final output file now lists many of the parameter settings used for the simulation to help with file tracking.
- The number of replicates to be simulated for each demographic group in each census tract is no longer hard-coded into the HAPEM module, but is specified by the user in the parameter file. This means the user no longer has to modify the HAPEM source code and re-compile it in order to change the number of replicates.
- The name of the parameter file is no longer hard-coded, but is specified by the user on the command line when a HAPEM5 module is run. This means the user no longer has to modify the source code and re-compile it in order to change the name of the parameter file.

HAPEM5 Downloads

- Revised Users Guide for the HAPEM5 Model - (http://www.epa.gov/ttn/fera/hapem5/hapem5_guide.pdf)

- HAPEM5 Modeling System (68mb) –
(http://www.epa.gov/ttn/fera/hapem5/hapem5_setup_05.exe)
- HAPEM5 Modeling System Readme file –
(<http://www.epa.gov/ttn/fera/hapem5/readme.txt>)
- HAPEM5 ME Factor Memo –
(http://www.epa.gov/ttn/fera/hapem5/hapem5_me_factor_memo.pdf)

Features in HAPEM6

The Hazardous Air Pollutant Exposure Model, version 6 (HAPEM6) includes a number of new features. These new features are designed to provide exposure estimates that better characterize the variability across the population. These new features are summarized here, and detailed in other portions of this User's Guide.

- Spatial variability for ambient concentrations within a tract can now be characterized for onroad mobile sources by accounting for concentration enhancements near major roadways. This is done by applying enhancement factors to outdoor concentrations in the vicinity of all indoor microenvironments for tract-specific fractions of tract residents.
- The fraction of the tract populations that commutes to work, and the mode of commuting (public or private transit) is now determined based on US Census data.
- Commuting time for each simulated individual who commutes is calculated according to the distance between the given home tract and the selected work tract, and the average commuting time for workers in the home tract based on US Census data.
- The number of demographic groups in the default files has been streamlined to 6 age groups (no gender stratification).
- The number of microenvironments in the default files has been streamlined to 14.

HAPEM6 Downloads

- Users Guide for the HAPEM6 Model
(http://www.epa.gov/ttn/fera/hapem5/hapem6_guide.pdf)
- HAPEM6 Modeling System Readme File
(<http://www.epa.gov/ttn/fera/hapem5/readmeh6.txt>)
- HAPEM6 Modeling System (53 MB)
(http://www.epa.gov/ttn/fera/hapem5/hapem6_setup.exe)