

Attachment 3

Supplemental User's Guidance for the Fumigant Emissions Modeling System (FEMS)

FEMS determines exposures of a pesticide at a certain distance from the edge of a pesticide applied agricultural field. The pesticides that would typically be used in FEMS are fumigants, because they are more volatile than other pesticides and will impact receptors at a distance away from the source field. FEMS uses measured fumigant data from field studies and modeled emissions distributions from a Monte Carlo approach to account for variability in emissions, in addition to randomized meteorological data¹ to incorporate variability in meteorology throughout a given year, and finally user input for model set-up parameters. This approach takes into account more realistic impacts compared with worst-case scenario modeled runs without using actual field results from field studies and also allows the user to select scenarios which are relevant. In addition, the flexibility of allowances for user input for a range of parameters and using emission rate distributions based on Monte Carlo randomization are what makes this system unique.

FEMS uses a series of FORTRAN executable programs in DOS, batch files, base modeling files, and user input to determine the distances to exposure thresholds. These exposure threshold endpoints are provided in meters from the edge of a field that was applied with a pesticide. FEMS uses a probabilistic approach using emission rate distributions calculated from actual measured data from agricultural field studies of fumigants and modeled data using the EPA's ISCST3 air dispersion modeling program and TOXST toxic exposure program. The meteorological datasets used in FEMS are from National Weather Service (NWS) stations across the country based on a regional analysis. The flexibility in FEMS allows the user to select many parameters including which regions meteorology to use. Below is a list of the parameters the user must input into FEMS to run. If there are any questions, please contact Sullivan Environmental Consulting, Inc. at 703-780-4580.

¹ Accounting for uncertainty in each hour of a sequential, hour-by-hour meteorological dataset.

Main Batch Files and FORTRAN Executable Program Files

Name of Batch File or FORTRAN File	Description
PROGRAM.BAT	Main batch file to start FEMS
WELCOME.EXE	Main FORTRAN file to acquire input from user and create working ISCST3, TOXST, and data files
CHECKDATA.EXE	Checks data and sets meteorological sensitivity and indoor analysis subroutines plus TOXST input file update
RANDOM.BAT	Runs pre-processing meteorological routine, runs the PCRAMMET formatting of the meteorological data program, randomizes meteorological data per user specifications, randomizes the final dataset by 'cutting the cards' routine to eliminate artifact bias in TOXST, and finally runs the ISCST3 and TOXST programs
AVG8.EXE	Averages the 8 datasets created by TOXST (25 years per TOXST run for a total of 200 simulated years)
BUFFNEW.EXE	Calculates the distances to user defined threshold endpoints from the edge of applied field
AMBIENT.EXE	Presents the ambient exposures
IND.BAT	Runs the indoor, personal exposures routine if applicable
BYE.EXE	Presents results of all exposure runs

Input Files Needed to Run FEMS

Name of File	Description
SFC1.ORG-SFC5.ORG	Five-year Meteorological dataset (Surface data)
MHT1-MHT5	Five-Year Meteorological dataset (Upper air data)
YEAR1.BAS-YEAR5.BAS	Base ISCST3 input files (5 years)
RANDOM.BAS	Base TOXST input file
PCRINP.BAS	Base PCRAMMET file
SPSS.DAT	SPSS generated emissions distributions cubic equation variables for each period in emissions dataset

Flow Chart

PROGRAM.BAT
WELCOME.EXE
YEAR1A.DAT-YEAR5A.DAT (ISCST3 input files)
RAND.INP (TOXST input file)
DATA.DAT (Data storage file)
CHECKDATA.EXE
RANDOM.BAT (Meteorological, ISCST3, and TOXST model run file)
IND.TXT (Indoor analysis data file)
IND.BAT (Indoor analysis running file)
RANDOM.BAT
Meteorological Input, Output, Randomization Files
TOXX Files (for TOXST)
ISCST3 Output Files (for TOXST)
TOXST Output Files (for AVG8 and BUFFNEW)
AVG8.EXE
BUFF.TST (Average times/year concentrations > of concentration threshold)
BUFFNEW.EXE
BUFF.OUT (Distance to reach selected number of times / year > threshold)
AMBIENT.EXE
AMBIENT.OUT (Ambient output)
IND.BAT
BUFF2.OUT (Indoor or personal exposures output)
BYE.EXE

Attachment 2 contains the FORTRAN programs and BATCH files in detail, including comments lines to provide a clearer explanation of the code.

Test Case Examples (Inputs / Outputs)

Refer to Section 6.0 of the text for the sample input and output files, and Attachment 2 for the CDs that contain the data files needed to replicate the results of the test run.