EDMS *Reference Manual* Supplement

-Model Changes between EDMS 4.1 and EDMS 4.2-

September 30, 2004

General

Change	Effect
More Emissions Factors In version 4.1, emission factors were limited to HC, CO, SOx, NOx, and PM_{10}. EDMS 4.2 incorporates conversion factors to estimate emissions for VOC, THC, NMHC, and $PM_{2.5}$.	EDMS 4.2 now outputs results for additional pollutants. The conversion factors that are hard-wired into EDMS 4.2 and their sources are provided in Tables I and II.
Database Crash Repair In version 4.1, a system crash or power failure would typically result in study corruption and loss of data. EDMS 4.2 now repairs corrupted database files to prevent loss of data.	Users are far less likely to lose study data as a result of a system crash.
MOBILE5a Data Table In version 4.1, a static lookup table of MOBILE5a output was used to determine emission factors for on-road vehicles (unless the modeler entered user-specified emission factors). In EDMS 4.2, users can choose between MOBILE5a, 5b, and 6.2. The appropriate version of MOBILE is called from within EDMS to obtain the on-road vehicle emission factors for each roadway and parking facility. Rather than static lookup tables, an automated interface to the appropriate MOBILE version is provided for enhanced accuracy and flexibility in characterizing vehicle emission factors.	Users are given more accuracy and flexibility for modeling vehicle emission factors. Lookup tables of on-road emission factors are no longer used.
MOBILE Emissions Previously, the lookup table of MOBILE5a output was used to determine emission factors for vehicles in parking lots and roadways based on speed, distance traveled and idle time. In EDMS 4.2, MOBILE5a, 5b, or 6.2 emission factors can be used. In addition, with the advantages of MOBILE6.2, emissions can be calculated as a function of vehicle fleet mix, fuel, and the manufactured year as well.	Gives users more accuracy and flexibility for modeling of vehicle emission factors. Lookup tables of on-road emission factors are no longer used.

Study Setup

Change	Effect
System Aircraft Times in Mode Previously, System Aircraft Times in Mode were performance-based as a function of aircraft type and aircraft weight. In EDMS 4.2, there are two methods available to estimate aircraft times in mode: (a) Performance-based and (b) EPA/ICAO defaults. The total assigned taxi/queue time for each aircraft is also displayed. *** NOTE: Performance-based times should be used in airport analyses conducted for FAA approval unless prior authorization is obtained from FAA's Office of Environment and Energy. ***	The user is able to choose between performance-based times in mode and the standard EPA/ICAO defaults. The total taxi/queue time to be used for dispersion purposes is displayed for comparison with the value to be used for calculating the emissions inventory.
MOBILE Previously, emission factors were derived from MOBILE version 5a. In EDMS 4.2, users can specify which version of MOBILE they want to use in the study setup window.	The ability to choose between MOBILE5a, MOBILE5b, and MOBILE6.2 will give users more accuracy, flexibility and increased compatibility with existing analyses, such as those used to generate a State Implementation Plan.
Default Taxi Time Previously, EDMS used a default taxi time of 26 minutes for all aircraft, which could be modified by the user for each aircraft under the aircraft operations time in mode interface. In EDMS 4.2, the default taxi time can be specified on the study setup screen. Users can also modify the time used for an individual aircraft on the aircraft operations time in mode screen. With EDMS 4.2, airport-specific default taxi times can be used, when available. When airport-specific times are not available, the default is still 26 minutes. The default taxi time and its source are shown on the study setup screen. The airport-specific default taxi times were obtained from the FAA's Office of Policy and Plans.	Users can change the default taxi time for all aircraft in the study setup screen. Airport-specific taxi times are provided for some airports for the years 1998-2004.
Emissions Inventory Units Previously, the only unit of measure for the emissions inventory was Short Tons. In EDMS 4.2, users can specify between Metric Tons and Kilograms for metric and between Short Tons and Pounds for English.	EDMS 4.2 is more versatile by increasing the use of metric units.
Domain Units Previously, the domain units were not specified by the user.	Users can view and edit the domain limits (the southwest and northeast corners) in addition to the origin coordinates. Users can also view and edit the domain limits and origin coordinates in Universal Transverse Mercator (UTMs) units.

Aircraft Operations & Assignments

Change	Effect
Aircraft-Engine Combination Tree EDMS 4.2 introduces icons for aircraft and engine types.	Users are provided with graphic cues to assist them in editing studies.
Default GSE Assignments Previously, once a user changed the GSE assignments for an aircraft, it was not possible to quickly return to the default assignments. Instead the user had to remove the aircraft from the study and then re-add it. In EDMS 4.2, users can reselect default GSE assignments for an aircraft with a checkbox	Reverting to the default GSE assignments are less cumbersome and more user friendly.

GSE Population

Change	Effect
GSE Tree A new combination tree akin to the aircraft-engine combination tree has been added with the capability to specify fuel and GSE type.	Users are able to more easily select ground support equipment.
Emissions Parameters Previously, emission factors for GSE were modeled based on a national average GSE fleet for each equipment category using an April 2002 version of EPA's NONROAD. EDMS 4.2 allows users to select NONROAD2004 to generate emission factors for an individual piece of equipment or use the previously generated fleet-average emission factors.	Gives users more accuracy and flexibility for modeling of GSE emission factors.
Default Fuel Previously, the option to specify a default fuel for a user-created GSE was provided. In EDMS 4.2, this option has been removed because fuel is selected at the time a GSE is added to a study.	The user need not specify a default fuel for user-created GSE.

Parking Facilities

Change	Effect
Parking Garage Previously, parking facilities consisted of only parking lots. In EDMS 4.2, an option for modeling multi-level parking garages has been added.	Users can model multi-level parking facilities.

Roadways

Change	Effect
Default widths Previously, roadways were hard-coded at 20m wide. In EDMS 4.2, the width can now be adjusted.	Users can override the default 20m width for roadways and taxiways.

Stationary Sources

Change	Effect
System Emissions Factors Previously, users were unable to specify base elevation for stationary sources. EDMS 4.2 takes advantage of that capability.	The user is given a means to modify source base elevation.
More categories & specific types Previously, users were limited to six categories of stationary sources. Stationary sources in EDMS 4.2 now have four new categories: Emergency Generator, Aircraft Engine Testing, Deicing Area, and Sand/Salt Pile. Also added are more descriptive and specific parameters such as Fuel Sulfur Content, Pollution Control Factor, and Percent Power.	The user is given a means to model a more precise representation of actual Stationary sources without being forced to use the "Other" category. In addition, more parameters are considered to increase the accuracy of emission factors. These changes make EDMS 4.2's stationary source emissions modeling consistent with *Air Quality Procedures for Civilian Airports and Air Force Bases* (The Air Quality Handbook).

Training Fires

Change	Effect
System Emissions Factors Previously, users were unable to edit emission factors for training fires. In EDMS 4.2, users can view and edit CO, HC, NOx, SOx and PM_{10} or use the system default emissions as part of the interface.	The user is given explicit access to training fires emission factors.

Taxiways

Change	Effect
Default widths Previously, taxiways were fixed at a width of 20m.	Users can override the default 20m width for roadways and taxiways.

Buildings

Change	Effect
EDMS 4.2 allows users to specify the identification and location of each building at the airport. In dispersion analyses, buildings affect point source plumes, and therefore can have a significant impact on concentrations.	Increased accuracy of point source dispersion modeling. There is no effect on area and volume sources.

Dispersion

Change	Effect
AERMET Wizard Previously, errors while processing AERMET were hard to pinpoint and correct. The AERMET Wizard in EDMS 4.2 parses the seven formats of surface data and three formats of upper air data for automatic weather format detection in an attempt to reduce the number of user errors.	The amount of manual input required to run AERMET is reduced.
AERMET Errors Previously, errors had to be investigated at the conclusion of the 4th AERMET step. EDMS 4.2's AERMET error reporting feature provides on the spot feedback in each step of the AERMET process.	AERMET errors are easier to detect since they are handled in a step by step manner.
AERMAP EDMS 4.2 includes AERMAP, which is the terrain preprocessor of AERMOD. AERMAP creates source (.SRC) and receptor (.REC) files for inclusion in AERMOD dispersion analyses.	Running AERMAP allows users to be able to model terrain in AERMOD.
Generate AERMOD Input Files EDMS 4.1 provided the user with just the minimum components necessary to generate the input files. EDMS 4.2 has a completely redesigned interface which provides the user with all inputs necessary to generate AERMOD input files with AERMOD's fullest capabilities.	Users have greater capabilities and more flexibility with respect to the creation of AERMOD input files.

View

Change	Effect
Airport Previously, all sources had to be added through their respective dialogs. In version 4.2, sources can be added to the study through the airport graphical interface. The user can also move the sources using the mouse.	The airport display is more functional, useful and user friendly.
Airport Wallpaper Airport wall paper has been redesigned. Users can now load files of type .BMP, .GIF, and .JPG.	The user can set airport coordinates more accurately by referring to the wallpaper, and are not limited to bitmaps (.BMPs).
Emissions Inventory… & System Tables… Previously, the emissions inventory & system tables could only display results in one standard form. The emissions inventory and system Tables in EDMS 4.2 have been redesigned so that data can now be sorted on any name, value, or emission factor.	Viewing the emissions inventory and the system tables has been enhanced. Data is more readable.

Reports

Change	Effect
Print Emissions Report(s)… & Print All Model Inputs… The reports menu that lead to the printing of all the model inputs has been removed. All printing occurs through the Print call or as a result of clicking the print icon.	Consolidated menus.

User-Created GSE

Change	Effect
Default Fuel The ability to select a default fuel for User-Created GSE has been removed.	The user need not specify a default fuel for user-created GSE.

AERMOD

Change	Effect
Software Update The most recent version of AERMOD (02222 Beta) and the associated updates to AERMET and AERMAP have been included with this EDMS release.	EDMS uses the most current versions of the EPA dispersion models.

Table I. HC and VOC Conversion Factors.

Category	Type	Conversion	Source of Conversion
Aircraft	All	NMHC = THC*1.0	Engineering Judgment
APU	Air Taxi & Commercial	VOC = THC*1.0947; NMHC = THC*1.0	Air Quality Handbook, page xxiv; None.
	Military	VOC = THC*1.1046; NMHC = THC*1.0	
	General Aviation	VOC = THC*0.9708; NMHC = THC*1.0	
Training Fires	Propane, JP-4, JP-8	THC = NMHC = VOC * 1.0	Engineering Judgment
	Tekflame, JP-5	NMHC = VOC = THC * 1.0	Engineering Judgment
Stationary Sources			
Boilers/Space Heaters	Sub-/Bituminous Coal, Overfeed Stoker	THC = NMHC = VOC * 1.0	Engineering Judgment
	Sub-/Bituminous Coal, all other types	THC = NMHC = VOC = NMOC * 1.0	Engineering Judgment
	Anthracite Coal	THC = NMHC = VOC * 1.0	Engineering Judgment
	Fuel Oil, Utility Boilers, No. 2 Oil	THC = NMHC = VOC * 1.0	Engineering Judgment
	Fuel Oil, all other types	THC = NMHC = VOC = TOC * 1.0	Engineering Judgment
	Natural Gas	THC = NMHC = VOC * 1.0	Engineering Judgment
	LPG	THC = NMHC = VOC = TOC * 1.0	Engineering Judgment
Emergency Generators	Gasoline Fuel (EPA Methodology)	THC = TOC * 0.9588; NMHC = TOC * 0.86, VOC = TOC * 0.895	Nonroad GSE Conversion Table.
	Diesel Fuel (EPA Methodology)	THC = TOC * 0.9346; NMHC = TOC * 0.920; VOC = TOC * 0.9841	
	Distillate Oil (Diesel) (USAF Methodology)	THC = VOC * 0.9497; NMHC = VOC * 0.934	
	Gasoline (USAF Methodology)	THC = VOC * 1.07; NMHC = VOC * 0.96	
	Natural Gas (USAF Methodology)	THC = VOC * 250; NMHC = VOC * 12	
	LPG (Propane or Butane) (USAF Methodology)	THC = VOC * 1.005; NMHC = VOC * 0.92	
	Kerosene/Naphtha (Jet Fuel) (USAF Methodology)	THC = NMHC = VOC * 1.0	Engineering Judgment
	Residual/Crude Oil (USAF Methodology)	THC = NMHC = VOC * 1.0	Engineering Judgment
Incinerators	Multiple & Single Chamber	THC = NMHC = VOC * 1.0	Engineering Judgment
Fuel Tanks	All	VOC = NMHC = THC	EPA, 1997. Compilation of Air Pollutant Emission Factors: Transportation and Marketing of Petroleum Liquids. Vol. I, Section 5.2.
Surface Coatings	All	THC = NMHC = VOC * 1.0	Assumes all coatings are in a Toluene HC base which evaporates.
Solvent Degreasers	Stoddard Solvent, Turpentine	THC = NMHC = VOC * 1.0	Both of these chemicals are pure hydrocarbons.
	All Others Solvents	THC = NMHC = 0.0	All other solvents are not hydrocarbons.

Table II. PM Conversion Factors.

Category	Type	Conversion	Source of Conversion
Aircraft	All	Not Applicable	Emission factors for aircraft PM are not available in EDMS.
APU	All	PM-10 = PM-2.5 * 1.0	Engineering Judgment
Training Fires	All	PM-10 = PM-2.5 * 1.0	Engineering Judgment
Stationary Sources			
Boilers/Space Heaters	Sub-/Bituminous Coal, Overfeed Stoker	THC = NMHC = VOC * 1.0	Engineering Judgment
	Sub-/Bituminous Coal, all other types	THC = NMHC = VOC = NMOC * 1.0	Engineering Judgment
	Anthracite Coal	THC = NMHC = VOC * 1.0	Engineering Judgment
	Fuel Oil, Utility Boilers, No. 2 Oil	THC = NMHC = VOC * 1.0	Engineering Judgment
	Fuel Oil, all other types	THC = NMHC = VOC = TOC * 1.0	Engineering Judgment
	Natural Gas	THC = NMHC = VOC * 1.0	Engineering Judgment
	LPG	THC = NMHC = VOC = TOC * 1.0	Engineering Judgment
Emergency Generators	Kerosene/Naphtha (Jet Fuel) (USAF Methodology)	PM-10 = PM-2.5 * 0.77	AP-42, Vol. 1, Tables 1.3-7
	Residual/Crude Oil (USAF Methodology)	PM-10 = PM-2.5 * 0.73	AP-42, Vol. 1, Tables 1.3-4
Incinerators	All	PM-10 = PM-2.5 * 1.0	Engineering Judgment