Emissions Quick Reference

Version 4.0.16

Revision History
1/8/2010 Edited by AECOM Consult, Inc.
4/15/2010 Edited by RSG, Inc.

Syntax:

Emissions [-flag] [control_file]

Purpose:

1. Apply emission rates to one or more speed bin distribution files generated for selected vehicle types by the Microsimulator.
2. Collapse one or more emission rate files into user-defined categories by year, month, time period, region/county, facility type, vehicle type and speed bin.
3. Include distribution weights in the emission rate collapsing procedure to estimate a weighted average emission rate for a set of composite rate classifications.
4. Include facility type, area type and vehicle type maps to assign TRANSIMS codes to emission rate classification categories.
5. Replicate the TRANSIMS speed bin distributions for user-defined ranges of years and months within years, and apply the appropriate year-month emission rate to each distribution.
6. Output an emissions inventory file by area type, facility type and vehicle type that includes vehicle miles and hours of travel, speed, and an arbitrary number of pollutants.
7. Generate emission inventory summary reports by any combination of area type, facility type and vehicle type cross classifications summarizing an arbitrary number of pollutants.
8. Generate emission inventories for selected zone ranges or within a subarea polygon.
9. Output an emission rate table aggregated or disaggregated by the specified classifications of year, month, time period, region/county, facility type, vehicle type and speed bin.
10. Generate a speed summary file that includes VMT and VHT data by vehicle type, facility type, time period, and speed bin.
11. Generate speed bins by hour and VMT by hour in the specific file formats required by the MOVES data importers.

Required Keys

NET_LINK_TABLE	[net_directory]*filename*
EMISSION_RATE_FILE (2)	[project_directory]*filename*
EMISSION_RATE_POLLUTANT (3)	Text (3)

Optional Keys

TITLE	Text
REPORT_FILE	*Filename*
REPORT_FLAG	FALSE {true/false/yes/no/1/0}

MAX_WARNING_MESSAGES	100,000
MAX_WARNING_EXIT_FLAG	TRUE {true/false/yes/no/1/0}
PROJECT_DIRECTORY	*Pathname*
DEFAULT_FILE_FORMAT	VERSION3 {(5)}
NET_DIRECTORY	*Pathname*
NET_NODE_TABLE	[net_directory]*filename*
NET_ZONE_TABLE	[net_directory]*filename*
SPEED_BIN_FILE (1)	[project_directory]*filename*
SPEED_BIN_FILE_# (1)	[project_directory]*filename*
EMISSION_RATE_FILE_# (1)	[project_directory]*filename*
RATE_SPEED_BIN_FIELD (4)	*field_name*
RATE_YEAR_FIELD (6)	*field_name*
RATE_MONTH_FIELD (6)	*field_name*
RATE_PERIOD_FIELD (6)	*field_name*
RATE_REGION_FIELD (6)	*field_name*
RATE_AREATYPE_FIELD (6)	*field_name*
RATE_FACILITY_FIELD (6)	*field_name*
RATE_ROADTYPE_FIELD (6)	*field_name*
RATE_VEHICLE_FIELD (6)	*field_name*
RATE_POLLUTANT_FIELD (6)	*field_name*
SPEED_BIN_FACTOR (6)	1.0 {0.1..400.0}
EMISSION_RATE_FIELD (6)	*field_name*
EMISSION_RATE_UNITS (6)	GRAMS_PER_KILOMETER (7)
RATE_SPEED_BIN_FIELD_# (6)	*field_name*
RATE_YEAR_FIELD_# (6)	*field_name*
RATE_MONTH_FIELD_# (6)	*field_name*
RATE_PERIOD_FIELD_# (6)	*field_name*
RATE_REGION_FIELD_# (6)	*field_name*
RATE_AREATYPE_FIELD_# (6)	*field_name*
RATE_FACILITY_FIELD_# (6)	*field_name*
RATE_ROADTYPE_FIELD_# (6)	*field_name*
RATE_VEHICLE_FIELD _# (6)	*field_name*
RATE_POLLUTANT_FIELD_# (6)	*field_name*
SPEED_BIN_FACTOR_# (6)	1.0 {0.1..400.0}
EMISSION_RATE_FIELD_# (6)	*field_name*
EMISSION_RATE_UNITS_# (6)	GRAMS_PER_KILOMETER (7)
EMISSION_RATE_POLLUTANT_# (3)	Text (3)
YEAR_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
MONTH_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
PERIOD_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)

REGION_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
AREATYPE_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
FACILITY_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
ROADTYPE_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
HPMS_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
VEHICLE_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
POLLUTANT_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
POLLUTANT_UNITS_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
SPEED_BIN_NUMBER_# (8)	*Label, [code[*share]] [, code [*share]]…* (9)
SUMMARY_YEARS (10)	NULL (10)
SUMMARY_MONTHS (11)	NULL (11)
SUMMARY_TIME_PERIODS	All (12)
SUMMARY_TIME_INCREMENT	Daily {0..240 minutes} (13)
SMOOTH_GROUP_SIZE (19)	3 {3..9}
SMOOTH_TO_MOVES_SPEED_BINS (19)	FALSE {true/false/yes/no/1/0}
USE_SIMPLE_INTERPOLATION	FALSE {true/false/yes/no/1/0}
SMOOTH_SPEED_INCREMENT (19)	1.0 meters per second {0.1..10.0}
PERCENT_MOVED_FORWARD	20 percent {0..(100 – 50 / [smooth group size])
PERCENT_MOVED_BACKWARD	20 percent {0..(100 – 50 / [smooth group size])
NUMBER_OF_ITERATIONS	3 {1..25}
RANDOM_NUMBER_SEED	0
PERCENT_SAMPLE_SIZE	0.05 {0.0001..100.0}
NEW_SMOOTH_SAMPLE_FILE (25)	[project_directory]*filename*
USE_AVERAGE_SEGMENT_SPEEDS	FALSE {true/false/yes/no/1/0}
WEEKEND_TRAVEL_FACTOR	1.0 {0.0..1.5}
TRAVELER_FILE (1)	[project_directory]*filename*
VEHICLE_FILE	[project_directory]*filename*
VOLUME_SPEED_FILE (1)	[project_directory]*filename*
VOLSPD_LENGTH_FIELD	*field_name*
VOLSPD_LENGTH_UNITS	MILES {(20)}
VOLSPD_FACILITY_FIELD	*field_name*
VOLSPD_AREATYPE_FIELD	*field_name*
VOLSPD_PERIOD_FIELD	*field_name*
VOLSPD_PERIOD_UNITS	HOURS {(22)}
VOLSPD_SPEED_FIELD	*field_name*
VOLSPD_SPEED_UNITS	MPH {(23)}
VOLUME_SPEED_FACTOR	1.0 {0.1..400.0}
VOLSPD_VOLUME_FIELD_#	*field_name*
VOLSPD_RAMP_FACILITY	9 {0..100}
SELECT_ZONE_RANGE	All (18)

SELECT_SUBAREA_POLYGON	[project_directory]*filename*.shp
VEHICLE_TYPE_MAP (14)	[project_directory]*filename*
FACILITY_TYPE_MAP (15)	[project_directory]*filename*
HPMS_TYPE_MAP (15)	[project_directory]*filename*
ZONE_EQUIVALENCE_FILE (16)	[project_directory]*filename*
AREA_TYPE_LABELS (17)	[project_directory]*filename*
FACILITY_TYPE_LABELS (17)	[project_directory]*filename*
VEHICLE_TYPE_LABELS (17)	[project_directory]*filename*
NEW_TRAVELER_FILE	[project_directory]*filename*
NEW_EMISSION_RATE_FILE	[project_directory]*filename*
NEW_EMISSION_SUMMARY_FILE	[project_directory]*filename*
NEW_SPEED_SUMMARY_FILE	[project_directory]*filename*
NEW_MOVES_SPEED_HOUR_FILE	[project_directory]*filename*
NEW_MOVES_VMT_HOUR_FILE	[project_directory]*filename*
NEW_MOVES_VMT_ROAD_FILE	[project_directory]*filename*
NEW_MOVES_HPMS_VMT_FILE	[project_directory]*filename*
NEW_MOVES_RAMP_FRACTION_FILE	[project_directory]*filename*
NEW_MOVES_LINK_SUMMARY_FILE	[project_directory]*filename*
NEW_MOVES_LINK_VEHICLE_FILE	[project_directory]*filename*
NEW_MOVES_LINK_SPEED_FILE	[project_directory]*filename*
NEW_MOVES_LINK_OPERATIONS_FILE	[project_directory]*filename*
NET_DEFAULT_FORMAT	[default_file_format] {(5)}
NET_LINK_FORMAT	[net_default_format] {(5)}
NET_NODE_FORMAT	[net_default_format] {(5)}
NET_ZONE_FORMAT	[net_default_format] {(5)}
SPEED_BIN_FORMAT	[default_file_format] {(5)}
SPEED_BIN_FORMAT_#	[default_file_format] {(5)}
EMISSION_RATE_FORMAT	[default_file_format] {(5)}
EMISSION_RATE_FORMAT_#	[default_file_format] {(5)}
VOLUME_SPEED_FORMAT	[default_file_format] {(5)}
TRAVELER_FORMAT	[default_file_format] {(5)}
NEW_TRAVELER_FORMAT	[new_default_format] {(5)}
NEW_SMOOTH_SAMPLE_FORMAT	[new_default_format] {(5)}
NEW_EMISSION_RATE_FORMAT	[new_default_format] {(5)}
NEW_EMISSION_SUMMARY_FORMAT	[new_default_format] {(5)}
NEW_SPEED_SUMMARY_FORMAT	[new_default_format] {(5)}
NEW_MOVES_SPEED_HOUR_FORMAT	[new_default_format] {(5)}
NEW_MOVES_VMT_HOUR_FORMAT	[new_default_format] {(5)}
NEW_MOVES_VMT_ROAD_FORMAT	[new_default_format] {(5)}
NEW_MOVES_HPMS_VMT_FORMAT	[new_default_format] {(5)}

NEW_MOVES_RAMP_FRACTION_FORMAT	[new_default_format] {(5)}
NEW_MOVES_LINK_SUMMARY_FORMAT	[new_default_format] {(5)}
NEW_MOVES_LINK_VEHICLE_FORMAT	[new_default_format] {(5)}
NEW_MOVES_LINK_SPEED_FORMAT	[new_default_format] {(5)}
NEW_MOVES_LINK_OPERATIONS_FORMAT	[new_default_format] {(5)}
REPORT_TRAVEL_UNITS	KILOMETERS {(20)}
REPORT_EMISSIONS_UNITS	KILOGRAMS {(21)}

Reports

EMISSIONS_REPORT_#	EMISSIONS_BY_AREA_TYPE
	EMISSIONS_BY_FACILITY_TYPE
	EMISSIONS_BY_VEHICLE_TYPE
	EMISSIONS_BY_AREA_AND_FACILITY
	EMISSIONS_BY_AREA_AND_VEHICLE
	EMISSIONS_BY_FACILITY_AND_VEHICLE
	EMISSIONS_SUMMARY_REPORT
	EMISSIONS_BY_ROAD_TYPE
	EMISSIONS_BY_ROAD_AND_VEHICLE
	PRINT_LINK_EQUIVALENCIES
	PRINT_ZONE_EQUIVALENCIES
	PRINT_REGION_EQUIVALENCIES

Notes

1	At least one of speed bin, traveler file or volume-speed file must be provided. For speed bin filoes you can use the key with or without a group extension (i.e., SPEED_BIN_FILE or SPEED_BIN_FILE_#). The order of priority in the program is as follows: speed-bin-file(s) > traveler file > volume-speed link data file. If more than one of these types of files is provided, then the program will only process the file type with the highest priority.
2	If a new speed summary file, MOVES speed hour or MOVES VMT hour file are provided, this key is optional. Otherwise, at least one emission rate file must be provided. You can use the key with or without a group extension (i.e., EMISSION_RATE_FILE or EMISSION_RATE_FILE_#).
3	At least one pollutant type must be associated with each emission rate file. The pollutant type can be identified using the RATE_POLLUTANT_FIELD or RATE_POLLUTANT_FIELD_# keys. If the field name is not provided, the EMISSION_RATE_POLLUTANT or EMISSION_RATE_POLLUTANT_# key must be provided. These keys identify the name of the pollutant used in reports and output data files. The text should use continuous characters (i.e., no spaces) and be relatively short (10 characters are printed on reports).
4	If speed-bin file(s) is provided, then at least one speed bin field name must also be provided. You can use the key with or without a group extension (i.e., RATE_SPEED_BIN_FIELD or RATE_SPEED_BIN_FIELD_#). Note that the key without the extension will be used as the default field name for each emission rate extension group.
5	{VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED,

	TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL, SQLITE3}
6	The rate field names are optional for those data categories that do not have emission rates. If a rate field is not specified for an emission file group (i.e., _#), the default field name is assumed to be the field name specified by the same key without the group extension. For example, RATE_FACILITY_FIELD key provides the default field name for RATE_FACILITY_FIELD_#.
7	{GRAMS_PER_KILOMETER, GRAMS_PER_MILE, GRAMS_PER_HOUR, POUNDS_PER_KILOMETER, POUNDS_PER_MILE, POUNDS_PER_HOUR, JOULES_PER_KILOMETER, JOULES_PER_MILE, JOULES_PER_HOUR, BTUS_PER_KILOMETER, BTUS_PER_MILE, BTUS_PER_HOUR}
8	Number keys are independent key groups that map field values found in each of the emission rate files to a new value number used in applying the emission rate to the data provided in the speed bin files. The extension number (i.e., _#) is the new value number used for the match. If Number fields are not provided for a given emission category, the program scans the emission rate files and creates a one-to-one map between the values found in the emission rate files and the values used for the match (e.g., 1=1, 2=2, etc.)
9	The Number key values can be specified in several ways. The simplest format creates a one-to-one mapping of category codes in the emission rate file to codes in TRANSIMS. For example, VEHICLE_NUMBER_2 with key value "53" will interpret emission rates identified as vehicle type 53 in the emission files and apply it to vehicle type 2 in TRANSIMS. The more complex format enables the user to create a weighted average emission rate using multiple fields in the emission rate files. For example, if VEHICLE_NUMBER_1 has a key value of "AUTO, 11*0.05, 21*0.80, 31*0.15", the emission rate for vehicle type "1" will be based on the weighted average emission rates for vehicle types 11, 21, and 31 in the emission rate files. The value following the * code is the weighting factor for each vehicle type. In other words, the resulting emission rate will be based on 5% of the emission rate for vehicle type 11, 80% of vehicle type 21, and 15% of vehicle type 31.
10	Since TRANSIMS does not directly consider year or month in any of its datasets, the option of specifying that the speed bin data should be applied to an emission rate from one or more years is controlled by this key. If this key is not provided, the program assumes the speed bin file and the emissions rate files represent the same year. The key value is a year range (e.g., 2005, 2010..2015). If the range includes multiple years, the emission rate for each of the years is applied to the data found in the speed bin file. In other words, the volumes and speeds in the speed bin file are copied to each of the summary years. The resulting emissions will be the sum of the emissions from each of the years.
11	Since TRANSIMS does not directly consider year or month in any of its datasets, the option of specifying that the speed bin data should be applied to an emission rate from one or more months is controlled by this key. If this key is not provided, the program assumes the speed bin file and the emissions rate files represent the same month. The key value is a month range (e.g., 1, 5..7). If the range includes multiple months, the emission rate for each of the months is applied to the data found in the speed bin file. In other words, the volumes and speeds in the speed bin file are copied to each of the summary months. The resulting emissions will be the sum of the emissions from each of the month. Note that SUMMARY_YEARS and SUMMARY_MONTHS interact with each other. The month range is applied to each year in the year range.
12	Time Range (e.g., 0:00..6:00, 18:00..23:00)
13	If the emission rates include PERIOD fields, the summary time increments are needed to map the period codes used in the emission rate files to the time of day aggregation in TRANSIMS. For example, if the emission rates are hourly (1, 2, 3…), this key should be set to 60 minutes.
14	The vehicle type map file is used to convert TRANSIMS vehicle type and subtype codes into

	vehicle type values used to apply the emission rate. The file includes three fields, the TRANSIMS vehicle type and subtype codes followed by the new vehicle type value. This file can be used to map several TRANSIMS type codes into a single emission rate type.
15	The facility type map file is used to convert TRANSIMS facility type strings (e.g., FREEWAY, EXPRESSWAY, MAJOR, etc.) into facility type values used to apply the emission rates. The file includes two fields, the TRANSIMS facility type text followed by an integer facility type code. This file can be used to map several TRANSIMS facility types into a single emission rate type.
16	If provided, it maps zones into area types or regions. If not provided, but a network zone file is provided, the area type values found in the zone file will be used.
17	Label files are used to convert the code numbers to descriptive text for output reports. For reports that summarize only one attribute, up to 25 characters of the label will be used. For cross classification reports a minimum of 12 characters from each label are used.
18	Zone number range (e.g., 1..100, 200..300).
19	If SMOOTH_TO_MOVES_SPEED_BINS key is false, then SMOOTH_SPEED_BINS specifies the user-defined speed increments at which to calculate the VMT and VHT for output speed bins based on smoothed moving average interpolated values. If SMOOTH_TO_MOVES_SPEED_BINS key is true, then a special case is provided to automate the processing of speed bins defined by EPA's MOVES software
20	Options for Travel units include MILES, KILOMETERS, METERS, and FEET. The default is KILOMETERS.
21	Options for Emissions units include KILOGRAMS and GRAMS. The default is KILOGRAMS.
22	Options for Time units include HOURS, DAYS, MINUTES, and SECONDS. The default is HOURS.
23	Options for Speed units include MPH, KPH, MPS, and FPS. The default is MPH.
24	Volume-speed link data file can be provided as an alternative to speed bin files and a traveler file. Only one of these files must be provided. The order of priority in the program is as follows: speed-bin-file(s) > traveler file > volume-speed link data file. If more than one of these types of files is provided, then the program will only process the file type with the highest priority.
25	Includes a sample of the input and output speed bin distributions generated by the smoothing process.