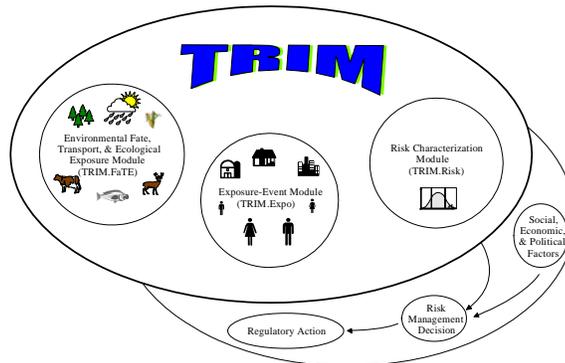


TRIM

Total Risk Integrated Methodology

TRIM.FaTE User's Guide



This guide is maintained by U.S. EPA, Office of Air Quality Planning and Standards.

INTRODUCTION

The *TRIM.FaTE User's Guide* is part of EPA's series of documentation for the Total Risk Integrated Methodology (TRIM) modeling system. This document provides information to assist the user of the TRIM Fate, Transport, and Ecological Exposure (TRIM.FaTE) model. In general, the information presented is based on EPA's experience with the test applications of TRIM.FaTE that have been implemented to date. Key topics related to running TRIM.FaTE and setting up a scenario are covered. However, this document is not meant to provide a comprehensive explanation of every aspect of TRIM.FaTE. Furthermore, the information included in this document should be considered subject to change as additional model applications are completed and the TRIM.FaTE model evolves.

This document is divided into 16 "modules" that cover selected topics involved with setting up a TRIM.FaTE scenario. Fourteen of these modules provide assistance to the user on specific topics; one other module compiles an array of additional helpful hints and caveats for users. The final module lists and provides brief definitions for the model's input parameters as stored in the current library. A complete list of the modules and a brief description of the content of each is presented in the Table of Contents. This version of the TRIM.FaTE User's Guide is organized as a set of modules in order to clarify the topics and types of information that are presented, facilitate their use, and more easily accommodate their update.

This User's Guide focuses specifically on the TRIM.FaTE model. However, it is important for the user to understand that the TRIM.FaTE model is designed to function not simply as a "stand-alone" fate, transport, and ecological exposure model but also as a component of the TRIM modeling system. Outputs generated by TRIM.FaTE can be used as inputs by other

modules of the TRIM system. For example, TRIM.FaTE outputs can be used by the ecological risk characterization model (TRIM.Risk_{Eco}) as inputs. This module uses ecological exposure estimates calculated by TRIM.FaTE (e.g., biota intake rates, such as mass of chemical ingested daily by an organism via all routes; or abiotic media concentrations, such as surface soil concentrations) to estimate ecological hazard values. Future plans call for the use of TRIM.FaTE results as inputs to the following modules, when completed.

- **Farm Food Chain Module:** Results for various media estimated by TRIM.FaTE, such as chemical concentrations in surface soil, can be used as inputs to this TRIM module that estimates chemical concentrations in produce, farm animals, and other media that can affect exposures to people that consume farm products.
- **TRIM.Expo_{Ingestion}:** Some TRIM.FaTE outputs can be used by TRIM.Expo_{Ingestion} to generate exposure estimates for humans for scenarios involving the ingestion pathway (e.g., a home gardener who consumes produce items and ingests some soil incidentally). Outputs from the TRIM Farm Food Chain module – which can use TRIM.FaTE results – can also be used by TRIM.Expo_{Ingestion} in estimating exposures for these scenarios.

TRIM.FaTE outputs can be transferred to other modules within the TRIM system as MySQL databases (see adjacent text box). Some general information regarding the relationship between MySQL and TRIM.FaTE is included in this User's Guide, including a brief description of TRIM.FaTE settings that specify which MySQL databases are generated by TRIM.FaTE (see Module 9, Scenario Properties) and instructions on how to output TRIM.FaTE results as a MySQL database (see Module 14, Simulation Results). However, specific instructions on how to use a TRIM.FaTE MySQL output database with other modules are not currently incorporated into the TRIM.FaTE User's Guide. Instead, users should refer to documentation for the other TRIM modules for more information on how TRIM.FaTE outputs are used by these other parts of TRIM.

What is MySQL?

MySQL is a relational database management system that is available free of charge (<http://www.mysql.com>). Within the framework of TRIM, MySQL software provides a standardized language for the links between TRIM data tables used by the different components, including TRIM.FaTE. In order to generate TRIM.FaTE output as a MySQL database, the user must define a username and password (see Module 14, Simulation Results, for more information).

Another piece of software that is used to help TRIM.FaTE interact with other parts of the TRIM system is EPA's Multimedia Integrated Modeling System (MIMS). MIMS is a modeling framework developed by EPA that is designed to allow users to configure multiple related models and programs and specify the settings (e.g., input file locations, model options) for these models and programs within a single interface. MIMS also manages the inputs and outputs for each model and program, allowing the outputs created by one model or program to be automatically used as inputs to another model or program within a single simulation. In addition, MIMS provides a standardized set of tools that can be used to process the outputs (e.g., create plots or tables) generated by different simulations. Although MIMS does not need to be

installed to run TRIM.FaTE (i.e., TRIM.FaTE can be executed as a stand-alone fate, transport, and ecological exposure model), MIMS can facilitate the use of TRIM.FaTE in conjunction with other parts of the TRIM system, including TRIM.Risk. More information on running TRIM.FaTE and TRIM.Risk within MIMS is provided in the TRIM.Risk User's Guide.

Several key TRIM.FaTE terms that are used throughout this set of User's Guide modules are defined in the text box on the following page. In addition, the user is strongly encouraged to review both volumes of the TRIM.FaTE Technical Support Document for detailed information on TRIM.FaTE's conceptual basis, structure, and components.¹ These documents and other TRIM materials are available to users on EPA's Fate, Exposure, and Risk Analysis (FERA) website (<http://www.epa.gov/ttn/fera/>).

¹TRIM.FaTE Technical Support Document, Volume I: Description of Module. EPA-453/R-02-011a. Office of Air Quality Planning and Standards. September 2002.

TRIM.FaTE Technical Support Document, Volume II: Description of Chemical Transport and Transformation Algorithms. EPA-453/R-02-011b. Office of Air Quality Planning and Standards. September 2002.

KEY TRIM.FaTE MODELING TERMINOLOGY

Algorithm: A mathematical expression that quantitatively describes the transfer of chemical mass between compartments or the transformation of chemical mass within a compartment. Algorithms are, in essence, the mass transfer and transformation formulas used by the model.

Category: A hierarchical classification for objects ordered from most general to most specific, with each level separated by a vertical bar ("|"). Categories are used in TRIM.FaTE to specify which objects are applicable for a certain purpose. For example, a chemical might have a category of "metal" or "organic | aldehyde;" a biological organism might have a category of "bird" or "mammal | rodent."

Compartment: The TRIM.FaTE modeling unit that contains chemical mass. Chemical mass is transported between and transformed within compartments; a specific compartment is characterized by its physical and spatial composition and its relationship to other compartments.

Library: A TRIM.FaTE file that contains the objects available for building a simulation: algorithms, chemicals, compartments, sources, and property types.

Link: A "connection" that allows the transfer of chemical mass between compartments, the degradation of a chemical present in a compartment (where the mass is then transferred to a degradation sink), or the transformation of one modeled chemical to another modeled chemical.

Object: Any component that can be defined in TRIM.FaTE, such as a compartment, a link, a property type, or an algorithm. Objects are the basic "building blocks" of a TRIM.FaTE simulation.

Outdoor Environment: The environment that is used for a simulation. This includes the volume elements defined for the modeling region, the compartments, links, and algorithms that define the mass transfer relationships in the scenario, and the chemicals, sources, and sinks included in the scenario.

Project: A computer framework for saving one or more scenarios, including all of the data properties for those scenarios.

Property: Information that is defined about a specific TRIM.FaTE object (e.g., vapor pressure of a chemical, ingestion rate of a specific biotic compartment, applicable receiving compartment type for an algorithm).

Property Type: Each property has a single property type that defines the name, type of data, units, default value, and minimum and maximum values for the property.

Scenario: A specified set of conditions (e.g., spatial, temporal, environmental, source, chemical) used to define the model setup for a particular simulation or set of simulations.

Simulation: A single application of a model to estimate environmental conditions based on a given scenario.

Sink: A special kind of compartment that accounts for chemical mass no longer available for transport or uptake within a scenario. There are three types of sinks: advection sinks, flush rate sinks, and degradation/reaction sinks.

Source: An external component that introduces chemical mass directly into a compartment.

Transfer Factor: A quantitative factor in units of inverse time that describes, for a first-order transfer between two compartments, the instantaneous flux of modeled chemical per amount of the chemical in the sending compartment.