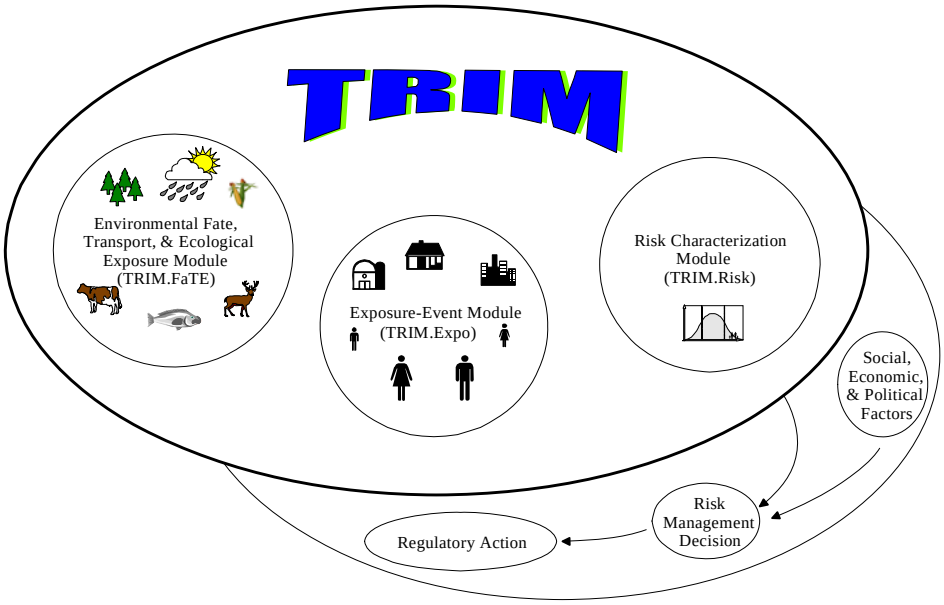
TRIM
Total Risk Integrated Methodology

TRIM.Risk User's Guide
Volume II: Human Health Inhalation Risk Assessment with Non-Probabilistic Exposure-Response Values



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1. Introduction

The TRIM.Risk User's Guide is part of EPA's series of documentation for the Total Risk Integrated Methodology (TRIM) modeling system. Volume II of this document focuses on using TRIM.Risk to perform human health risk assessments for the inhalation pathway using non-probabilistic exposure-response values. In general, the information presented in this document is based on EPA's experience with the test applications of TRIM.Risk that have been implemented to date. The information included in this document may be subject to change as additional model applications are completed and the TRIM.Risk model evolves.

1.1 How TRIM.Risk Is Used for Inhalation Risk Assessment

For inhalation risk assessments using non-probabilistic exposure-response values, TRIM.Risk calculates human health cancer risks and chronic hazards by combining exposure estimates with toxicity values. The information presented in this volume assumes that exposure modeling is performed using either $\text{TRIM.Expo}_{\text{Inhalation}}$ or HAPEM. Toxicity values used for TRIM.Risk calculations include inhalation unit risk estimates (UREs) for assessment of cancer risk and chronic reference concentrations (RfCs) or similar values for estimating non-cancer hazard or cancer hazard for non-linear carcinogens.[1] Exhibit 1-1 illustrates the functions of the parts of TRIM related to human health inhalation risk assessment and the output databases associated with each part in the context of EPA's framework for human health risk assessment.

1.1.1 Problem Formulation Phase

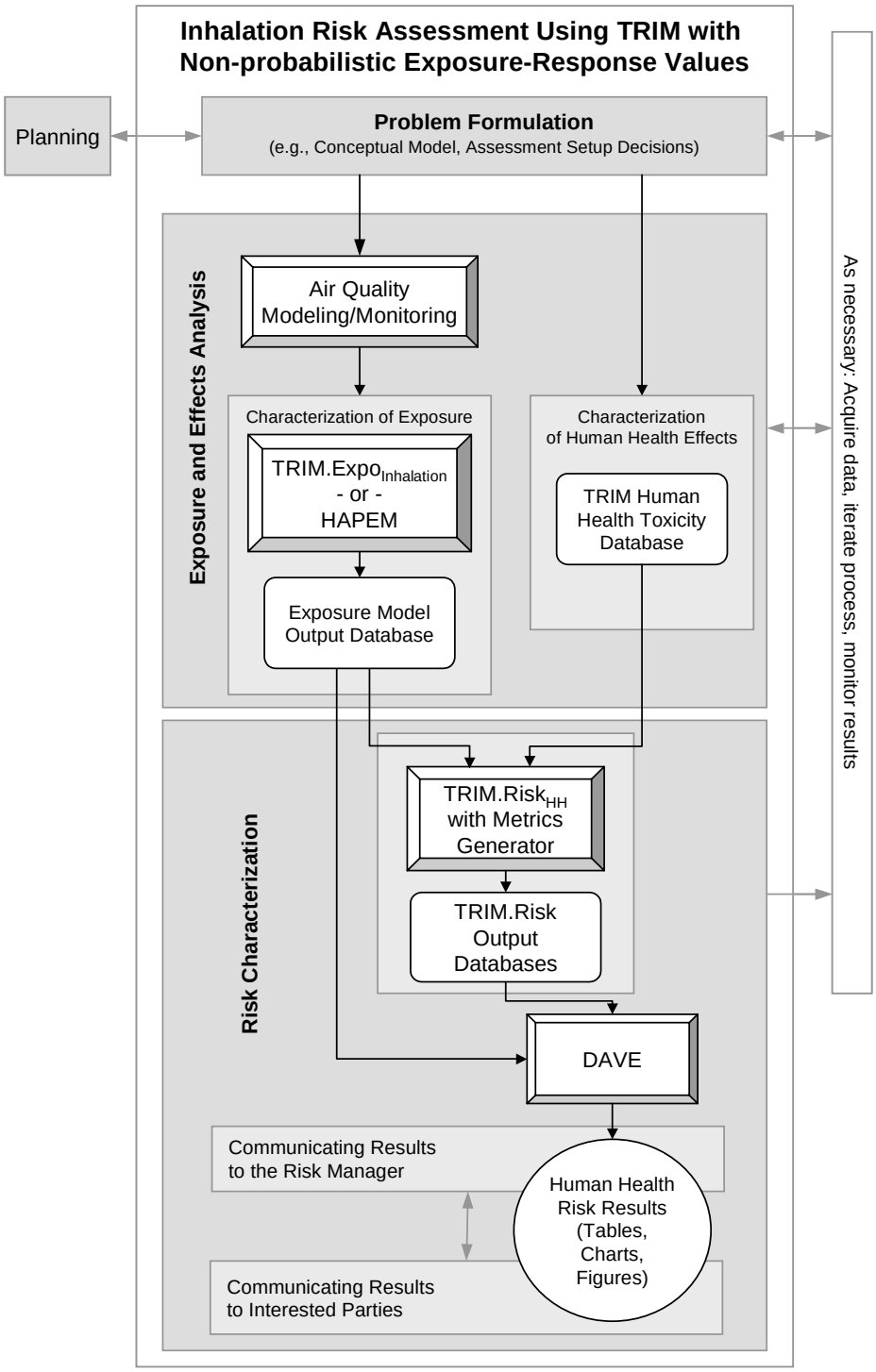
During this phase of an inhalation risk assessment, the risk assessor identifies the measures of exposure and effect or toxicity needed for the risk analysis and characterization phases. In the context of an inhalation risk assessment for human health, this includes making decisions with regard to the study area, study population, time frame, chemicals, and endpoints of concern. These decisions must be considered before progressing through the exposure, effects, and risk characterization phases.

1.1.2 Exposure and Effect Analysis Phase

During this phase, the user develops the exposure estimates and confirms the exposure-response values (whether provided in the TRIM human health toxicity database or added by the user) to be used in risk characterization. For the applications described in this User's Guide, either $\text{TRIM.Expo}_{\text{Inhalation}}$ or HAPEM is used to generate exposure estimates for TRIM.Risk calculations. Basic descriptions of both models are provided below.

[1] The EPA's 2005 Guidelines for Carcinogen Risk Assessment describe the use of reference concentrations as the default approach for carcinogens determined to have a non-linear mode of action.

Exhibit 1-1. TRIM in the Context of EPA Human Health Risk Assessment



- **TRIM.Expo$_{Inhalation}$** (also referred to as the Air Pollutants Exposure Model, or APEX) is an exposure-event model designed to estimate human inhalation exposure to criteria and toxic air pollutants at the local, urban, and consolidated metropolitan level using a stochastic, "microenvironmental" approach. Information about TRIM.Expo$_{Inhalation}$ is available on the EPA Fate, Exposure, and Risk Analysis (FERA) website, and information about using TRIM.Expo$_{Inhalation}$ in inhalation risk assessments for air toxics is presented in the Air Toxics Risk Assessment (ATRA) Reference Library, Volumes 1 and 2, also available on the FERA website (http://www.epa.gov/ttn/fera). TRIM.Expo$_{Inhalation}$ can be installed along with TRIM.Risk using the TRIM installation program. This installation program, as well as technical documentation and user guidance for TRIM.Expo$_{Inhalation}$, are provided on EPA's FERA web page at http://www.epa.gov/ttn/fera/human_apex.html.

- **HAPEM** (the Hazardous Air Pollutant Exposure Model) is an exposure-event model designed to estimate inhalation exposures to toxic air pollutants for selected population groups. Through a series of calculation routines, the model uses ambient air concentration data, indoor/outdoor microenvironment concentration relationship data, population data, and human activity pattern data to estimate an expected range of inhalation exposure concentrations for groups of individuals. Like TRIM.Expo$_{Inhalation}$, HAPEM generates exposure estimates for a set of hypothetical individuals; however, the activity patterns for these individuals are generated randomly by HAPEM (unlike TRIM.Expo$_{Inhalation}$, which generates activity patterns that are statistically representative of the population in the modeling region). Users wishing to perform inhalation risk assessments using exposure estimates generated by HAPEM must install HAPEM in addition to the required TRIM.Risk software. Instructions for downloading and installing HAPEM, as well as technical documentation and user guidance, are provided on EPA's FERA web page at http://www.epa.gov/ttn/fera/human_hapem.html.

These exposure models can be run independently of TRIM.Risk if desired (and the results fed into TRIM.Risk), or they can be run in conjunction with TRIM.Risk within the TRIM system (i.e., as a part of a MIMS scenario including TRIM.Risk). A human health toxicity database is included with the TRIM.Risk software available for download from the FERA website (see http://www.epa.gov/ttn/fera). For additional details about this database, refer to the documentation available on this site.

1.1.3 Risk Characterization Phase

During this phase, TRIM.Risk can be used to calculate and present a variety of risk metrics and associated information. The Graphical User Interface (GUI) for the TRIM.Risk metrics generator is designed to help the user specify settings for the calculation of risk metrics. See Chapter 2 for more information on the types of risk outputs that can be generated with TRIM.Risk and options for their calculation. The inhalation risk estimates and associated information (including the exposure estimates) generated by TRIM can be processed using the Data Analysis and Visualization Engine (DAVE) to generate tables and charts for characterizing and communicating risk assessment results.

1.2 MIMS Projects Associated with TRIM.Risk for Inhalation Risk Assessment

EPA's Multimedia Integrated Modeling System (MIMS) provides a user interface for TRIM.Risk and functions as the computer framework within which the parts of the TRIM system communicate with each other (refer to Volume I of this User's Guide for more information on using TRIM.Risk within MIMS). Two MIMS projects are available for TRIM.Risk inhalation risk assessments with non-probabilistic exposure-response values:

- Inhalation risk assessment using RfCs and UREs, with TRIM.Expo; and
- Inhalation risk assessment using RfCs and UREs, with HAPEM.

These MIMS projects differ according to the inhalation exposure model used (i.e., $\text{TRIM.Expo}_{\text{Inhalation}}$ or HAPEM) and the risk metrics that are available to the user. Users are encouraged to consult the FERA website and the $\text{TRIM.Expo}_{\text{Inhalation}}$ (i.e., APEX) and HAPEM User's Guides for detailed information on each of these inhalation exposure models. Advanced users can also create their own alternate MIMS projects for using TRIM.Risk if neither of these projects meets their needs (see Volume I of this TRIM.Risk User's Guide).

To allow users to tailor their analyses to meet specific needs, each of these MIMS projects contains multiple scenarios constructed by EPA that can accommodate analyses of various scales and scopes, from a simple analysis of risks associated with a single chemical emitted from a single source, to a more complex analysis of the risks associated with multiple chemicals emitted from multiple emission sources at facilities in different study areas. The scenarios that are provided also allow users some choice in the TRIM components that are run. For example, some scenarios include the execution of the inhalation exposure model within the scenario, whereas others generate risk metrics using outputs from a previously completed exposure modeling simulation. Complete descriptions of the available scenarios and information to assist users in selecting among them are provided in Chapters 3 (for risk assessments using $\text{TRIM.Expo}_{\text{Inhalation}}$) and 4 (for risk assessments using HAPEM).

1.3 How to Use This Document

This volume provides instructions for using TRIM.Risk for inhalation risk assessment using non-probabilistic exposure-response values. Chapter 2 describes the different individual- and population-level human health risk metrics that are available from TRIM.Risk. Chapter 3 describes the steps involved in setting up and running the currently available scenarios using exposure estimates generated by $\text{TRIM.Expo}_{\text{Inhalation}}$, and Chapter 4 describes the steps involved in setting up and running the currently available scenarios using exposure estimates generated by HAPEM. By design, the step-by-step descriptions for running TRIM scenarios presented in Chapters 3 and 4 are somewhat repetitive, so that the user can refer directly to the set of scenario-specific instructions relevant to their needs. Chapter 5 describes each of the components of the scenarios associated with these two MIMS projects, including detailed instructions for configuring each component. In addition, several appendices are included to provide additional information related to risk metric calculations carried out by TRIM.Risk and the application of TRIM.Risk for an inhalation risk assessment.

New users will want to review Volume I of this User's Guide, Introduction to TRIM.Risk, for a summary of TRIM.Risk and its associated required software, as well as instructions on how to perform basic operations in MIMS (the model framework for TRIM.Risk), MySQL (the relational database used to communicate data between components of TRIM.Risk), and DAVE (the data analysis software provided with TRIM.Risk).

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2. Risk Outputs

2.1 Introduction

For inhalation risk assessments using non-probabilistic exposure-response (i.e., toxicity) values, TRIM.Risk combines toxicity values with human inhalation exposure estimates (e.g., from $TRIM.Expo_{Inhalation}$) and other population-specific information to derive a variety of risk metrics. Using the GUI for the TRIM.Risk metrics generator, the user specifies the type of risk metrics to be derived (individual or population) and the specific metrics (e.g., for population risk: bin frequency counts, frequency distributions, statistical cancer incidence). Available to the user for grouping or subsetting of risk metrics are a variety of ***dimensions*** (initially associated with the exposure estimates or exposure-response values). These include:

Dimensions of Population: Race and gender.

Dimensions of Assessment: Study area, facility, source, and chemical.[1]

Dimensions of Cumulative Risk Metrics (i.e., chemical aggregation): Target organ (chronic hazard metrics only) and weight-of-evidence (cancer metrics only).

Dimensions Associated with Risk Metrics

Dimensions are characteristics that are initially associated with the exposure estimates and exposure-response values used by TRIM.Risk, such as demographic attributes of an exposed individual or target organ for the critical toxic effect associated with a chemical. By selecting and/or grouping risk results using these dimensions, users can generate specific risk metrics using TRIM.Risk according to the needs of a particular assessment.

The human health metrics available with the initial release of TRIM.Risk and their associated dimensions are summarized in Exhibit 2-1.

This chapter describes the inhalation risk metrics using non-probabilistic response values derived by the initial release of TRIM.Risk. Section 2.2 presents a description of dimensions associated with risk metrics derived with the initial release of TRIM.Risk, and Section 2.3 describes how the metrics are calculated. More detailed information on the calculation of risk metrics is presented in Appendix A.

[1] These dimensions will be available if $TRIM.Expo_{Inhalation}$ is used to generate exposure estimates; if HAPEM is used to generate exposure estimates, the available assessment dimensions will be state, source, and chemical (urban/rural designation can also be tracked).

Exhibit 2-1. Summary of Metrics Information

Risk Metric	Abbreviation	Dimensions [a,b]	Dependency of Metric		Output
			Metrics	Additional User-Specified Parameters	
Individual Risk/Hazard Metrics					
Annualized Cancer Risk/Hazard Quotient	ACR/AHQ	modeled individual, age, home sector, weight-of-evidence/target organ	None	None	Cancer risk/hazard
Lifetime Cancer Risk/Hazard Quotient for Lifetime Residency Period (70 years)	LCR/HQ_L	home sector, weight-of-evidence/target organ	ACR/ AHQ	• Age ranges for age bins • Percentile for each age bin	Cancer risk/hazard
Lifetime Cancer Risk/Hazard Quotient for Less-Than-Lifetime Residency Period	LCR_LT/ HQ_LT	home sector, weight-of-evidence/target organ, age bin, residency period percentile	ACR/ AHQ	• Age ranges for age bins • Residency period for each age bin • Percentile for each age bin • Residency period percentile	Cancer risk/hazard
Greatest 7-Year Hazard Quotient for Lifetime Residency Period	MAX7HQ_L	home sector, target organ	AHQ; HQ_L	• Residency period for each age bin (age bins defined for HQ_L) • Starting age	Hazard
Greatest 7-Year Hazard Quotient for Less-Than-Lifetime Residency Period	MAX7HQ_LT	home sector, target organ, age bin, residency period percentile	AHQ; HQ_LT	• Residency period for each age bin (age bins defined for HQ_LT) • Starting age	Hazard
Population Risk/Hazard Metrics – *Bin Frequency Counts*					
Hazard Bin Frequency Count	HBF	weight-of-evidence/target organ, HQ bin	AHQ	• Hazard ranges for hazard bins • Representative percentile for hazard distribution	Number of people

Exhibit 2-1. Summary of Metrics Information

Risk Metric	Abbreviation	Dimensions [a,b]	Dependency of Metric		Output
			Metrics	Additional User-Specified Parameters	
Risk/Hazard Bin Frequency Count for Lifetime Residency Period	RBF/HBF_L	home sector, weight-of-evidence/target organ, risk/HQ bin	ACR/ AHQ; LCR/ HQ_L	• Risk/hazard ranges for risk/hazard bins	Number of people
Risk/Hazard Bin Frequency Count for Less-Than-Lifetime Residency Period	RBF_LT/ HBF_LT	weight-of-evidence/target organ, age bin, residency period percentile, risk/HQ bin	ACR/ AHQ; LCR_LT/ HQ_LT	• Risk/hazard ranges for risk/hazard bins	Number of people
Hazard Bin Frequency Count for Greatest 7-Year Hazard Quotient for Lifetime Residency Period	HBF_7_L	target organ, HQ bin	AHQ; MAX7HQ_L	• Hazard ranges for hazard bins	Number of people
Hazard Bin Frequency Count for Greatest 7-Year Hazard Quotient for Less-Than-Lifetime Residency Period	HBF_7_LT	target organ, age bin, residency period percentile, HQ bin	AHQ; MAX7HQ_LT	• Hazard ranges for hazard bins	Number of people
Population Risk/Hazard Metrics – *Distributions*					
Population-Weighted Hazard Distribution	PHD	home sector, target organ	AHQ; HQ_L	• Representative percentile for hazard distribution	• Hazard • Number of people • Percentage • Cumulative percentile • Rank
Population-weighted Risk/Hazard Distribution for Lifetime Residency Period	PRD/PHD_L	home sector, weight-of-evidence/target organ	ACR/ AHQ; LCR/ HQ_L	None	• Cancer risk/hazard • Number of people • Percentage • Cumulative percentile • Rank

Exhibit 2-1. Summary of Metrics Information

Risk Metric	Abbreviation	Dimensions [a,b]	Dependency of Metric		Output
			Metrics	Additional User-Specified Parameters	
Population-Weighted Risk/Hazard Distributions for Less-Than-Lifetime Residency Period	PRD_LT/ PHD_LT	home sector, weight-of-evidence/target organ, age bin, residency period percentile	ACR; LCR_LT/ AHQ; HQ_LT	None	• Cancer risk/hazard • Number of people • Percentage • Cumulative percentile • Rank
Population-weighted Hazard Distribution for Greatest 7-Year Hazard Quotient for Lifetime Residency Period	PHD_7_L	home sector, target organ	AHQ; MAX7H Q_L	None	• Hazard • Number of people • Percentage • Cumulative percentile • Rank
Population-weighted Hazard Distribution for Greatest 7-Year Hazard Quotient for Less-Than-Lifetime Residency Period	PHD_7_LT	home sector, target organ, age bin, residency period percentile	AHQ; MAX7H Q_LT	None	• Hazard • Number of people • Percentage • Cumulative percentile • Rank
Population Risk Metrics – *Statistical Cancer Incidence*					
Statistical Cancer Incidence	SCI	home sector, weight-of-evidence	ACR	None	• Annual SCI • Total SCI

[a] The dimensions of race, gender, and chemical/group of chemicals, and assessment dimensions (i.e., study area, facility, and source if $\text{TRIM.Expo}_{\text{Inhalation}}$ is used; state, source, and urban/rural classification if HAPEM is used) can be associated with ***any*** of the risk metrics described here (i.e., if these dimensions are selected by the user for subsetting risk outputs). In this table, the term "home sector" refers to a risk metric dimension derived from exposure results generated by $\text{TRIM.Expo}_{\text{Inhalation}}$. If HAPEM is used to estimate exposures, the term "home tract" would apply; however, the basic conceptual dependence of metrics on this dimension would be the same as described here for "home sector." See Section 2.2 for additional details.

[b] Age is a dimension of ACR and AHQ only if $\text{TRIM.Expo}_{\text{Inhalation}}$ is used as the exposure model. If HAPEM is used as the exposure model, results are associated with preset age bins, not specific ages.

2.2 Risk Metric Dimensions

Risk metric dimensions are based on attributes associated with the exposure modeling outputs or the exposure-response values in the toxicity database. Based on user specifications, TRIM.Risk uses these dimensions to create a set of risk metrics that meet the needs of the user for their assessment, i.e., to derive metrics for the population group(s), study area(s), facility(ies), source type(s), chemical(s) and chemical aggregation desired. These dimensions can be used as follows.

Population. The user can specify that risk metrics be derived for the entire study population or for subsets based on one or both of the following dimensions.

- **Gender:** Risk metrics can be generated for each gender separately or for only males or females. Alternatively, the user can elect to remove the dimension of gender by selecting "all persons;" in this case, individual risk results would no longer be associated with a specific gender.

- **Race:** Risk metrics can be generated for each race individually or for one or more selected races. Alternatively, the user can elect to remove the dimension of race by selecting "all races." Note that some annualized risk results (e.g., those based on exposure estimates generated at the block level) may not include differentiation by race. In these cases, the user will not have the option of selecting specific races.

Study Area, Facilities, Sources, and Chemicals. The user can specify that risk metrics be derived for all dimensions for which exposure was estimated or for subsets or groupings based on one or more exposure dimensions.

- **Chemical:** Risk metrics can be generated for each chemical for which exposure estimates have been developed or filtered to include only selected chemicals.

Using Monitoring Data with TRIM.Risk

If air quality monitoring data are used as inputs to $\text{TRIM.Expo}_{\text{Inhalation}}$ or HAPEM, some of the dimensions of assessment described here may not be associated with the modeled exposures. For example, ***chemical*** will be a dimension of the exposure estimate, but ***facility*** or ***source*** may not be available dimensions. The user will need to consider the characteristics of their input data when generating risk metrics using TRIM.Risk.

If $\text{TRIM.Expo}_{\text{Inhalation}}$ is used, the following dimensions can also be used to derive risk metrics:

- **Study area:** Risk metrics can be generated for each study area individually or filtered to include only selected study areas.

- **Facility:** Risk metrics can be generated for each facility individually, filtered to include only selected facilities, or aggregated to combine each individual's risk results across selected facilities.

- **Source:** Risk metrics can be generated for each source individually, filtered to include only selected source types, or aggregated to combine each individual's results across all source types.[2]

> ***If HAPEM is used,*** the following two dimensions are available instead of the previous three:
>
> - **State:** Risk metrics can be generated for each state individually or filtered to include only selected states.
> - **Source:** Risk metrics can be generated for each source individually, filtered to include only selected sources, or aggregated to combine each individual's risk results across selected sources.

Cumulative Risk. In addition to producing chemical-specific risk metrics (if desired), TRIM.Risk can also produce cumulative (i.e., aggregated) risk estimates for groups of chemicals based on the following attributes.

- **Weight of evidence:** Cumulative cancer risk metrics can be developed by summing cancer risks across all chemicals that are carcinogens (i.e., adding all chemical-specific risks together), on the basis of cancer weight-of-evidence, or not at all (i.e., retaining all chemical-specific risk results).

- **Target organ:** Cumulative hazard metrics (hazard indices) can be developed by summing hazards across all chemicals (i.e., adding all chemical-specific hazard quotients), on the basis of the target organ or system associated with their "critical effect," or not at all (i.e., retaining all chemical-specific hazards).

Another dimension associated with the risk metrics is the location for which an individual exposure estimate was derived. In the case of $\text{TRIM.Expo}_{\text{Inhalation}}$, this locational descriptor is termed "home sector," while in the case of HAPEM, this locational descriptor is termed "home tract." For $\text{TRIM.Expo}_{\text{Inhalation}}$, the scale of the home sector (e.g., census block, tract, or other area) is specified when the exposure model is run. For HAPEM (Version 5), the scale of the home tract is fixed at the census tract level.

Risk metrics can be developed for a single combination of assessment dimensions (e.g., for a single chemical in a single study area) or for combinations involving multiple values of multiple dimensions (e.g., for two of the five facilities modeled and three of seven chemicals, or for one source type in three study areas and all chemicals, or for all emissions from three of the facilities modeled). TRIM.Risk will generate metrics for all possible combinations of the user-selected study areas, facilities, and sources (plus metrics corresponding to specified chemical categories and demographics).

---

[2] The source dimension can be used in $\text{TRIM.Expo}_{\text{Inhalation}}$ or HAPEM to distinguish between individual sources (e.g., discrete facilities) or source types (e.g., point vs. area sources); risk metrics derived using this dimension would reflect the choices made during the exposure modeling.

2.3 How Risk Metrics Are Derived

This section describes the steps by which inhalation risk metrics using non-probabilistic exposure-response values are derived by TRIM.Risk and may be output to the user via the Data Analysis and Visualization Engine (DAVE). Exhibit 2-2 presents a diagram summarizing these steps. The process involved in each of these steps is described in more detail in the sections that follow.

2.3.1 Exposure Modeling Estimates Input to TRIM.Risk

For the applications described in this User's Guide, either TRIM.Expo or HAPEM is used to generate exposure estimates for TRIM.Risk calculations.[3] In the initial release of TRIM.Risk (focusing on chronic risk assessment), these estimates are provided to TRIM.Risk in the form of a database containing annual average exposure estimates. In the case of TRIM.Expo, these estimates are for modeled individuals, while in the case of HAPEM, they are for a set of specific demographic groups (e.g., males aged 12-17).

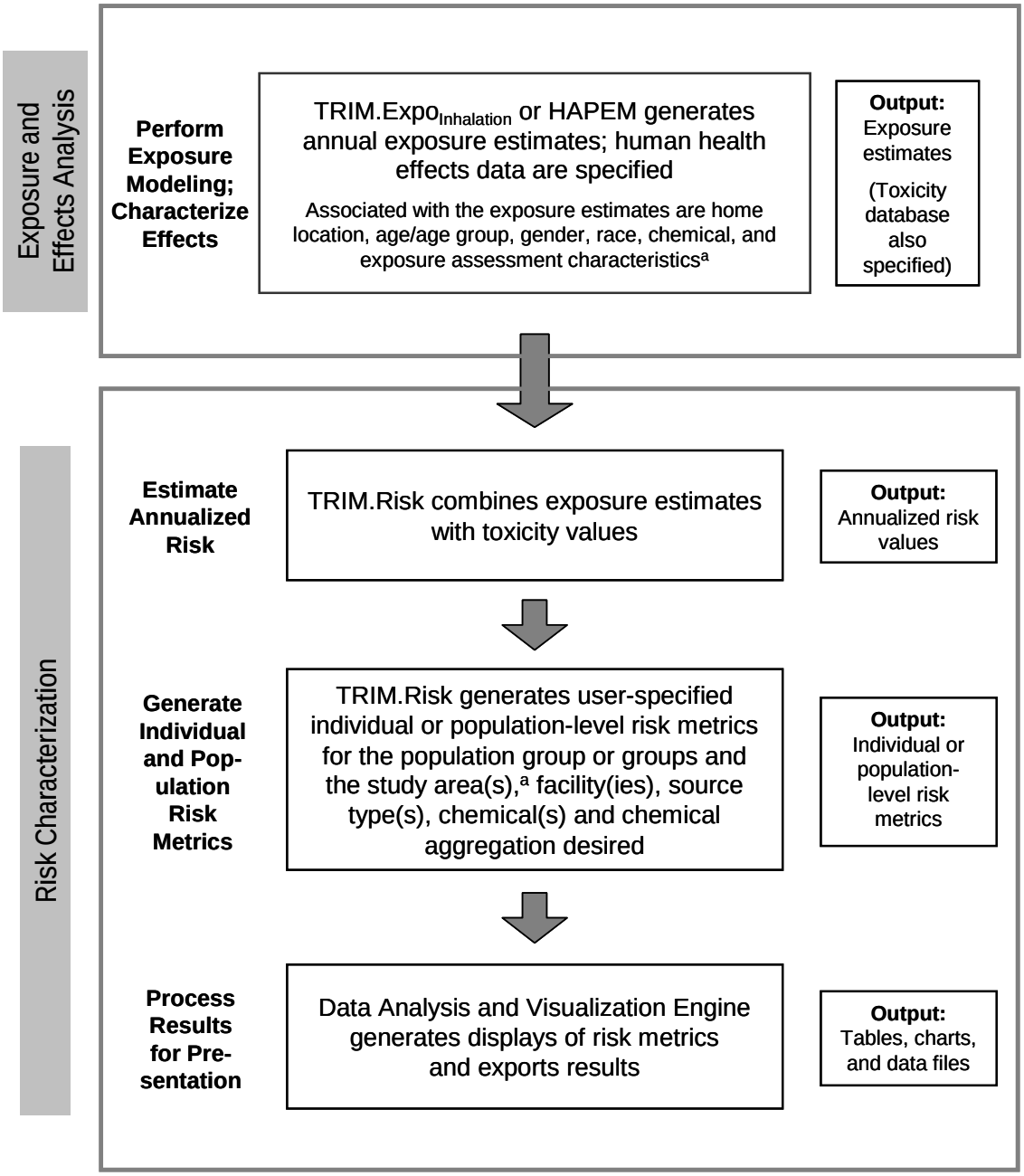
2.3.2 Calculation of Annualized Results by TRIM.Risk

In TRIM.Risk, the annual average inhalation exposure concentration estimates generated by TRIM.Expo or HAPEM for the modeled population are first combined with inhalation cancer unit risk estimates and chronic reference values (e.g., RfCs) to derive annualized cancer risk and hazard quotient values, respectively. The annualized hazard quotients are derived by dividing the 1-year exposure concentration by the reference value, without any adjustment, while the annualized cancer risk estimates are derived by multiplying the unit risk estimate[4] by the 1-year exposure concentration and dividing by 70 (as the assumed length of lifetime). This is done on a chemical-specific basis.

[3] Details regarding these exposure models are available on the EPA FERA website (www.epa.gov/ttn/fera).

[4] While not accommodated in the initial release of TRIM.Risk, subsequent releases will include a slight revision of this calculation to accommodate the incorporation of age-dependent adjustment factors, as appropriate, in accordance with the Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA 2005).

Exhibit 2-2. Steps by which TRIM.Risk (Initial Release) Derives Risk Metrics Using Non-Probabilistic Exposure-Response Values



[a] Exposure assessment characteristics (e.g., source, facility, and study area) that are available as dimensions depend on the exposure assessment model used (i.e., TRIM.Expo$_{Inhalation}$ or HAPEM) and may not be applicable dimensions in all cases (e.g., if monitoring data are used as inputs to TRIM.Risk). See Section 2.2.

These **annualized values** are stored in a MySQL database and used by TRIM.Risk as the "building blocks" in calculating the chronic risk metrics. Stored in this database along with these annualized values are the various dimensions associated with the exposure estimates and exposure-response values (see Section 2.2).

2.3.3 Generating Risk Metrics

The TRIM.Risk metrics generator uses the annualized risk results to derive chronic (i.e., based on multi-year exposures, including lifetime) risk metrics. These metrics can be produced for individual risk or population risk.

In the initial release of TRIM.Risk, chronic (multi-year) risk metrics are developed from the annualized risk values described in Section 2.3.2 by applying the concept of a ***constructed individual*** (see text box below). For cancer risks and non-cancer hazard results, each annualized value is associated with an age or age group that is passed to TRIM.Risk with the exposure estimate developed by $\text{TRIM.Expo}_{\text{Inhalation}}$ or HAPEM. TRIM.Risk groups the annualized results into five age bins.[5] Once the results have been grouped into these bins (taking into account user selections regarding other dimensions, as described in more detail below), they are ordered by risk or hazard value and a cumulative probability distribution is generated for each age bin. The users make two selections at this point to direct TRIM.Risk how to generate risk metrics with regard to age.

- **Age group representation:** The user selects a percentile (or the mean) to be used to represent each age bin. For example, the user can designate that the 95th percentile estimate within each age bin be used as the representative risk or hazard value for each bin.

- **Residency period:** The user selects a percentile for the assumed residency period of each individual, ranging from the mean or median residency period for that individual's age group up to a lifetime of 70 years. The user also designates when residency begins for each age group (i.e., either at the minimum or the median age within that age group). Calculations performed for metrics involving less-than-lifetime exposures are discussed in Appendix A.

Using the selected representative risk and hazard values for each age bin and taking into account the selected residency period, TRIM.Risk calculates individual-level risk and hazard metrics based on the concept of a constructed individual. Refer to Exhibit 2-1 for the list of risk metrics available from TRIM.Risk.

[5] If $\text{TRIM.Expo}_{\text{Inhalation}}$ is used to produce the exposure estimates, exposures are output for specific ages, and age bin cutoffs are defined by the user. If HAPEM is used to generate exposure estimates, exposures are output for specific, pre-defined age groups (e.g., 12-17).

TRIM.Risk can also calculate population-level risk metrics for a study population, such as the number of people in the study area within certain risk or hazard bins (e.g., number of individuals with an estimated lifetime cancer risk between one in ten million and one in one million). Calculations for population-level metrics depend in part on the user decisions made for individual-level metrics because population-level metrics are calculated using individual-level results. Exhibits 2-3 and 2-4 illustrate the dependencies of each metric. For cancer and hazard metrics, any filtering or aggregation decisions by the user (e.g., regarding race, gender, chemical, or other dimensions) apply to ***all*** metrics – including both individual- and population-level metrics – developed by that execution of the TRIM.Risk metrics generator. Another model run would be required to generate additional results with metrics filtered or aggregated in different ways (i.e., with different dimensions). In addition, some pairs of hazard metrics are created simultaneously and cannot be generated separately. These pairs are indicated in Figure 2-4 by including two metrics in the same box.

Constructed Individual

As described in Chapter 1, TRIM.Risk first calculates annualized risk and hazard values based on a one-year estimate of exposure. In order to generate metrics for multiple years, annualized results are combined mathematically to estimate risks and hazards for a constructed individual exposed for a multi-year period (with the inherent assumption that the air quality on which the exposure estimates are based is unchanging across multiple years). However, because each annual exposure estimate passed to TRIM.Risk has a specific age (or age range, in the case of HAPEM) and other characteristics associated with it, calculating metrics for a constructed individual is not as straightforward as simply summing multiple risks or hazards.

In the initial release of TRIM.Risk, the process of generating results for a constructed individual begins by distilling the distribution of results for modeled individuals within an age bin into a single result representing that bin (taking into account filtering or aggregation decisions by the user based on available dimensions). For each home sector (e.g., each census block), a distribution of individual annualized risks and/or hazards is generated by TRIM.Risk for each of five age bins. A user-specified percentile (or the mean) is used to define the "representative" cancer and/or hazard result for the set of annualized values associated with each age bin. For example, if the 90th percentile is selected for age group representation, the cancer or hazard result corresponding to the 90th percentile of the distribution of results for each age bin is used. Risks or hazards are then combined across different age bins according to the user-designated residency period assumptions to generate risk and hazard results for the constructed individual.

An estimate of statistical annual cancer incidence can also be generated by TRIM.Risk. This metric is calculated differently from other population-level metrics in that it is *not* based on the constructed individual concept (and associated age binning). Rather, it is derived directly from the annualized cancer risk results, the population count for the area of interest, and the user-specified number of years for the exposure duration.

Technical information on the algorithms used to calculate metrics and illustrative example calculations are presented in Appendix A.

Exhibit 2-3. Dependencies of Cancer Metrics

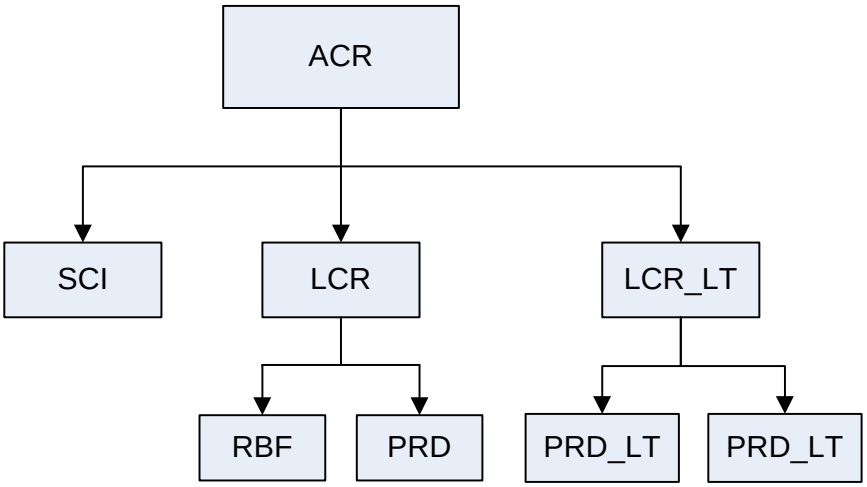
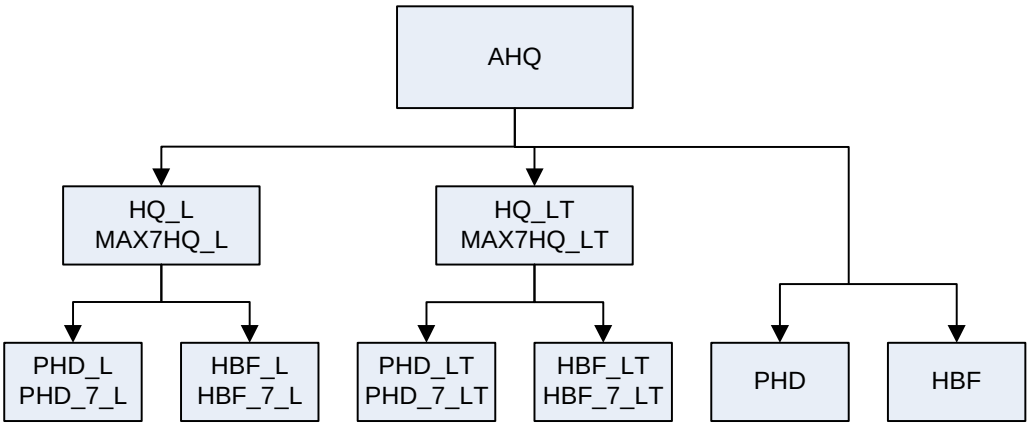


Exhibit 2-4. Dependencies of Chronic Hazard Metrics



Note: Refer to Exhibit 2-1 for definitions of abbreviated cancer and hazard metric names.

Residency Period

As noted above, TRIM.Risk can calculate metrics for two types of ***residency periods***: lifetime, where each constructed individual resides at one location for their entire lifespan (set at 70 years in this version of TRIM.Risk); and less-than-lifetime, where each constructed individual resides at one location for a specific period of time and does not reside there or elsewhere within the study area(s) during the remainder of their lifespan. Accordingly, the lifetime risk and hazard estimates for the constructed individuals are calculated using the selected percentile risk or hazard for each age bin and the number of years in each age bin. For less-than-lifetime metrics, the user also specifies a representative residency period via selection of a percentile associated with the residency period input database.

The residency period input database (see adjacent text box) contains residency period values for specific ages, with values organized by percentile. This database can be modified or replaced by the user (e.g., to reflect more up-to-date or study area-specific information). The database that is provided with the initial release of TRIM.Risk was developed from Table 15-168 of the U.S. EPA Exposure Factors Handbook (1997) that is derived from Johnson and Capel (1992). This table provides national estimates of the total time a person of a given age is expected to live at a single location (i.e., the duration in years between a person moving into a residence and the time the person moves out or dies). The database includes residency duration for males and females at 3-year age intervals, for the mean and 50th, 75th, 90th, 95th, and 99th percentile residency periods.

Residency Period Database

For a constructed individual in TRIM.Risk, the residency period is required for an age range. EPA's Exposure Factors Handbook (EFH) Table 15-168 gives the residency period for specific ages (e.g., 3, 6, 9 years of age), and TRIM.Risk calculations assume that the age stated in the table is the ending age for those data (note that per Johnson and Capel (1992) the residency period for that age actually includes some time prior to that age and some time subsequent). For example, residency period data for age 6 is used in this initial release of TRIM.Risk to represent ages 4, 5, and 6. Additionally, the EFH provides values in decimal years, all values for mean residency were rounded to the nearest whole year. An excerpt of the residency period table provided with TRIM.Risk is presented below.

Sample Portion of TRIM.Risk Residency Period Data

Beginning Age	Ending Age	Duration (years)	Residency Period (years)	Residency Period Percentile
0	3	4	7	50th
4	6	3	8	50th
7	9	3	9	50th
10	12	3	9	50th
13	15	3	9	50th

... Table continues with other ages and percentiles....

The TRIM.Risk user selects a value for the residency period (e.g., mean, median, 95th percentile), which is used with the residency period database to set a residency period for each age group. The less-than-lifetime risk or hazard estimate for each age bin is constructed using the selected residency period for the age bin, the selected percentile risk or hazard for the age bin and any subsequent age bins within the residency period (if the residency period extends beyond

the initial age bin), and the number of years spent in each of these age bins. For more details on the calculation of the lifetime and less-than-lifetime risk metrics, refer to Appendix A.

2.4 Exporting Results and Generating Tables and Charts Using the Data Analysis and Visualization Engine (DAVE)

In the final step of an inhalation risk assessment using TRIM.Risk, DAVE can be used to export the metrics generated in the previous step or to create plots or tables for these risk metrics. Example types of plots that can be created include bar plots, box plots, scatter plots, ranked order plots, and others. Tables can be generated as basic data tables, histograms, or percentile tables. For each table or plot that is generated, the risk metric is considered to be the dependent variable and the user specifies the independent variables involved. Independent variables include any of the risk metric dimensions. For example, the user can specify that a risk metric plot be generated that includes results for one, some, or all of the chemicals included in the TRIM.Risk analysis. DAVE also allows the user to generate output tables of the inhalation exposure estimates (e.g., from $\text{TRIM.Expo}_{\text{Inhalation}}$ or HAPEM) or the annualized risk estimates calculated by TRIM.Risk.

For more information on DAVE, see Volume I of the TRIM.Risk User's Guide or the DAVE User's Guide, both of which are available on the TRIM.Risk page, accessible via the EPA FERA website (http://www.epa.gov/ttn/fera).

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3. Inhalation Risk Assessment with TRIM.Expo Scenarios

3.1 Introduction

As described in Chapter 1, TRIM.Risk can be used to perform inhalation risk assessment using non-probabilistic exposure-response values and exposure estimates generated by $\text{TRIM.Expo}_{\text{Inhalation}}$. These assessments can be performed using the scenarios in the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" project or by creating a new MIMS scenario (see Volume I, Section 3.1.10). The set of scenarios that involve $\text{TRIM.Expo}_{\text{Inhalation}}$ contain different combinations of TRIM.Risk components to fit the requirements of specific assessments. Exhibit 3-1 lists each of the scenarios available for inhalation risk assessments with $\text{TRIM.Expo}_{\text{Inhalation}}$ and specifies which components each of these scenarios include. A decision tree is provided in Exhibit 3-2 to assist users in determining which scenario is appropriate for their needs. The appendices to Volume II contain additional information on these scenarios, including the sequence in which components are run (Appendix B), an overview of the components involved in each scenario (Appendix C), scenario parameters (Appendix D), module instance parameters for each scenario (Appendix E), and the MySQL database schema (Appendix F). Information on troubleshooting is included in Appendix G.

This chapter provides step-by-step instructions for running each of the scenarios provided in the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" MIMS project. Numerous tables are used to summarize the parameters required by TRIM.Risk and the default values included in the software package available from EPA. When applying TRIM.Risk, users should review these parameters carefully to ensure that appropriate values are used in their scenario.

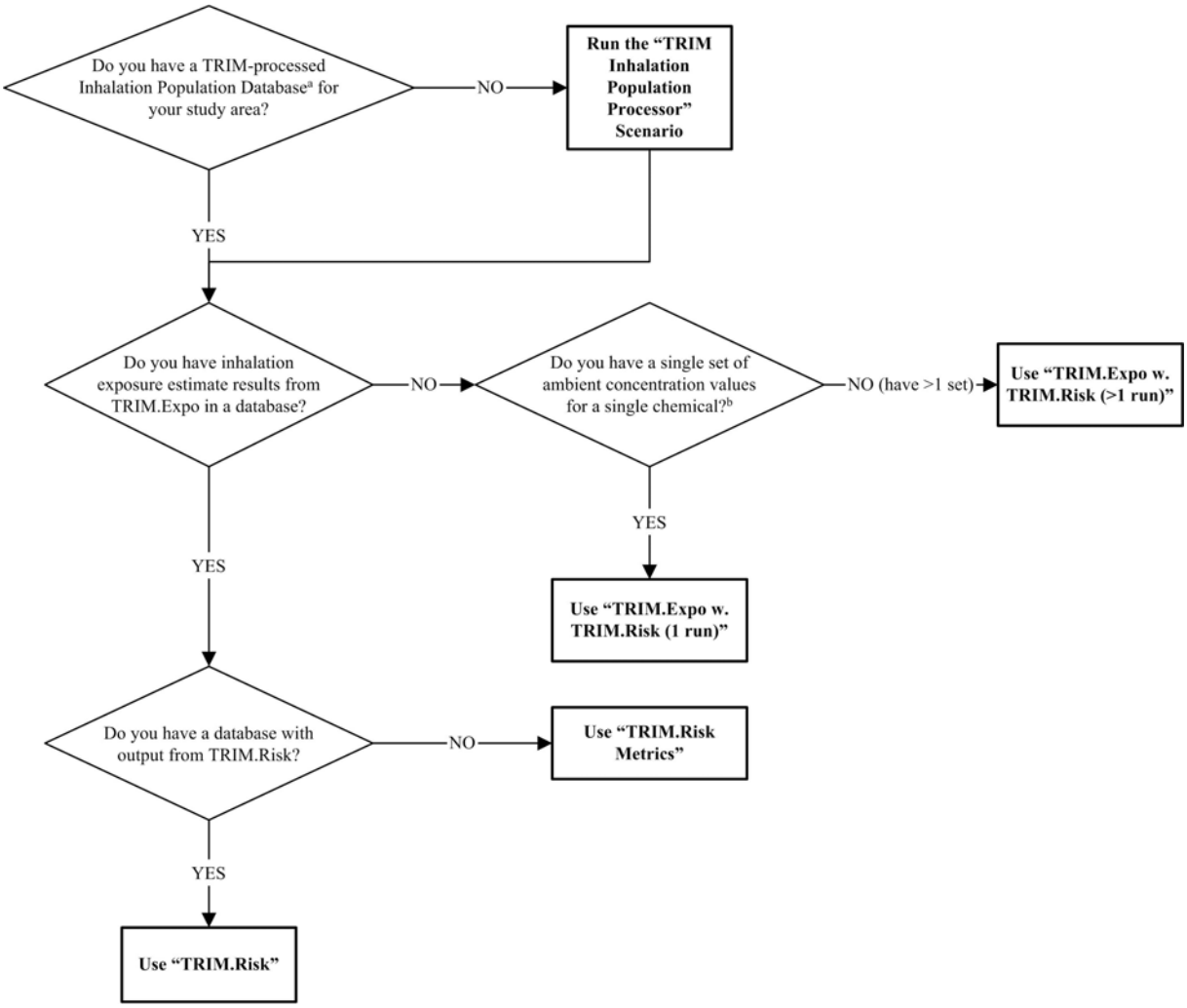
What is APEX?

APEX is a specific software program currently used for $\text{TRIM.Expo}_{\text{Inhalation}}$. Consequently, a sentence about APEX is conceptually about $\text{TRIM.Expo}_{\text{Inhalation}}$. Throughout this chapter, the term APEX will be used when APEX is what the user sees on the MIMS screen. Otherwise, the term $\text{TRIM.Expo}_{\text{Inhalation}}$ will be used to discuss the TRIM component that produces inhalation exposure estimates.

Exhibit 3-1. Currently Available Scenarios for "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" Project

Scenario	Description	TRIM.Expo$_{Inhalation}$ Population Processor	TRIM.Expo$_{Inhalation}$	TRIM.Expo$_{Inhalation}$ with Iterator	TRIM.Expo$_{Inhalation}$ Postprocessor	TRIM.Risk$_{HH-NP}$	TRIM.Risk metrics generator	DAVE
TRIM Inhalation Population Processor	Used to process TRIM.Expo$_{Inhalation}$ population files into a MySQL database for use in calculating population risk metrics. This scenario only needs to be run once for a given population data set.	✓						
TRIM.Expo w. TRIM.Risk (1 run)	Used to perform an inhalation exposure and risk assessment for a single set of ambient concentration values for a single chemical using TRIM.Expo and TRIM.Risk.		✓		✓	✓	✓	✓
TRIM.Expo w. TRIM.Risk (>1 run)	Used to perform an inhalation exposure and risk assessment for more than one set of ambient concentration values (e.g., for more than one chemical, source, facility, or study area) using TRIM.Expo and TRIM.Risk.[a]			✓	✓	✓	✓	✓
TRIM.Risk	Used to perform an inhalation risk assessment using an existing TRIM.Expo output database and TRIM.Risk.					✓	✓	✓
TRIM.Risk Metrics	Used to develop risk metrics using an existing TRIM.Risk output database and the TRIM.Risk metrics generator.						✓	✓

Exhibit 3-2. "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" Scenario Decision Tree



[a] This is a MySQL database containing population data used by $\text{TRIM.Expo}_{\text{Inhalation}}$ (i.e., APEX), which are also needed to generate TRIM risk metrics. This database will not exist unless the "TRIM Inhalation Population Processor" scenario has been run.
[b] If input data is based on monitoring data, use "dummy" values for the source and facility; see text box at the beginning of Section 3.4.

In order to run these scenarios, users must have installed the required software (see Volume I, Chapter 2) and imported the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" project into MIMS (see Volume I, Section 3.1.2).

3.2 TRIM Inhalation Population Processor Scenario

This section describes the steps required to run the "**TRIM Inhalation Population Processor**" MIMS scenario. This scenario is run to convert population data for the risk assessment study area from the format used for TRIM.Expo$_{Inhalation}$ (see http://www.epa.gov/ttn/fera/apex_download.html) to a MySQL format needed by the TRIM.Risk MIMS scenarios. **Users must run this scenario before running any other inhalation risk scenarios using TRIM.Expo$_{Inhalation}$.**[1] However, this scenario only needs to be run once for the population data corresponding to a given study area.

When Should I Run This Scenario?

This scenario must be run to convert population data for the risk assessment study area from the format used by TRIM.Expo$_{Inhalation}$ to that needed by TRIM.Risk and DAVE. For a risk assessment using census tract-level population data, the national population data files accompanying the TRIM.Expo$_{Inhalation}$ installation will need to be processed only once by the user. TRIM.Risk applications can then use the resultant database for any study area within those files (at a census-tract scale of resolution). However, for applications relying on population data other than the national, census tract-level data files provided with the TRIM.Expo$_{Inhalation}$ installation – such as separately created, census block-level data files – this scenario must be run with each "new" study area data set.

Step 1 Open the "TRIM Inhalation Population Processor" Scenario in MIMS

Start MIMS by navigating to the Start menu, Programs, TRIM, and selecting "TRIM" or by double-clicking on "runtrim.bat" in Windows Explorer. Open the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" MIMS project and then the "TRIM Inhalation Population Processor" scenario.

Refer to: Volume I, Section 3.1.4, Opening a MIMS Project

Volume I, Section 3.1.6, Opening, Duplicating, Renaming, or Deleting a MIMS Scenario

Step 2 Complete the Input Panels

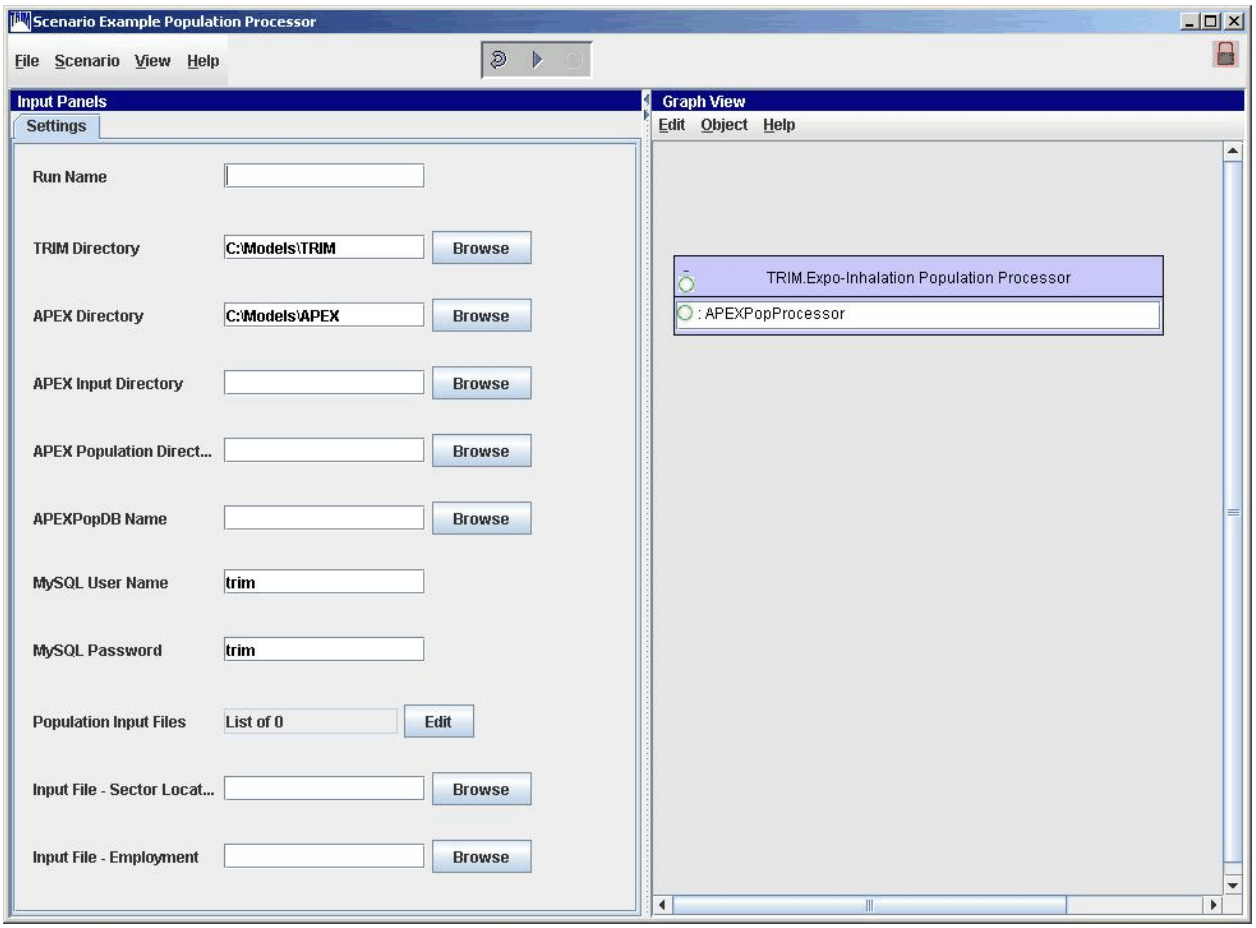
Parameters are set via the "Settings" tab located on the "Input Panels" pane (see Exhibits 3-3 and 3-4). The "Input Panels" present those parameters that are most likely to require attention from users. Note that some of these parameters will have been set by the user during the installation of TRIM. Users should use caution when making changes to any preset parameter values.

[1] Execution of this scenario with the national population data files that accompany TRIM.Expo$_{Inhalation}$ (that provide population counts for demographic groups for each census tract) will provide population data of a "TRIM.Risk-ready" format for all study areas within that national data set.

Exhibit 3-3. Parameters on "Settings" Tab of "TRIM Inhalation Population Processor" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Run Name	–	No	Name of the unique scenario run.
TRIM Directory	–	Yes	Name and location of the TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).
APEX Directory	–	Yes	Name and location of the directory containing APEX (i.e, $TRIM.Expo_{Inhalation}$) input files or folders.
APEX Input Directory	–	No	Name and location of the directory containing the input files for APEX (i.e., $TRIM.Expo_{Inhalation}$).
APEX Population Directory	–	No	Name and location of directory containing population files.
APEXPopDBName	–	No	Name of the MySQL database (to be generated) with population data used by $TRIM.Expo_{Inhalation}$ (i.e., APEX), and also used to generate risk metrics.
MySQL User Name	–	Yes	User name for access to the MySQL databases created or used for the TRIM.Risk projects.
MySQL Password	–	Yes	Password for access to the MySQL databases created or used for the TRIM.Risk projects.
Population Input Files	–	No	Name and location of gender and/or race specific population data files with defined age groups.
Input File - Sector Location	–	No	Name and location of file providing the latitude and longitude of sector IDs.
Input File - Employment	–	No	Name and location of file containing employment probabilities for all age groups in population input files.

Exhibit 3-4. "Settings" Tab of "TRIM Inhalation Population Processor" Scenario



Step 3 Run the Scenario

Run this scenario by selecting "Execute Ready Modules" from the "Scenario" menu of the scenario window or clicking the "play" button ( ) at the top of the scenario window.

Refer to: Volume I, Section 3.1.9, Running a MIMS Scenario

Appendix G, Troubleshooting

3.3 TRIM.Expo with TRIM.Risk for a Single Run

This section describes the steps required to run the "**TRIM.Expo w. TRIM.Risk (1 run)**" MIMS scenario. This scenario allows the user to employ TRIM.Expo$_{Inhalation}$ and TRIM.Risk to perform an inhalation exposure and risk assessment using a single set of ambient concentration values for a single chemical. ***To run this scenario, the user must have TRIM.Expo$_{Inhalation}$ inputs available in the required format.*** Details regarding TRIM.Expo$_{Inhalation}$ inputs and associated formatting requirements are presented in the TRIM.Expo$_{Inhalation}$ User's Guide available on the EPA FERA website (http://www.epa.gov/ttn/fera/human_apex.html).

When Should I Run This Scenario?

This scenario is designed to be used when a combined inhalation exposure and risk assessment is carried out (i.e., the exposure and risk models are run consecutively in a single application) using a single set of ambient concentration values for a single chemical. These values can be comprised of either ambient air measurements (e.g., monitoring data) or output from an air quality model. In either case, the user will need to ensure that the concentration data set is formatted appropriately according to the requirements of TRIM.Expo$_{Inhalation}$.

The steps required to run this scenario are presented below. For names of the domain objects and module instances in this scenario, refer to Appendix C.1.

Step 1 Open the "TRIM.Expo w. TRIM.Risk (1 run)" scenario in MIMS

Start MIMS by navigating to the Start menu, Programs, TRIM, and selecting "TRIM" or by double-clicking on "runtrim.bat" in Windows Explorer. Open the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" MIMS project and then the "TRIM.Expo w. TRIM.Risk (1 run)" scenario in MIMS.

Refer to: Volume I, Section 3.1.4, Opening a MIMS Project

Volume I, Section 3.1.6, Opening, Duplicating, Renaming, or Deleting a MIMS Scenario

Step 2 Complete the Input Panels

Parameters are set via the tabs located on the "Input Panels" pane, as described in Steps 2a through 2e. The "Input Panels" present those parameters that are most likely to require attention by users (see Exhibits 3-5 through 3-14). Note that some of these parameters will have been set by the user during the installation of TRIM. Users should use caution when making changes to any preset parameter values.

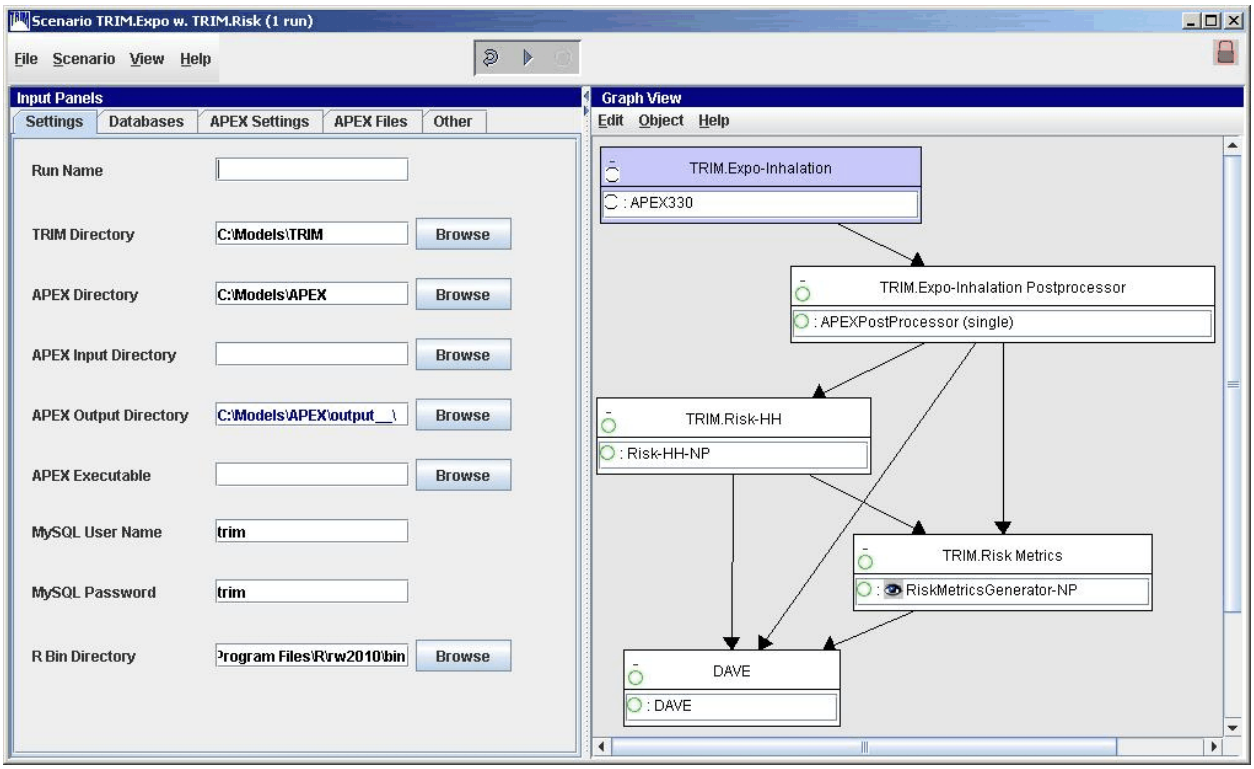
Step 2a **Set Parameters on "Settings" Tab**

Click on the "Settings" tab. The parameters that can be set on this tab are listed in Exhibits 3-5 and 3-6. Set parameters by typing in a value or clicking the "Browse" button next to the parameter field and selecting the desired file or directory.

Exhibit 3-5. Parameters on "Settings" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Run Name	–	No	Name of the unique scenario run.
TRIM Directory	–	Yes	Name and location of the TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).
APEX Directory	–	Yes	Name and location of the directory containing APEX (i.e., $TRIM.Expo_{Inhalation}$) input files or folders.
APEX Input Directory	–	No	Name and location of the directory containing the input files for APEX (i.e., $TRIM.Expo_{Inhalation}$).
APEX Output Directory	${str("APEX Directory")}\output_${str("Pollutant")}_${str("Location")}\${str("Run Name")}	No	Name and location of the directory containing the APEX (i.e., $TRIM.Expo_{Inhalation}$) output files.
APEX Executable	–	No	Name and location of the APEX (i.e., $TRIM.Expo_{Inhalation}$) executable.
MySQL User Name	–	Yes	User name for access to the MySQL databases created or used for the TRIM.Risk projects.
MySQL Password	–	Yes	Password for access to the MySQL databases created or used for the TRIM.Risk projects.
R Bin Directory	–	Yes	Location of the bin directory for the R program.

Exhibit 3-6. "Settings" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario



Step 2b **Set Parameters on "Databases" Tab**

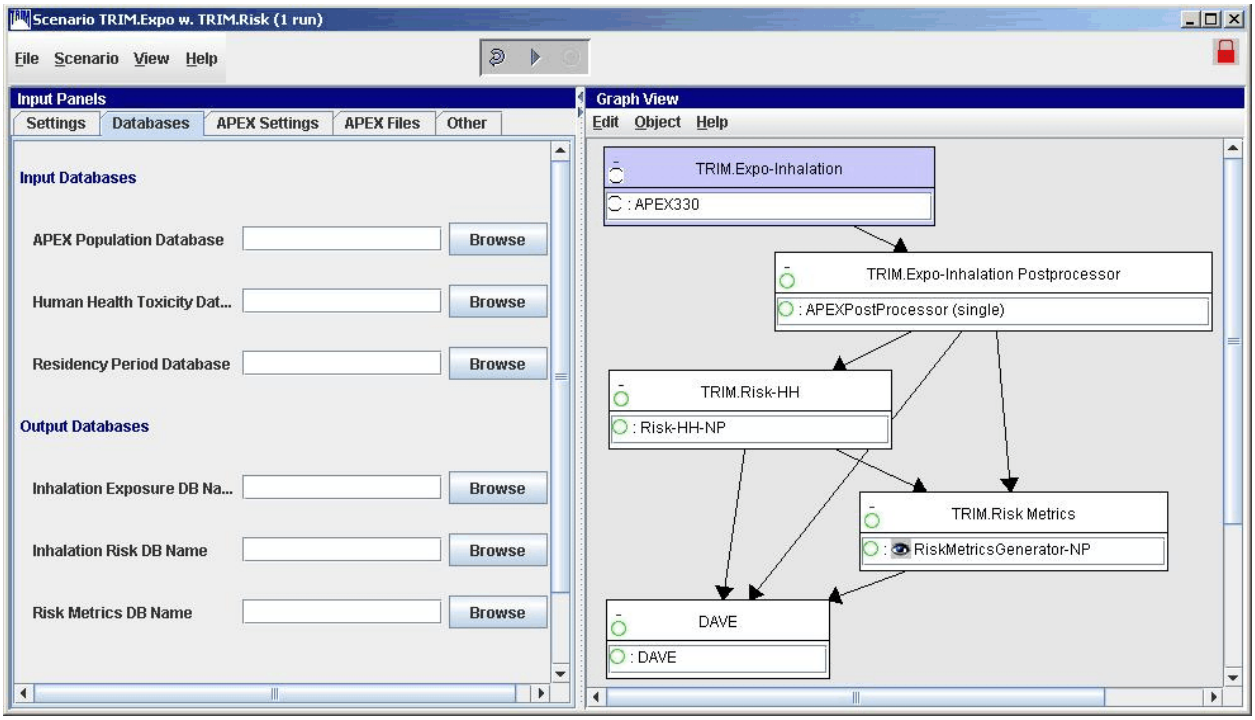
Click on the "Databases" tab. The parameters that can be set on this tab are listed in Exhibits 3-7 and 3-8. Set parameters by typing in each database name.

Exhibit 3-7. Parameters on "Databases" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Input Databases			
APEX Population Database	–	No	Name of the MySQL database containing population data used by APEX (i.e., TRIM.Expo$_{Inhalation}$), and also used to generate risk metrics.
Human Health Toxicity Database	–	No	The name of the database containing chemical-specific information on human health effects.
Residency Period Database	–	No	The name of the database containing residency period data.

Parameter Name	Default Value	Set via Installer?	Description
Output Databases			
Inhalation Exposure DB Name	–	No	The name of the database with inhalation exposure estimates generated by $TRIM.Expo_{Inhalation}$.
Inhalation Risk DB Name	–	No	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.
Risk Metrics DB Name	–	No	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.

Exhibit 3-8. "Databases" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario



Step 2c **Set Parameters on "APEX Settings" Tab**

Click on the "APEX Settings" tab. The parameters that can be set on this tab are listed in Exhibits 3-9 and 3-10. Set parameters by typing in a value or clicking the "Browse" button next to the parameter field and selecting the desired file or directory.

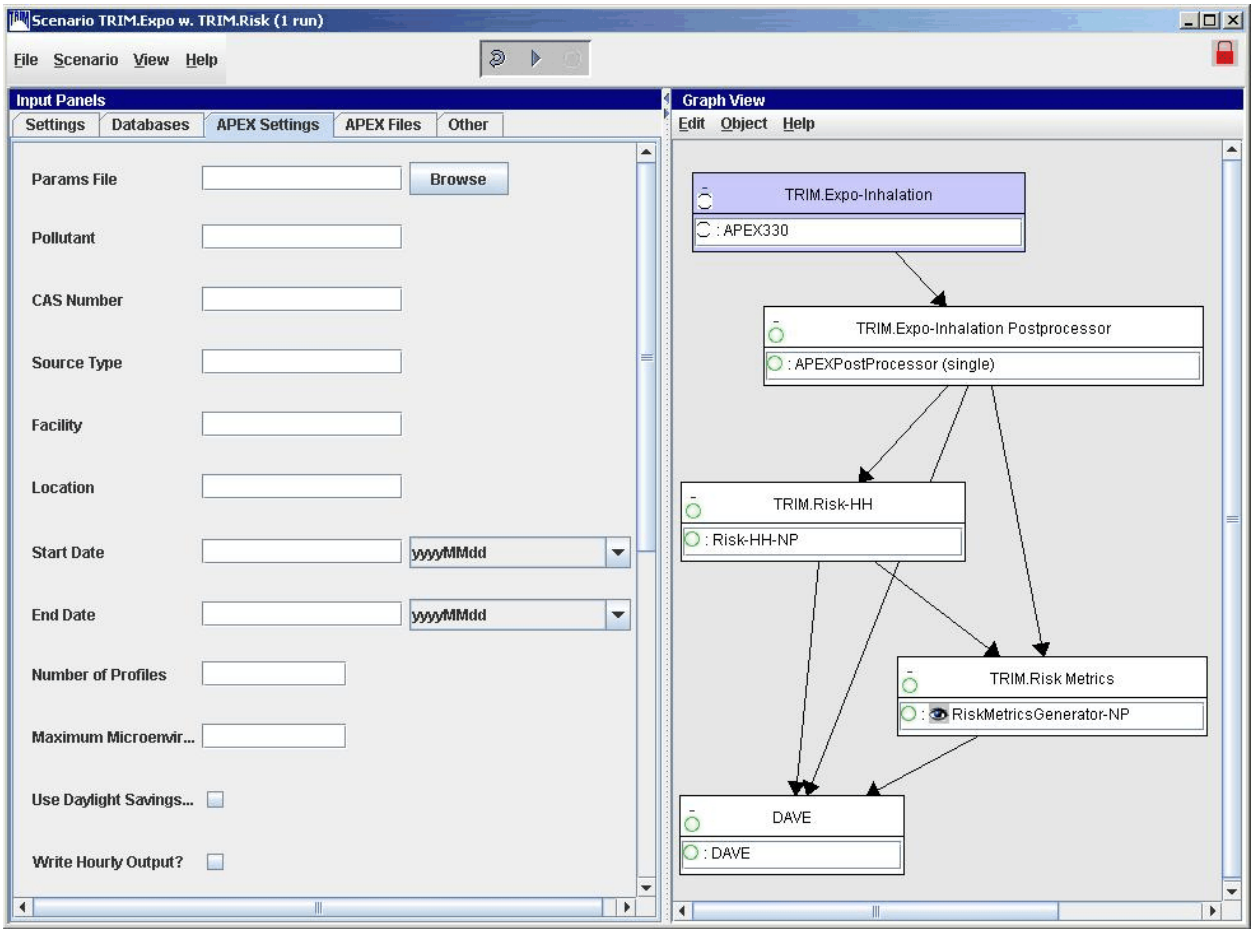
Exhibit 3-9. Parameters on "APEX Settings" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Params File	–	No	The file that specifies input and output files, model parameters, and format of output files for this execution of $TRIM.Expo_{Inhalation}$.
Pollutant	–	No	The chemical under analysis.
CAS Number	–	No	The assigned CAS number for the chemical under analysis.
Source Type	–	No	The type of source being modeled.
Facility	–	No	The type of facility being modeled.
Location	–	No	The location of the simulation.
Start Date	–	No	The start date of the simulation.
End Date	–	No	The end date of the simulation.
Number of Profiles	–	No	The number of persons modeled.
Maximum Microenvironment Number	–	No	The number of microenvironments defined in the Micro Mapping and Micro Descriptions files.
Use Daylight Savings Time?	No	No	If yes, the Air Quality Data file will be adjusted for Daylight Savings Time in the summer.
Write Hourly Output?	No	No	If yes, the hourly exposure and dose (if applicable) output files are created.
Include Commuting to Work?	No	No	If yes, commuting to work is allowed/simulated.
Random Seed	–	No	This value determines how modeled individuals are selected for a simulation. If the same random seed is used for two simulations with the same population and number of profiles, the same set of modeled individuals will be simulated. If different random seeds are used for these same two simulations, a different set of modeled individuals will be simulated.
Study Area Information			
Study Area Radius	–	No	The distance in kilometers from the center to the edge of the study area.
Latitude	–	No	The latitude in decimal degrees of the center of the study area.

Parameter Name	Default Value	Set via Installer?	Description
Longitude	–	No	The longitude in decimal degrees of the center of the study area.
Air Quality District Radius	–	No	The maximum distance in kilometers that a sector can be from the nearest air district to remain in the study.
Meteorological Zone Radius	–	No	Specifies maximum distance in kilometers from a weather station to which daily temperature data collected at that station should be applied.
Use County List?	No	No	Specifies whether to use a list of counties to define the study area.
County FIPS Codes[a]	–	No	FIPS codes for the counties to which the study area is restricted if a county list is being used.

[a] If the study area is not being restricted to particular counties (i.e., the "Use County List" check box is not checked), a placeholder value is required in the input parameter "County FIPS Codes" for the model to run successfully. To enter a placeholder value, simply click on the "Edit" button next to "County FIPS Codes," click on the plus button ( ), type "1234" in the "Value" column, then press "Tab" to the enter the value. Click "OK" when finished; the parameter "County FIPS Codes" should display the input as "List of 1." This dummy value will not be misinterpreted as a county list as long as the "Use County List" check box is not checked.

Exhibit 3-10. "APEX Settings" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario



Step 2d **Set Parameters on "APEX Files" Tab**

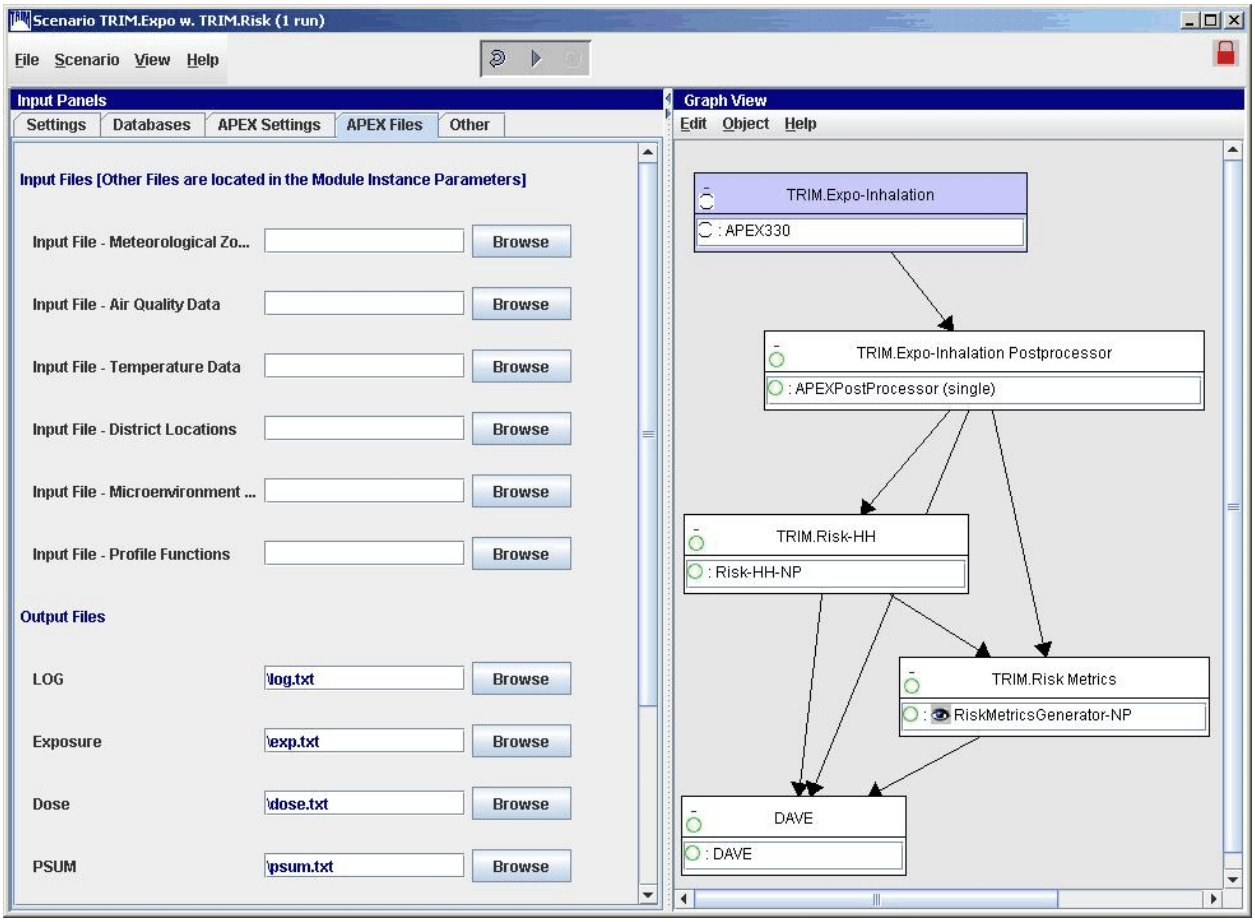
Click on the "APEX Files" tab. The parameters that can be set on this tab are listed in Exhibits 3-11 and 3-12. Set parameters by either typing in a value or clicking the "Browse" button next to the parameter field and selecting the desired file or directory.

Exhibit 3-11. Parameters on "APEX Files" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Input Files			
Input File - Meteorological Zone Locations	–	No	Provides the site IDs and locations (decimal degrees latitude and longitude) of the meteorological stations.
Input File - Air Quality Data	–	No	Provides the hourly air quality data for the modeled pollutant for each monitoring/modeling location listed in the District Location File.
Input File - Temperature Data	–	No	Contains the daily maximum and, optionally, average (or other) temperature data for the meteorological stations and dates indicated in the Meteorological Zones file.
Input File - District Location	–	No	Provides the site IDs and locations (decimal degrees latitude and longitude) of air quality monitoring or modeling locations.
Input File - Microenvironment Descriptions	–	No	Contains the definitions of the microenvironments and the microenvironment factors used to determine the exposure concentrations in user-defined microenvironments.
Input File - Profile Functions	–	No	Provides the definitions of the following user-definable functions: MaxTempCat, AvgTempCat, DiaryPools, IDGRP, HasGasStove, HasPilot, AC_Home, AC_Car, WindowPos, and SpeedCat.
Output Files			
LOG	${str("APEX Output Directory")}\ log.txt	No	Contains the record of the model simulation; if it completes successfully, the log file indicates the input files and parameter settings used for the simulation. If the simulation does not run successfully, the log file contains error messages describing the fatal errors.
Exposure	${str("APEX Output Directory")}\ exp.txt	No	Provides a time series of exposure estimates for each modeled profile.

Parameter Name	Default Value	Set via Installer?	Description
Dose	${str("APEX Output Directory")}\ dose.txt	No	Provides a time series of dose estimates for each modeled profile (if doses are modeled).
PSUM	${str("APEX Output Directory")}\ psum.txt	No	Provides a summary of each profile modeled in the simulation.
MSUM	${str("APEX Output Directory")}\ msum.txt	No	Provides a summary of the time and exposure by microenvironment for each profile modeled in the simulation.
TABLESB	${str("APEX Output Directory")}\ tables.txt	No	Contains tables summarizing the results of the simulation.
SITES	${str("APEX Output Directory")}\ sites.txt	No	Lists the sectors, districts, and zones in the study area, and identifies mapping between them.
EVENTS	${str("APEX Output Directory")}\ events.txt	No	Provides a summary of the activity diary with accompanying exposure and dose, at the diary event level. Note that this file can become very large, and for this reason, the user is given the option of only writing the events for a fraction of the simulated persons.

Exhibit 3-12. "APEX Files" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario



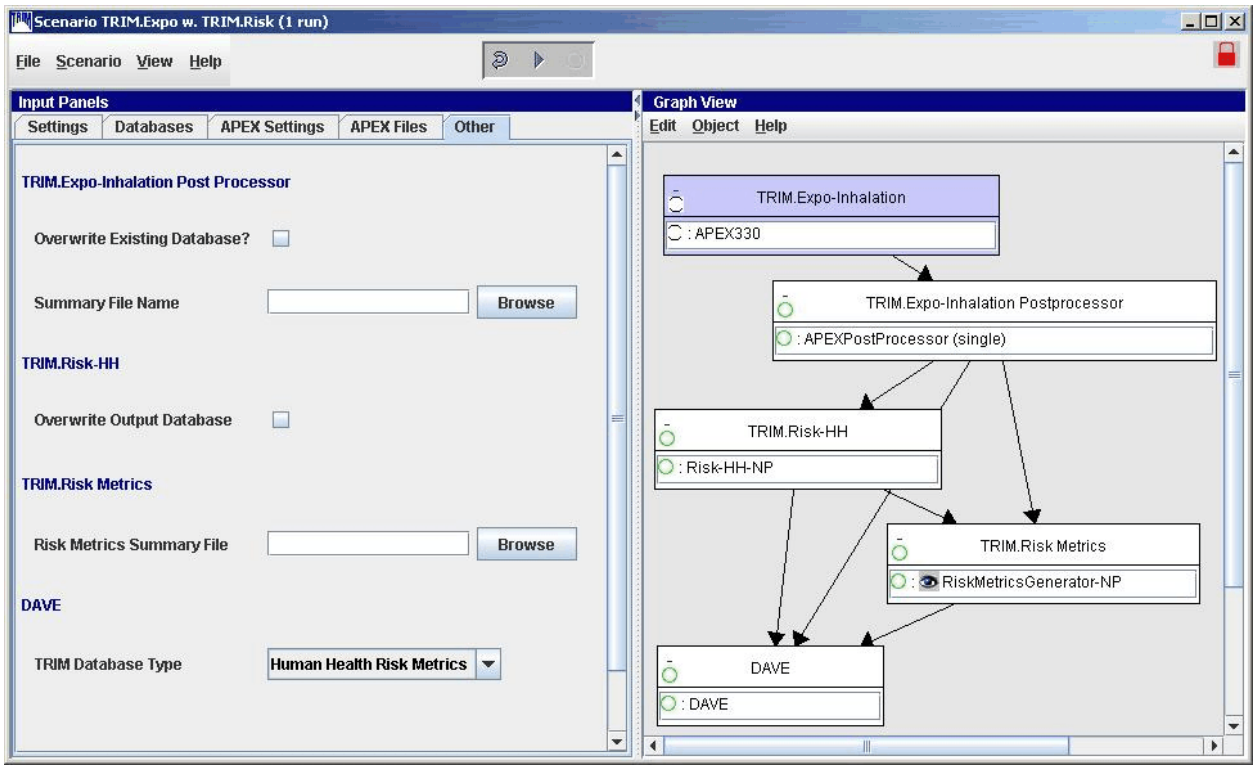
Step 2e **Set Parameters on "Other" Tab**

Click on the "Other" tab. The parameters that can be set on this tab are listed in Exhibits 3-13 and 3-14. Set parameters by either typing in a value, clicking the "Browse" button next to the parameter field and selecting the desired file or directory, selecting an option from a drop-down menu, or clicking a check box.

Exhibit 3-13. Parameters on "Other" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
$TRIM.Expo_{Inhalation}$ Postprocessor			
Overwrite Existing Database?	No	No	If yes, an output database previously generated by the $TRIM.Expo_{Inhalation}$ Postprocessor will be overwritten if a new database is specified with an identical name.
Summary File Name	–	No	Indicates the location of the Params file and logs a summary of the input parameter settings used by the $TRIM.Expo_{Inhalation}$ Postprocessor to generate the MySQL database of exposure estimates.
$TRIM.Risk_{HH-NP}$			
Overwrite Output Database	No	No	If yes, an output database previously generated by $TRIM.Risk_{HH-NP}$ will be overwritten if a new database is specified with an identical name.
TRIM.Risk Metrics			
Risk Metrics Summary File	–	No	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.
DAVE			
TRIM Database Type	Human Health Risk Metrics	No	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.

Exhibit 3-14. "Other" Tab of "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario



Step 3 Set Additional TRIM.Expo Parameters

For more options (beyond those provided on the "Input Panels") in setting up TRIM.Expo$_{Inhalation}$, the user will need to specify APEX330 parameters. Access the APEX330 parameters table by double-clicking on "APEX330" in the "Graph View" pane. This opens the APEX330 module instance window (Exhibit 3-15). On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, selecting the "Browse" button to locate the file, or clicking on an "Edit" button.[2] Specific parameters are listed and described in Appendix E. No user interaction is required on the "Module" tab.

Refer to: Section 5.2.2, TRIM.Expo$_{Inhalation}$

Appendix E, Module Instance Parameters

TRIM.Expo$_{Inhalation}$ (APEX) User's Guide

[2] See Volume I, Section 3.1 for definitions of common MIMS terminology and Volume I, Section 3.1.8 for information on opening a module instance and specifying parameter values.

Exhibit 3-15. "APEX330" Module Instance Parameters in "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario

Module Instance [APEX330] in Scenario [TRIM.Expo w. TRIM.Risk (1 run)]

File Edit Parameters Help

Module | Parameters

Object Type	Parameter	Value		Additional Type...	Source	Status
Exposed Individuals	APEX Executable		Browse		TRIM.Expo w. TRIM.Risk (1 run)	in, required
Exposed Individuals	CAS Number				TRIM.Expo w. TRIM.Risk (1 run)	in, required
	Comments					in
Exposed Individuals	Do COHb Dose Calculations?	☐				in, required
Exposed Individuals	Do Rollback Adjustments?	☐				in, required
	Dose Calculation Parameters	Set of 3	Edit			in, required
Exposed Individuals	End Date		yyyyMMdd		TRIM.Expo w. TRIM.Risk (1 run)	in, required
Exposed Individuals	Facility				TRIM.Expo w. TRIM.Risk (1 run)	in
Exposed Individuals	Include Commuting to Work?	☐			TRIM.Expo w. TRIM.Risk (1 run)	in, required
Exposed Individuals	Input Concentration Units					in, required
Exposed Individuals	Input Data Directory		Browse			in, required
	Input Database Files	Set of 7	Edit			in, required
Exposed Individuals	Location				TRIM.Expo w. TRIM.Risk (1 run)	in, required
	Location and Time Specific Files	Set of 2	Edit			in, required
Exposed Individuals	Maximum Microenvironment Number				TRIM.Expo w. TRIM.Risk (1 run)	in, required
Exposed Individuals	Number of Profiles				TRIM.Expo w. TRIM.Risk (1 run)	in, required
Exposed Individuals	Number of Sources					in, required
Exposed Individuals	Output Concentration Units					in, required
Exposed Individuals	Output Data Directory		Browse			in, required
Exposed Individuals	Output File - Events File		${str("APE...	Set Name		out, required
Exposed Individuals	Output File - Hourly COHb Dose Estimates		${str("APE...	Set Name		out, Used, required
Exposed Individuals	Output File - Hourly Exposure Estimates		${str("APE...	Set Name		out, Used, required
Exposed Individuals	Output File - Log		${str("APE...	Set Name		out, Used, required
Exposed Individuals	Output File - Microenvironment Summary		${str("APE...	Set Name		out, Used, required
Exposed Individuals	Output File - Person Summary		${str("APE...	Set Name		out, Used, required
Exposed Individuals	Output File - Site Mapping		${str("APE...	Set Name		out, Used, required
Exposed Individuals	Output File - Tables		${str("APE...	Set Name		out, Used, required
	Output Settings	Set of 14	Edit			in
	Output Table Levels	Set of 13	Edit			in, required
Exposed Individuals	PPM to ug/m3 Factor		not set			in, required
Exposed Individuals	Params File		Browse		TRIM.Expo w. TRIM.Risk (1 run)	in
Exposed Individuals	Pollutant				TRIM.Expo w. TRIM.Risk (1 run)	in, required
	Population Files	Set of 4	Edit			in, required
	Profile Parameters	Set of 8	Edit			in, required
Exposed Individuals	Random Seed				TRIM.Expo w. TRIM.Risk (1 run)	in, required
	Rollback Adjustments	Set of 3	Edit			in, required

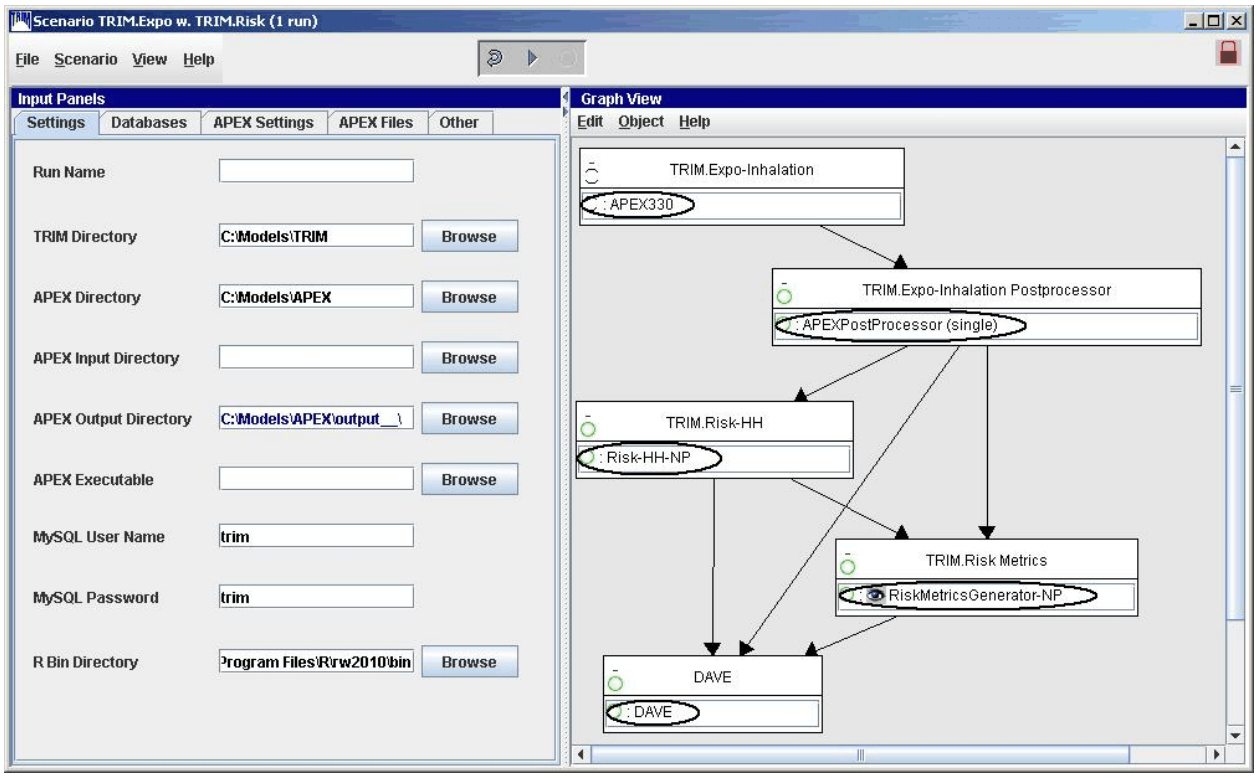
Step 4 Set Any Additional Parameters

In most cases, users will not be required to set any parameters beyond those in the "Input Panels" and "APEX330." However, in some applications users may find it necessary to view or edit additional parameters. To access the scenario parameters table, select "Edit Parameter Values" from the "Scenario" menu of the scenario window. Access the parameters tables for individual module instances by double-clicking on a module instance name in the "Graph View" pane to open that module instance window (Exhibit 3-16 shows circled module instance names). On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, or selecting the "Browse" button to locate the file. Note that this step may not be required for some applications. No user interaction is required on the "Module" tab.

Refer to: Appendix D, Scenario Parameters

Appendix E, Module Instance Parameters

Exhibit 3-16. Module Instances in "TRIM.Expo w. TRIM.Risk - 1 Run" Scenario



Step 5 Start the Scenario

Run the scenario by selecting "Execute Ready Modules" from the "Scenario" menu in the scenario window or clicking on the "play" button ( ) at the top of the scenario window.

Refer to: Volume I, Section 3.1.9, Running a MIMS Scenario

Appendix G, Troubleshooting

Step 6 Specify Inputs and Run TRIM.Risk Metrics Generator

The TRIM.Risk$_{HH}$ Inhalation Metrics GUI will open automatically in MIMS as the run is executing to allow the user to specify inputs used to generate risk metrics. Only one set of metrics is generated with each run. Additional risk metrics may be generated from the same TRIM.Risk output database using the "TRIM.Risk Metrics" scenario. However, these additional metrics cannot be added to an existing database.[3]

Select the desired risk metrics and set the required inputs on the numbered tabs in the TRIM.Risk$_{HH}$ Inhalation Metrics GUI (the metrics are described in Chapter 2 and Appendix A and specification of the required inputs is described in detail in Section 5.4.2). Then, click "Validate" to verify the selections and click "Exit" to exit the GUI and continue the scenario.

Refer to: Section 5.4.2, TRIM.Risk Metrics Generator

Chapter 2, Risk Calculations

Appendix A, Human Health Risk Metrics

Step 7 Run DAVE

Unless the user specified a change to the TRIM database type in Step 2e, the DAVE GUI will open in MIMS after the risk metrics database has been created. If another type of TRIM database was selected, the DAVE GUI will open after that database has been created.

DAVE can be used to generate tables and charts of exposure estimates, risk estimates, and risk metrics, or to create delimited text exports of results. Exported results can then be further analyzed off-line after they have been imported into a spreadsheet or other data analysis software. Alternatively, risk estimates can be retrieved directly from the database using MySQL queries.

Refer to: Section 5.5, DAVE

Volume I, Section 3.3, Basic Operations with DAVE

DAVE User's Guide

[3] To prevent the previous risk metrics database from being overwritten, select a different output database name on the first tab of the TRIM.Risk$_{HH}$ Inhalation Metrics GUI.

3.4 TRIM.Expo with TRIM.Risk for Multiple Runs

This section describes the steps required to run the "**TRIM.Expo w. TRIM.Risk (>1 run)**" MIMS scenario. This scenario allows the user to employ $\text{TRIM.Expo}_{\text{Inhalation}}$ and TRIM.Risk to perform an inhalation exposure and risk assessment using multiple sets of concentration data (e.g., for multiple chemicals, sources, facilities, and/or study areas). ***To run this scenario, the user must have $\text{TRIM.Expo}_{\text{Inhalation}}$ inputs available in the required format.*** Details regarding $\text{TRIM.Expo}_{\text{Inhalation}}$ inputs and associated formatting requirements are presented in the $\text{TRIM.Expo}_{\text{Inhalation}}$ User's Guide available on the EPA FERA website (http://www.epa.gov/ttn/fera/human_apex.html).

In addition to the components used in the "1 run" scenario (see Section 3.3), this scenario includes an iterator that reruns $\text{TRIM.Expo}_{\text{Inhalation}}$ using a different set of inputs, making it possible to generate exposure and risk estimates for more than one chemical within one scenario. The steps required to run this scenario are presented below. For names of the domain objects and module instances in this scenario, refer to Appendix C.1.

When Should I Run This Scenario?

This scenario is designed to be used when a combined inhalation exposure and risk assessment is carried out (i.e., the exposure and risk models are run consecutively in a single application) for more than one set of ambient concentration values. These ambient concentration data sets can be comprised of either ambient air measurements (e.g., monitoring data) for multiple chemicals or output from an air quality model for multiple chemicals, sources, facilities, and/or study areas. In either case, the user will need to ensure that the concentration data sets are formatted correctly according to the input requirements of $\text{TRIM.Expo}_{\text{Inhalation}}$. The scenario can produce outputs specific to each of the data sets (e.g., per chemical, source, etc.) and/or cumulative across the data sets (e.g., all chemicals, sources, etc.). Examples of concentration data sets that could be used with this scenario include:

- Annual average concentrations of 10 HAPs based on measurements taken at an array of 15 air quality monitoring stations located throughout a metropolitan area.
- Annual average concentrations of 6 HAPs emitted by four industrial facilities, each with multiple stacks, vents, and other release points, estimated by dispersion modeling for geographic centroids of all census blocks located within 20 km of the industrial area.

Step 1 Open the "TRIM.Expo w. TRIM.Risk (>1 run)" scenario in MIMS

Start MIMS by navigating to the Start menu, Programs, TRIM, and selecting "TRIM" or by double-clicking on "runtrim.bat" in Windows Explorer. Open the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" MIMS project and then the "TRIM.Expo w. TRIM.Risk (>1 run)" scenario in MIMS.

Refer to: Volume I, Section 3.1.4, Opening a MIMS Project

Volume I, Section 3.1.6, Opening, Duplicating, Renaming or Deleting a MIMS Scenario

Step 2 Complete the Input Panels

Parameters are set via the tabs located on the "Input Panels" pane, as described as described in Steps 2a through 2d. The "Input Panels" present those parameters that are most likely to require attention by users (see Exhibits 3-17 through 3-24). Note that some of these parameters will have been set by the user during the installation of TRIM. Users should use caution when making changes to any preset parameter values.

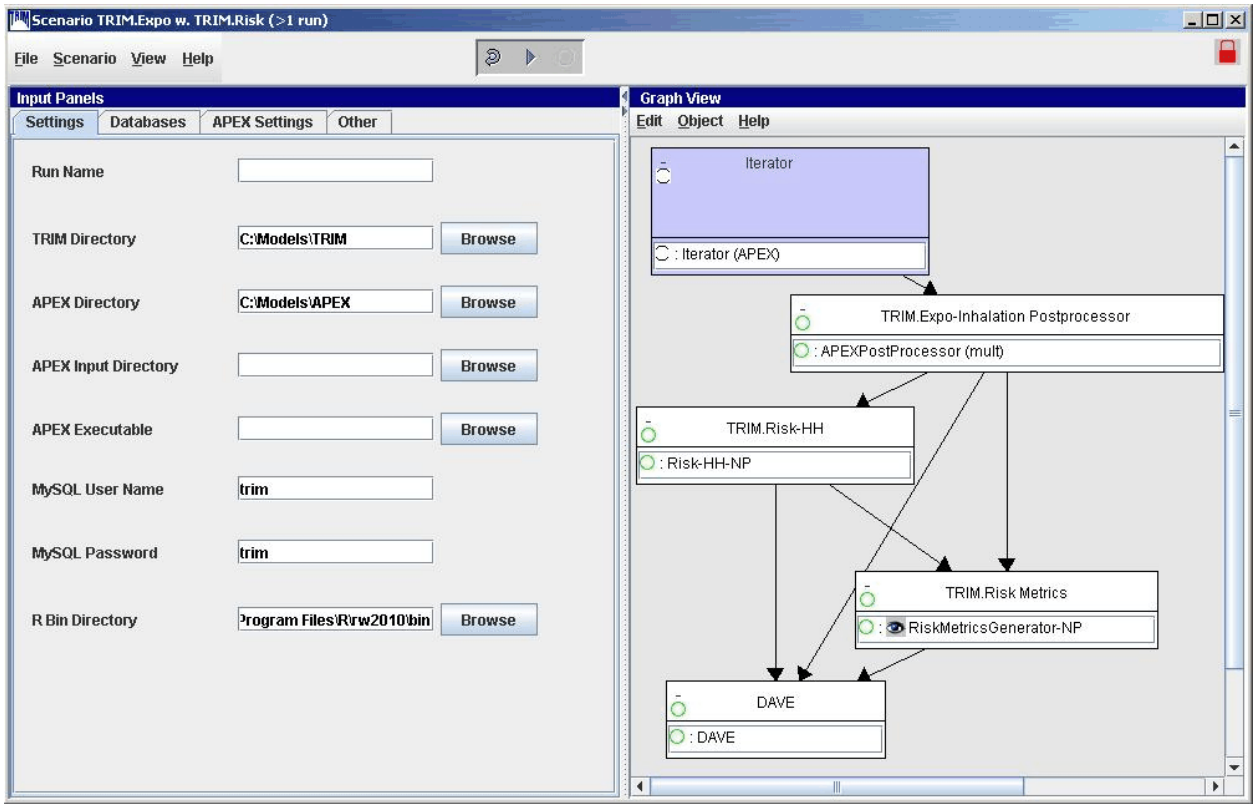
Step 2a Set Parameters on "Settings" Tab

Click on the "Settings" tab. The parameters that can be set on this tab are listed in Exhibits 3-17 and 3-18. Set parameters by typing in a value or clicking the "Browse" button next to the parameter field and selecting the desired file or directory.

Exhibit 3-17. Parameters on "Settings" Tab for "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Run Name	–	No	Name of the unique scenario run.
TRIM Directory	–	Yes	Name and location of the TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).
APEX Directory	–	Yes	Name and location of the directory containing APEX (i.e., $\text{TRIM.Expo}_{\text{Inhalation}}$) input files or folders.
APEX Input Directory	–	No	Name and location of the directory containing the input files for APEX (i.e., $\text{TRIM.Expo}_{\text{Inhalation}}$).
APEX Executable	–	No	Name and location of the APEX (i.e., $\text{TRIM.Expo}_{\text{Inhalation}}$) executable.
MySQL User Name	–	Yes	User name for access to the MySQL databases created or used for the TRIM.Risk projects.
MySQL Password	–	Yes	Password for access to the MySQL databases created or used for the TRIM.Risk projects.
R Bin Directory	–	Yes	Location of the bin directory for the R program.

Exhibit 3-18. "Settings" Tab of "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario



Step 2b **Set Parameters on "Databases" Tab**

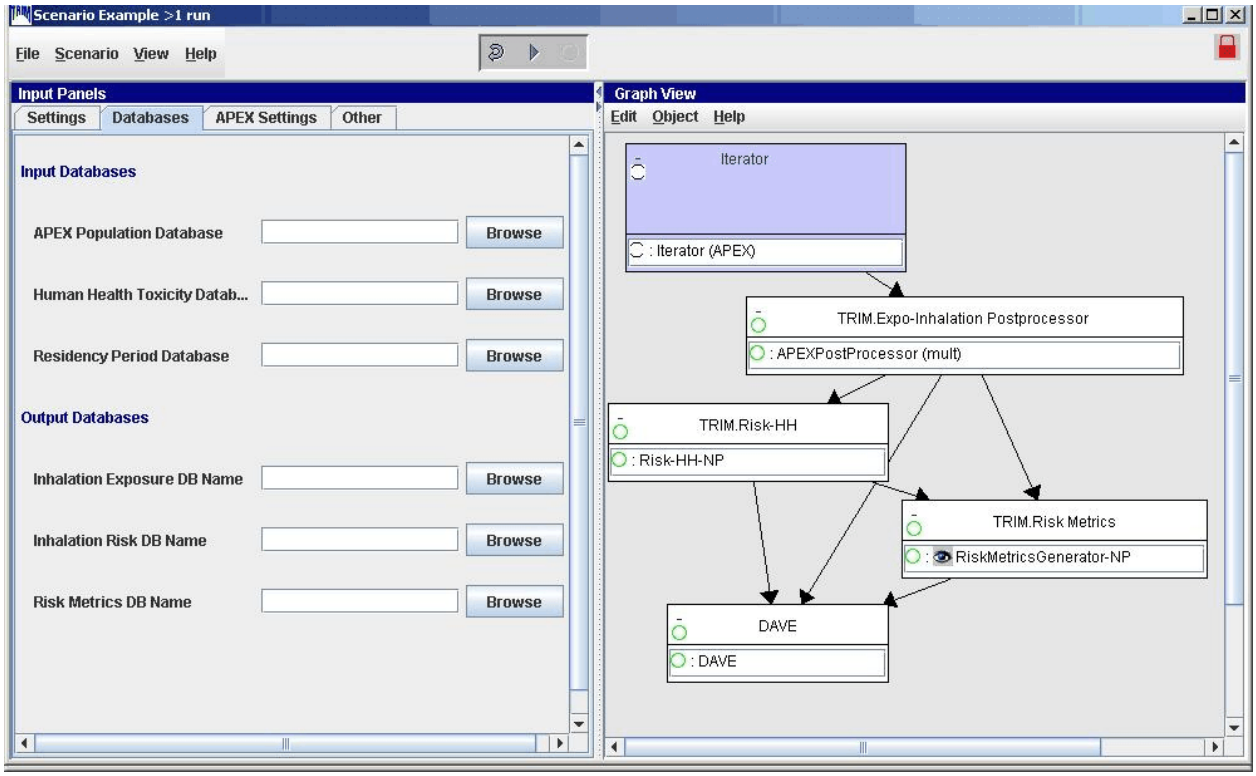
Click on the "Databases" tab. The parameters that can be set on this tab are listed in Exhibits 3-19 and 3-20. Set parameters by typing in each database name.

Exhibit 3-19. Parameters on "Databases" Tab of "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Input Databases			
APEX Population Database	–	No	Name of the MySQL database containing population data used by APEX (i.e., $TRIM.Expo_{Inhalation}$), and also used to generate risk metrics.
Human Health Toxicity Database	–	No	The name of the database containing chemical-specific information on human health effects.
Residency Period Database	–	No	The name of the database containing residency period data.
Output Databases			

Parameter Name	Default Value	Set via Installer?	Description
Inhalation Exposure DB Name	–	No	The name of the database with inhalation exposure estimates generated by $TRIM.Expo_{Inhalation}$.
Inhalation Risk DB Name	–	No	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.
Risk Metrics DB Name	–	No	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.

Exhibit 3-20. "Databases" Tab of "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario



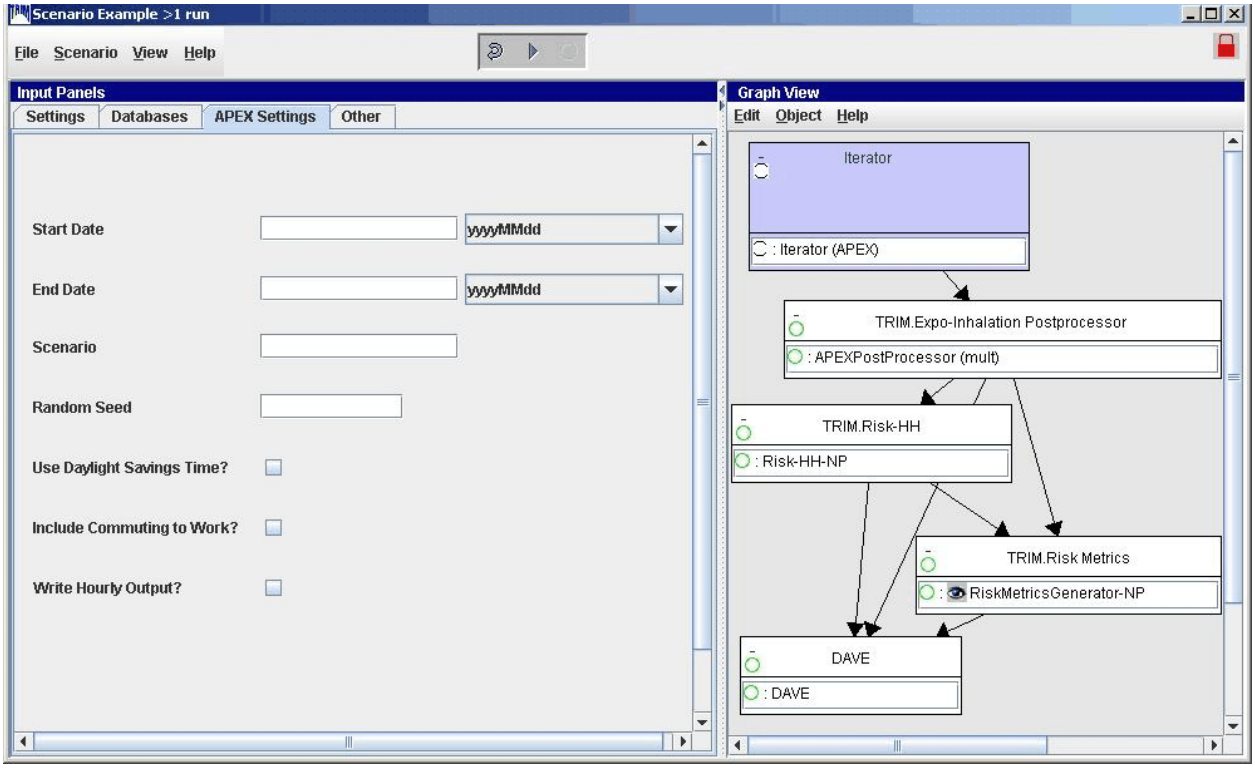
Step 2c **Set Parameters on "APEX Settings" Tab**

Click on the "APEX Settings" tab. The parameters that can be set on this tab are listed in Exhibits 3-21 and 3-22. Set parameters by typing in a value or clicking on a check box.

Exhibit 3-21. Parameters on "APEX Settings" Tab of "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Start Date	–	No	The start date of the simulation.
End Date	–	No	The end date of the simulation.
Scenario	–	No	Name of the scenario.
Random Seed	–	No	This value determines how modeled individuals are selected for a simulation. If the same random seed is used for two simulations with the same population and number of profiles, the same set of modeled individuals will be simulated. If different random seeds are used for these same two simulations, a different set of modeled individuals will be simulated.
Use Daylight Savings Time?	No	No	If yes, the Air Quality Data file will be adjusted for Daylight Savings Time in the summer.
Include Commuting to Work?	No	No	If yes, commuting to work is allowed/simulated.
Write Hourly Output?	No	No	If yes, the hourly exposure and dose (if applicable) output files are created.

Exhibit 3-22. "APEX Settings" Tab of "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario



Step 2d **Set Parameters on "Other" Tab**

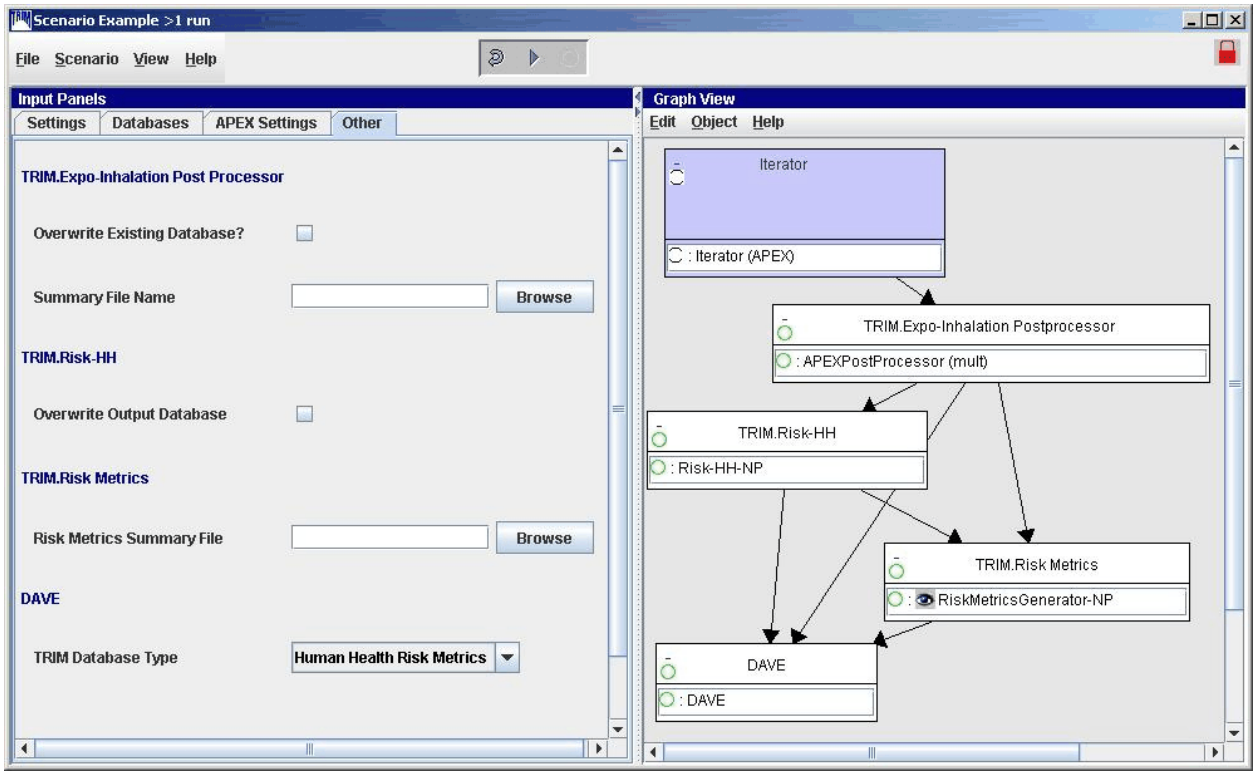
Click on the "Other" tab. The parameters that can be set on this tab are listed in Exhibits 3-23 and 3-24. Set parameters by typing in a value, clicking the "Browse" button next to the parameter field and selecting the desired file or directory, selecting an option from a drop-down menu, or clicking on a check box.

Exhibit 3-23. Parameters on "Other" Tab of "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario

Parameter Name	Default Value	Set via Installer?	Description
TRIM.Expo$_{Inhalation}$ Postprocessor			
Overwrite Existing Database?	No	No	If yes, an output database previously generated by the TRIM.Expo$_{Inhalation}$ Postprocessor will be overwritten if a new database is specified with an identical name.

Parameter Name	Default Value	Set via Installer?	Description
Summary File Name	–	No	Indicates the location of the Params file and logs a summary of the input parameter settings used by the TRIM.Expo$_{Inhalation}$ Postprocessor to generate the MySQL database of exposure estimates.
TRIM.Risk$_{HH-NP}$			
Overwrite Output Database	No	No	If yes, an output database previously generated by TRIM.Risk$_{HH-NP}$ will be overwritten if a new database is specified with an identical name.
TRIM.Risk Metrics			
Risk Metrics Summary File	–	No	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.
DAVE			
TRIM Database Type	Human Health Risk Metrics	No	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.

Exhibit 3-24. "Other" Tab of "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario



Step 3 Set Additional TRIM.Expo with Iterator Parameters

For more options (beyond those provided on the "Input Panels") in setting up TRIM.Expo with the Iterator (i.e., the Iterator(APEX) module instance), the user will need to specify parameters for "Iterator(APEX)." Access the Iterator(APEX) parameters table by double-clicking on "Iterator(APEX)" in the "Graph View" pane. This opens the Iterator(APEX) module instance window (Exhibit 3-25).[4] On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, or selecting the "Browse" button to locate the file, or clicking on an "Edit" button. Click on the "Iterating Lists" tab to set parameters for chemical, source type, and facility profiles. This window displays the lists of input parameters to be iterated over (Exhibit 3-26). To see which profile input parameters are associated with and to edit these values, select the "Edit Synchronized Lists" button.[5] (Edits can also be made to input lists of parameters on the Iterating Lists tab by clicking "Edit," but this is not the recommended method.) Specific parameters are listed and described in Appendix E. No user interaction is required on the "Module" tab.

Refer to: Section 5.2.2, $\text{TRIM.Expo}_{\text{Inhalation}}$

Appendix E, Module Instance Parameters

$\text{TRIM.Expo}_{\text{Inhalation}}$ (APEX) User's Guide

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[4] See Volume I, Section 3.1 for definitions of common MIMS terminology and Volume I, Section 3.1.8 for information on opening a module instance and specifying parameter values.

[5] The "County FIPS Code" parameter on the "Facility" tab of the "Synchronized Input Lists Editor" cannot be left blank when the "Use County List" check box is not checked (i.e., the study area is not being restricted to particular counties). When a list of county FIPS codes is not being used, a placeholder value is required in the input parameter "County FIPS Codes" for the model to run successfully. To enter a placeholder value, simply click on the "Edit" button next to "County FIPS Codes," click on the plus button (+), type "1234" in the "Value" column, and then press "Tab" to the enter the value. Click "OK" when finished; the parameter "County FIPS Codes" should display the input as "List of 1." Repeat this procedure for each facility profile in which a county list is not being used. This dummy value will not be misinterpreted as a county list as long as the "Use County List" check box is not checked.

Exhibit 3-25. "Iterator(APEX)" Module Instance Parameters

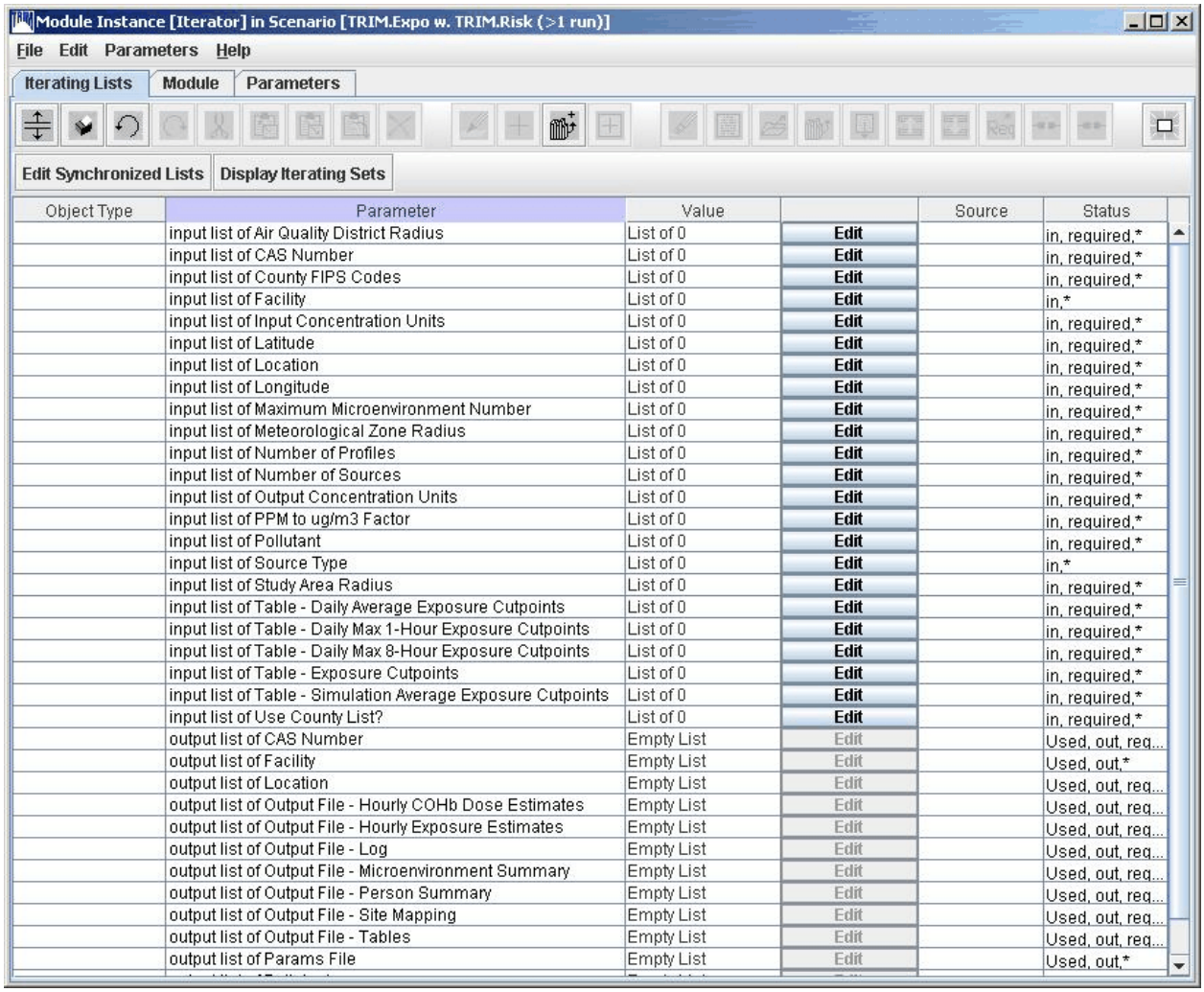
Module Instance [Iterator] in Scenario [TRIM.Expo w. TRIM.Risk (>1 run)]

File Edit Parameters Help

Iterating Lists | Module | Parameters

Object Type	Parameter	Value		Source	Status
Exposed Individuals	APEX Executable		Browse	TRIM.Expo w. TRIM.Risk (>1 run)	in, required
Exposed Individuals	Additive factor for average concentration		not set		in, required=n
Exposed Individuals	Altitude		Feet		in, required
Exposed Individuals	COHb Convergence Factor		not set		in
	Comments				in
Exposed Individuals	Create the Events Output File?	☐			in, required
Exposed Individuals	Do COHb Dose Calculations?	☐			in, required
Exposed Individuals	Do Rollback Adjustments?	☐			in, required
	Dose	${str("Output Data Directory")}\dose.txt	Browse		in, required
	EVENTS	${str("Output Data Directory")}\events.txt	Browse		in, required
Exposed Individuals	End Date		yyyyMMdd	TRIM.Expo w. TRIM.Risk (>1 run)	in, required
	Exposure	${str("Output Data Directory")}\exp.txt	Browse		in, required
Exposed Individuals	Include Commuting to Work?	☐		TRIM.Expo w. TRIM.Risk (>1 run)	in, required
Exposed Individuals	Include people who work outside study area?	☐			in, required
Exposed Individuals	Include these profiles in Events File				in
Exposed Individuals	Input Data Directory		Browse		in, required
Exposed Individuals	Input File - Activity Specific METS	\CHAD\CHADMets.txt	Browse		in, required
Exposed Individuals	Input File - Air Quality Data		Browse		in, required
Exposed Individuals	Input File - Census Commuting Flow		Browse		in, required
Exposed Individuals	Input File - Diary Events	\CHAD\CHADEvents.txt	Browse		in, required
Exposed Individuals	Input File - District Locations		Browse		in, required
Exposed Individuals	Input File - Employment		Browse		in, required
Exposed Individuals	Input File - Meteorological Zone Locations		Browse		in, required
Exposed Individuals	Input File - Microenvironment Descriptions		Browse		in, required
Exposed Individuals	Input File - Microenvironment Mapping		Browse		in, required
Exposed Individuals	Input File - Personal Info	\CHAD\CHADQuest.txt	Browse		in, required
Exposed Individuals	Input File - Physiological Parameters	\Other\Physiology.txt	Browse		in, required
Exposed Individuals	Input File - Profile Functions		Browse		in, required
Exposed Individuals	Input File - Sector Locations		Browse		in, required
Exposed Individuals	Input File - Temperature Data		Browse		in, required
Exposed Individuals	Input File - Ventilation Regression	\Other\ventilation.txt	Browse		in, required
	LOG	${str("Output Data Directory")}\log.txt	Browse		in, required
Exposed Individuals	Log Home Sectors?	☐			in, required
Exposed Individuals	Log Population Summary Data?	☐			in, required
Exposed Individuals	Log Profile Summary?	☐			in, required
Exposed Individuals	Log Tables Information?	☐			in, required
Exposed Individuals	Log Temperature Zones?	☐			in, required

Exhibit 3-26. "Iterator(APEX)" Module Instance Iterating List Parameters



Object Type	Parameter	Value		Source	Status
	input list of Air Quality District Radius	List of 0	Edit		in, required,*
	input list of CAS Number	List of 0	Edit		in, required,*
	input list of County FIPS Codes	List of 0	Edit		in, required,*
	input list of Facility	List of 0	Edit		in,*
	input list of Input Concentration Units	List of 0	Edit		in, required,*
	input list of Latitude	List of 0	Edit		in, required,*
	input list of Location	List of 0	Edit		in, required,*
	input list of Longitude	List of 0	Edit		in, required,*
	input list of Maximum Microenvironment Number	List of 0	Edit		in, required,*
	input list of Meteorological Zone Radius	List of 0	Edit		in, required,*
	input list of Number of Profiles	List of 0	Edit		in, required,*
	input list of Number of Sources	List of 0	Edit		in, required,*
	input list of Output Concentration Units	List of 0	Edit		in, required,*
	input list of PPM to ug/m3 Factor	List of 0	Edit		in, required,*
	input list of Pollutant	List of 0	Edit		in, required,*
	input list of Source Type	List of 0	Edit		in,*
	input list of Study Area Radius	List of 0	Edit		in, required,*
	input list of Table - Daily Average Exposure Cutpoints	List of 0	Edit		in, required,*
	input list of Table - Daily Max 1-Hour Exposure Cutpoints	List of 0	Edit		in, required,*
	input list of Table - Daily Max 8-Hour Exposure Cutpoints	List of 0	Edit		in, required,*
	input list of Table - Exposure Cutpoints	List of 0	Edit		in, required,*
	input list of Table - Simulation Average Exposure Cutpoints	List of 0	Edit		in, required,*
	input list of Use County List?	List of 0	Edit		in, required,*
	output list of CAS Number	Empty List	Edit		Used, out, req...
	output list of Facility	Empty List	Edit		Used, out,*
	output list of Location	Empty List	Edit		Used, out, req...
	output list of Output File - Hourly COHb Dose Estimates	Empty List	Edit		Used, out, req...
	output list of Output File - Hourly Exposure Estimates	Empty List	Edit		Used, out, req...
	output list of Output File - Log	Empty List	Edit		Used, out, req...
	output list of Output File - Microenvironment Summary	Empty List	Edit		Used, out, req...
	output list of Output File - Person Summary	Empty List	Edit		Used, out, req...
	output list of Output File - Site Mapping	Empty List	Edit		Used, out, req...
	output list of Output File - Tables	Empty List	Edit		Used, out, req...
	output list of Params File	Empty List	Edit		Used, out,*

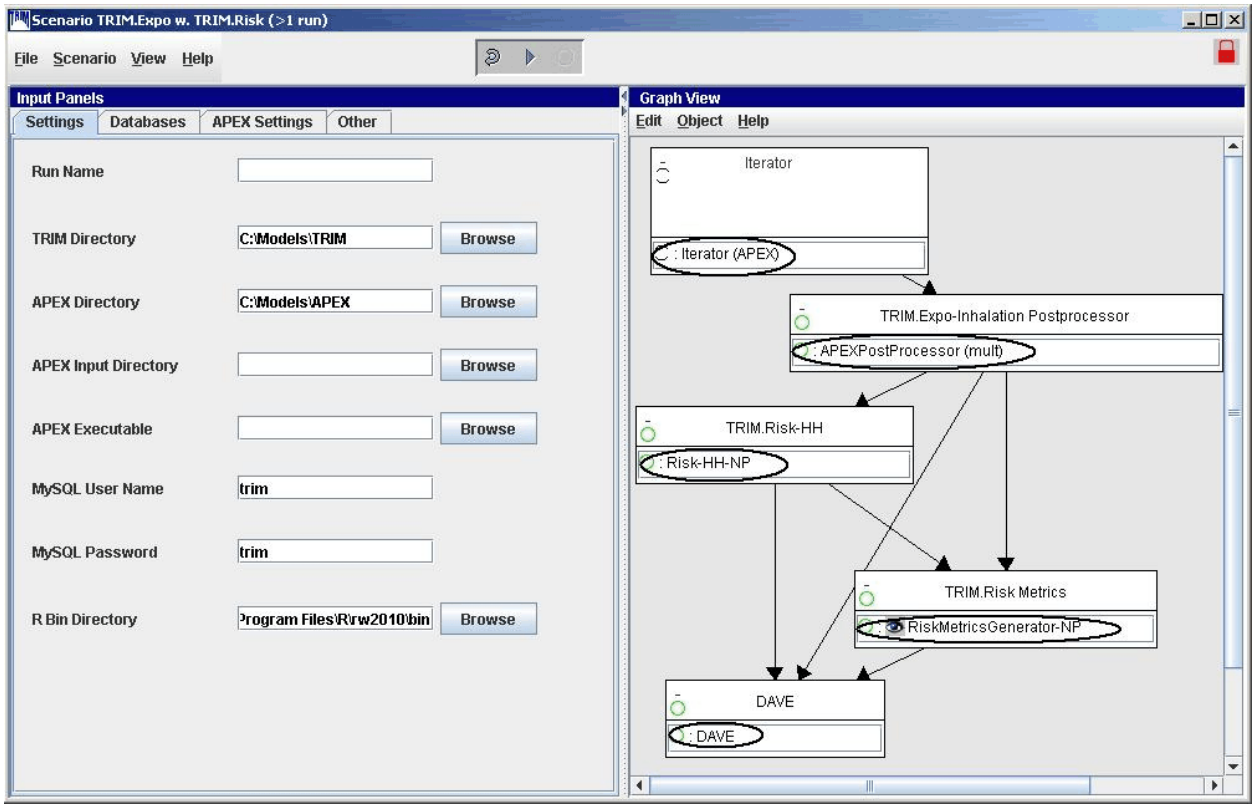
Step 4 Set Any Additional Parameters

In most cases, users will not be required to set any parameters beyond those in the "Input Panels" and for "Iterator(APEX)." However, in some applications users may find it necessary to view or edit additional parameters. To access the scenario parameters table, select "Edit Parameter Values" from the "Scenario" menu of the scenario window. Access the parameters tables for individual module instances by double-clicking on a module instance name in the "Graph View" pane to open that module instance window (Exhibit 3-27 shows circled module instance names). On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, or selecting the "Browse" button to locate the file. Note that this step may not be required for some applications. No user interaction is required on the "Module" tab.

Refer to: Appendix D, Scenario Parameters

Appendix E, Module Instance Parameters

Exhibit 3-27. Module Instances in "TRIM.Expo w. TRIM.Risk - More than 1 Run" Scenario



Step 5 Start the Scenario

Run the scenario by selecting "Execute Ready Modules" from the "Scenario" menu in the scenario window or clicking the "play" button ( ) at the top of the scenario window.

Refer to: Volume I, Section 3.1.9, Running a MIMS Scenario

Appendix G, Troubleshooting

Step 6 Specify Inputs and Run TRIM.Risk Metrics Generator

The TRIM.Risk$_{HH}$ Inhalation Metrics GUI will open automatically in MIMS as the run is executing to allow the user to specify inputs used to generate risk metrics. Only one set of metrics is generated with each run. Additional risk metrics may be generated from the same TRIM.Risk output database using the "TRIM.Risk Metrics" scenario. However, these additional metrics cannot be added to an existing database.[6]

Select the desired risk metrics and set the required inputs on the numbered tabs in the TRIM.Risk$_{HH}$ Inhalation Metrics GUI (the metrics are described in Chapter 2 and Appendix A and specification of the required inputs is described in detail in Section 5.4.2). Then, click "Validate" to verify the selections and click "Exit" to exit the GUI and continue the scenario.

Refer to: Section 5.4.2, TRIM.Risk Metrics Generator

Chapter 2, Risk Calculations

Appendix A, Human Health Risk Metrics

[6] To prevent the previous risk metrics database from being overwritten, select a different output database name on the first tab of the TRIM.Risk$_{HH}$ Inhalation Metrics GUI.

Step 7 Run DAVE

Unless the user specified a change to the TRIM database type in Step 2d, the DAVE GUI will open in MIMS after the risk metrics database has been created. If another type of TRIM database was selected, the DAVE GUI will open after that database has been created.

DAVE can be used to generate tables and charts of exposure estimates, risk estimates, and risk metrics, or to create delimited text exports of results. Exported results can then be further analyzed off-line after they have been imported into a spreadsheet or other data analysis software. Alternatively, risk estimates can be retrieved directly from the database using MySQL queries.

Refer to: Section 5.5, DAVE

Volume 1, Section 3.3, Basic Operations with DAVE

DAVE User's Guide

3.5 TRIM.Risk Scenario

This section describes the steps required to run the "**TRIM.Risk**" MIMS scenario in the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" MIMS project. This scenario generates annualized individual risk estimates from an existing $\text{TRIM.Expo}_{\text{Inhalation}}$ output database using TRIM.Risk. Individual- or population-level risk metrics are then calculated from the annualized individual risk estimates using the TRIM.Risk metrics generator. An exposure model other than $\text{TRIM.Expo}_{\text{Inhalation}}$ can be used to generate inhalation exposure estimates for use in this scenario; however, the exposure results must be in the MySQL format required by TRIM.Risk for the exposure data set (see Appendix F for the MySQL Database Schema). The steps required to run this scenario are presented below. For names of the domain objects and module instances in this scenario, refer to Appendix C.1.

When Should I Run This Scenario?

This scenario can be used to generate inhalation risk metrics when the $\text{TRIM.Expo}_{\text{Inhalation}}$ output database has already been prepared. The $\text{TRIM.Expo}_{\text{Inhalation}}$ database can contain inhalation exposure estimates for one or more chemicals, sources, facilities, and/or study areas.

Step 1 Open the "TRIM.Risk" Scenario in MIMS

Start MIMS by navigating to the Start menu, Programs, TRIM, and selecting "TRIM" or by double-clicking on "runtrim.bat" in Windows Explorer. Open the "Inhalation risk assessment using RfCs and UREs with TRIM.Expo" MIMS project and then the "TRIM.Risk" scenario in MIMS.

Refer to: Volume I, Section 3.1.4, Opening a MIMS Project

Volume I, Section 3.1.6, Opening, Duplicating, Renaming or Deleting a MIMS Scenario

Step 2 Complete the Input Panels

Parameters are set via the tabs located on the "Input Panels" pane, as described in Steps 2a through 2c. The "Input Panels" present those parameters that are most likely to require attention from users (see Exhibits 3-28 through 3-33). Note that some of these parameters will have been set by the user during the installation of TRIM. Users should use caution when making changes to any preset parameter values.

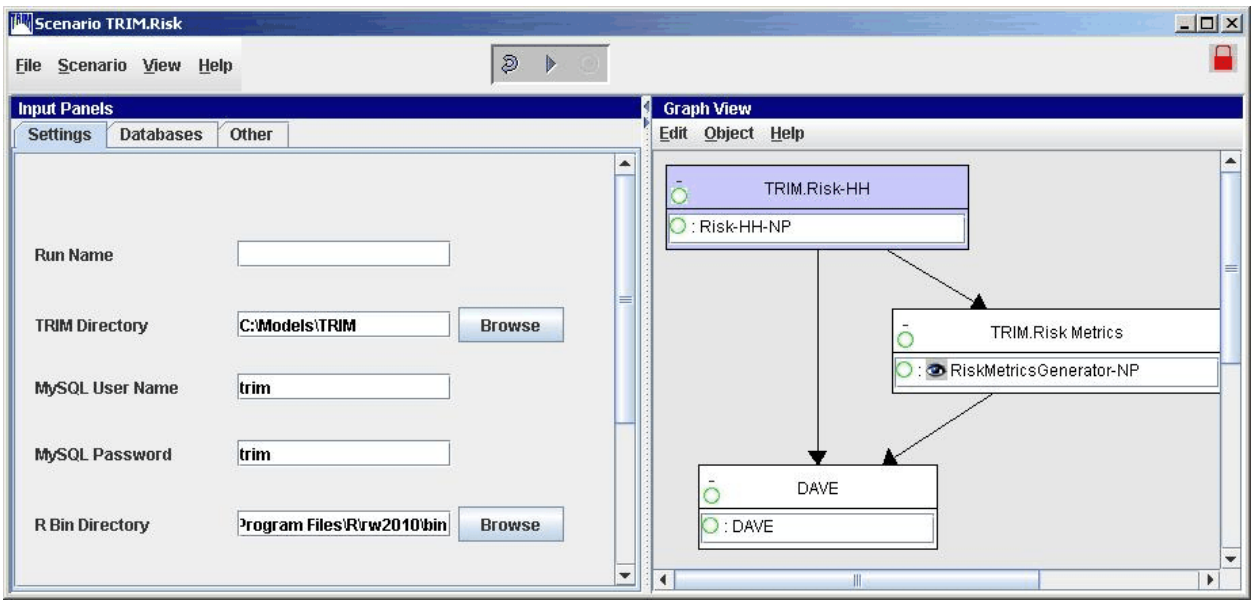
Step 2a **Set Parameters on "Settings" Tab**

Click on the "Settings" tab. The parameters that can be set on this tab are listed in Exhibits 3-28 and 3-29. Set parameters by typing in a value or by clicking on the "Browse" button next to the parameter field and browsing to the desired file or directory.

Exhibit 3-28. Parameters on "Settings" Tab of "TRIM.Risk" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Run Name	–	No	Name of the unique scenario run.
TRIM Directory	–	Yes	Name and location of the TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).
MySQL User Name	–	Yes	User name for access to the MySQL databases created or used for the TRIM.Risk projects.
MySQL Password	–	Yes	Password for access to the MySQL databases created or used for the TRIM.Risk projects.
R Bin Directory	–	Yes	Location of the bin directory for the R program.

Exhibit 3-29. "Settings" Tab of "TRIM.Risk" Scenario



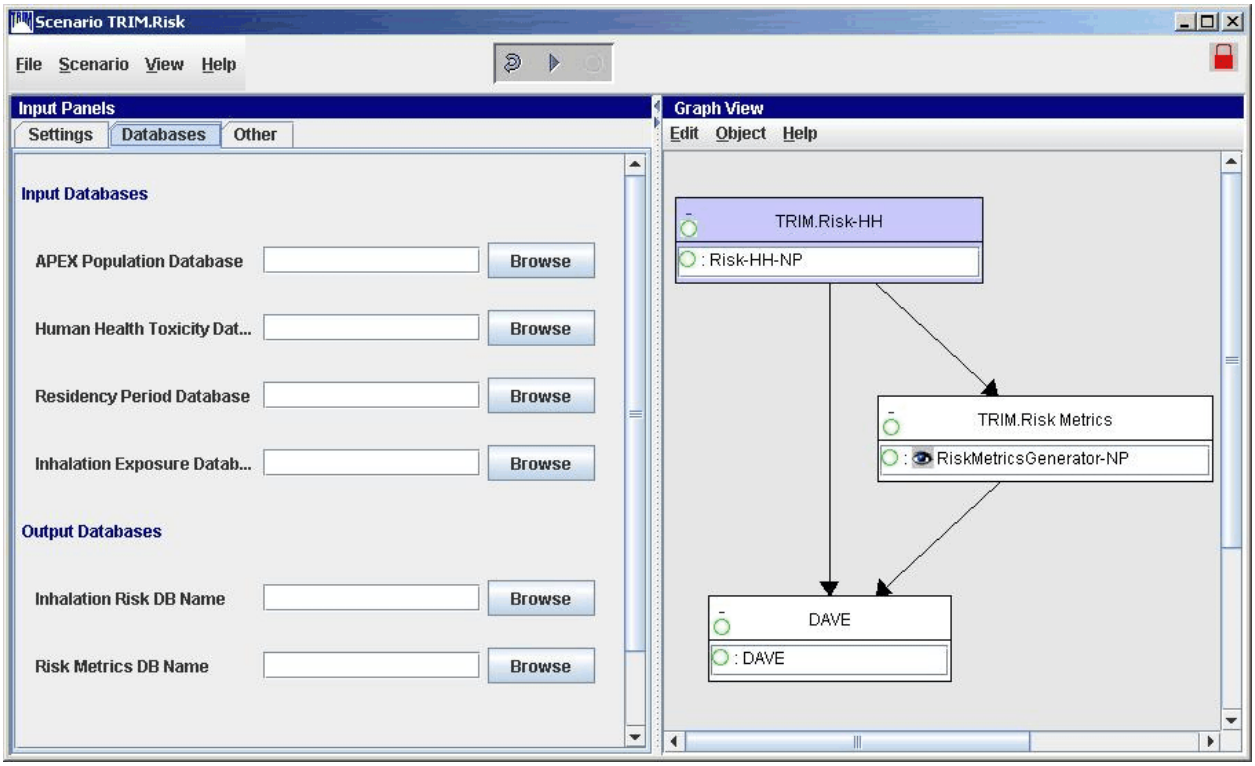
Step 2b **Set Parameters on "Databases" Tab**

Click on the "Databases" tab. The parameters that can be set on this tab are listed in Exhibits 3-30 and 3-31. Set parameters by typing in each database name.

Exhibit 3-30. Parameters on "Databases" Tab of "TRIM.Risk" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Input Databases			
APEX Population Database	–	No	Name of the MySQL database containing population data used by APEX (i.e., $TRIM.Expo_{Inhalation}$), and also used to generate risk metrics.
Human Health Toxicity Database	–	No	The name of the database containing chemical-specific information on human health effects.
Residency Period Database	–	No	The name of the database containing residency period data.
Inhalation Exposure Database	–	No	The name of the database with inhalation exposure estimates generated by $TRIM.Expo_{Inhalation}$.
Output Databases			
Inhalation Risk DB Name	–	No	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.
Risk Metrics DB Name	–	No	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.

Exhibit 3-31. "Databases" Tab of "TRIM.Risk" Scenario



Step 2c **Set Parameters on "Other" Tab**

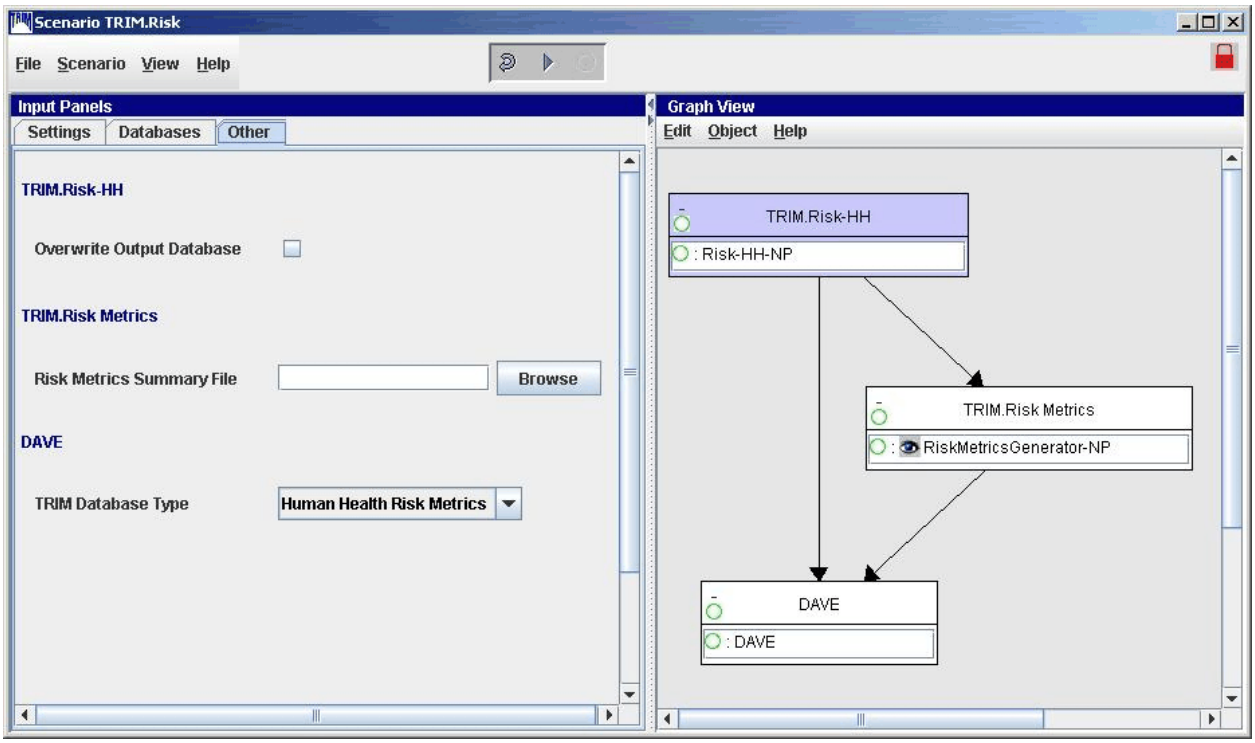
Click on the "Other" tab. The parameters that can be set on this tab are listed in Exhibits 3-32 and 3-33. Set parameters by typing in a value, clicking on the "Browse" button next to the parameter field and browsing to the desired file or directory, selecting an option from a drop-down menu, or clicking on a check box.

Exhibit 3-32. Parameters on "Other" Tab of "TRIM.Risk" Scenario

Parameter Name	Default Value	Set via Installer?	Description
TRIM.Risk$_{HH-NP}$			
Overwrite Output Database	No	No	If yes, an output database previously generated by TRIM.Risk$_{HH-NP}$ will be overwritten if a new database is specified with an identical name.
TRIM.Risk Metrics			
Risk Metrics Summary File	–	No	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.

Parameter Name	Default Value	Set via Installer?	Description
DAVE			
TRIM Database Type	Human Health Risk Metrics	No	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.

Exhibit 3-33. "Other" Tab of "TRIM.Risk" Scenario



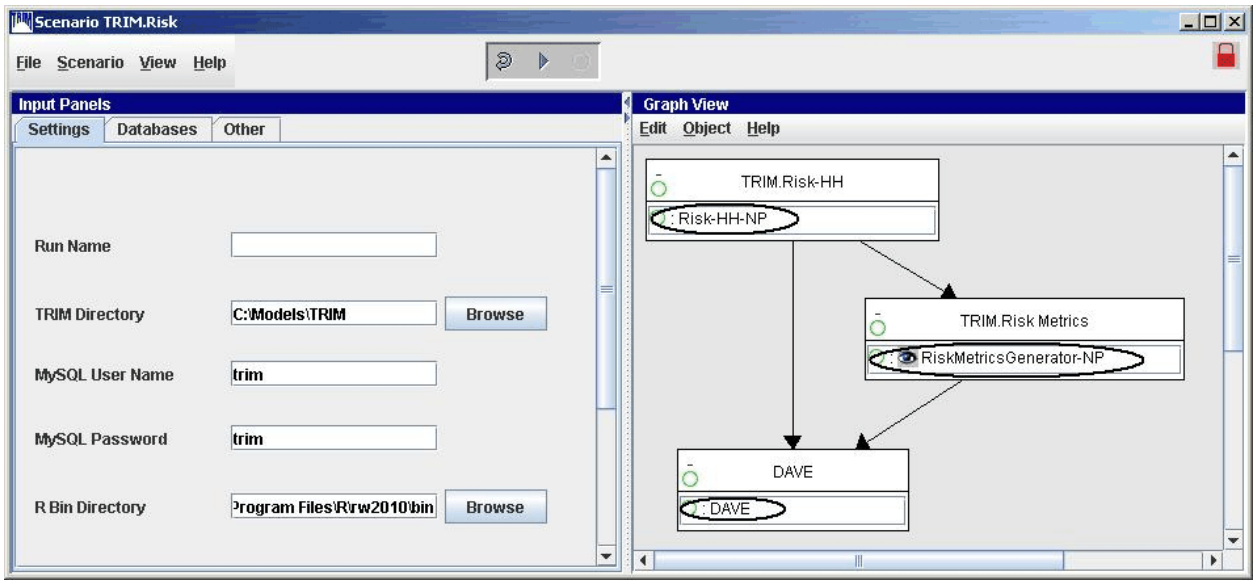
Step 3 Set Any Additional Parameters

For some applications, users may find it necessary to view or edit additional parameters beyond those in the "Input Panels." To access the scenario parameters table, select "Edit Parameter Values" from the "Scenario" menu of the scenario window. Access the parameters table for individual module instances by double-clicking on a module instance name in the "Graph View" pane to open that module instance window (Exhibit 3-34 shows circled module instance names).[7] On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, or selecting the "Browse" button to locate the file. Note that this step may not be required for some applications. No user interaction is required on the "Module" tab.

Refer to: Appendix D, Scenario Parameters

Appendix E, Module Instance Parameters

Exhibit 3-34. Module Instances in "TRIM.Risk" Scenario



[7] See Volume I, Section 3.1 for definitions of common MIMS terminology and Volume I, Section 3.1.8 for information on opening a module instance and specifying parameter values.

Step 4 Start the Scenario

Run the scenario by selecting "Execute Ready Modules" from the "Scenario" menu in the scenario window or clicking the "play" button ( ) at the top of the scenario window.

Refer to: Volume I, Section 3.1.9, Running a MIMS Scenario

Appendix G, Troubleshooting

Step 5 Specify Inputs and Run TRIM.Risk Metrics Generator

The TRIM.Risk$_{HH}$ Inhalation Metrics GUI will open automatically in MIMS as the run is executing to allow the user to specify inputs used to generate risk metrics. Only one set of metrics is generated with each run. Additional risk metrics may be generated from the same TRIM.Risk output database using the "TRIM.Risk Metrics" scenario. However, these additional metrics cannot be added to an existing database.[8]

Select the desired risk metrics and set the required inputs on the numbered tabs in the TRIM.Risk$_{HH}$ Inhalation Metrics GUI (the metrics are described in Chapter 2 and Appendix A and specification of the required inputs is described in detail in Section 5.4.2). Then, click "Validate" to verify the selections and click "Exit" to exit the GUI and continue the scenario.

Refer to: Section 5.4.2, TRIM.Risk Metrics Generator

Chapter 2, Risk Calculations

Appendix A, Human Health Risk Metrics

[8] To prevent the previous risk metrics database from being overwritten, select a different output database name on the first tab of the TRIM.Risk$_{HH}$ Inhalation Metrics GUI.

Step 6 Run DAVE

Unless the user specified a change to the TRIM database type in Step 2c, the DAVE GUI will open in MIMS after the risk metrics database has been created. If another type of TRIM database was selected, the DAVE GUI will open after that database has been created.

DAVE can be used to generate tables and charts of exposure estimates, risk estimates, and risk metrics, or to create delimited text exports of results. Exported results can then be further analyzed off-line after they have been imported into a spreadsheet or other data analysis software. Alternatively, risk estimates can be retrieved directly from the database using MySQL queries.

Refer to: Section 5.5, DAVE

Volume I, Section 3.3, Basic Operations with DAVE

DAVE User's Guide

3.6 TRIM.Risk Metrics Scenario

When Should I Run This Scenario?

This scenario is designed to generate inhalation risk metrics using an available, previously prepared TRIM.Risk$_{HH-NP}$ database. The database can contain annualized hazard or cancer risk estimates for a single or multiple chemicals, sources, facilities, and/or study areas.

This section describes the steps required to run the "**TRIM.Risk Metrics**" MIMS scenario within the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" project. This scenario accesses an existing TRIM.Risk output database and, based on these values, generates user-selected risk metrics using the TRIM.Risk metrics generator. A risk model other than TRIM.Risk can be used to generate inhalation risk estimates; however, the risk results must be in the MySQL format required by the TRIM.Risk metrics generator (see Appendix F for the MySQL Database Schema). The steps required to run this scenario are presented below. For names of the domain objects and module instances in this scenario, refer to Appendix C.1.

Step 1 Open the "TRIM.Risk Metrics" scenario in MIMS

Start MIMS by navigating to the Start menu, Programs, TRIM, and selecting "TRIM" or by double-clicking on "runtrim.bat" in Windows Explorer. Open the "Inhalation risk assessment with TRIM.Expo" MIMS project and then the "TRIM.Risk Metrics" scenario in MIMS.

Refer to: Volume I, Section 3.1.4, Opening a MIMS Project

Volume I, Section 3.1.6, Opening, Duplicating, Renaming or Deleting a MIMS Scenario

Step 2 Complete the Input Panels

Parameters are set via the tabs located on the "Input Panels" pane, as described in Steps 2a through 2c. The "Input Panels" present those parameters that are most likely to require attention from users (see Exhibits 3-35 through 3-40). Note that some of these parameters will have been set by the user during the installation of TRIM. Users should use caution when making changes to any preset parameter values.

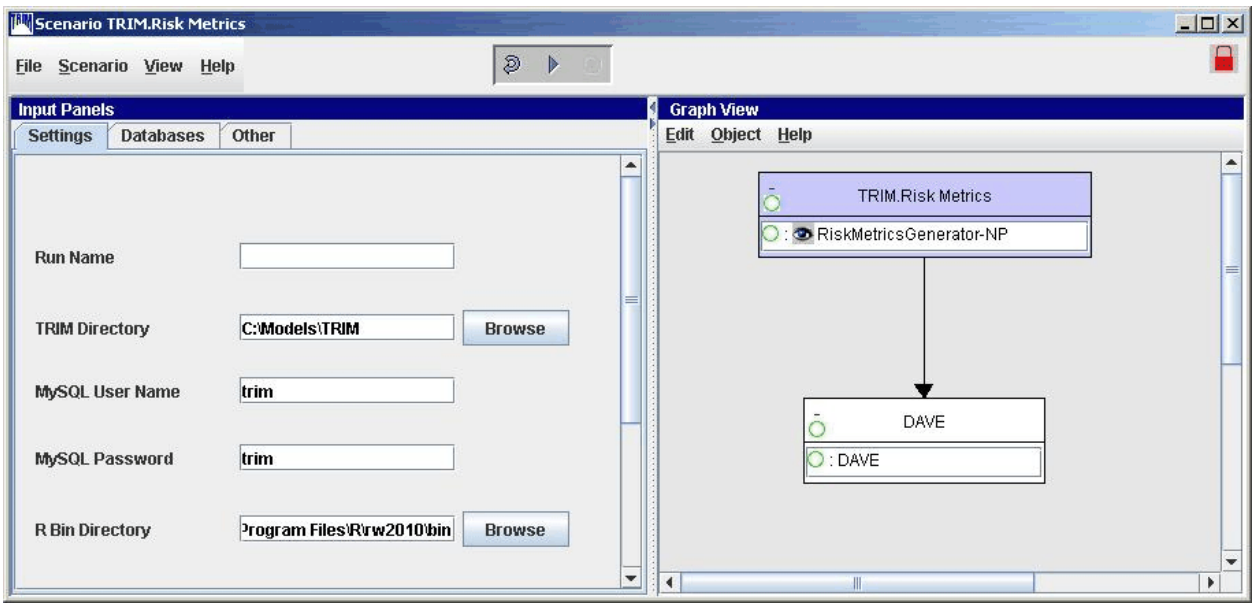
Step 2a Set Parameters on "Settings" Tab

Click on the "Settings" tab. The parameters that can be set on this tab are listed in Exhibits 3-35 and 3-36. Set parameters by typing in a value or by clicking the "Browse" button next to the parameter field and selecting the desired file or directory.

Exhibit 3-35. Parameters on "Settings" Tab of "TRIM.Risk Metrics" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Run Name	–	No	Name of the unique scenario run.
TRIM Directory	–	Yes	Name and location of the TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).
MySQL User Name	–	Yes	User name for access to the MySQL databases created or used for the TRIM.Risk projects.
MySQL Password	–	Yes	Password for access to the MySQL databases created or used for the TRIM.Risk projects.
R Bin Directory	–	Yes	Location of the bin directory for the R program.

Exhibit 3-36. "Settings" Tab of "TRIM.Risk Metrics" Scenario



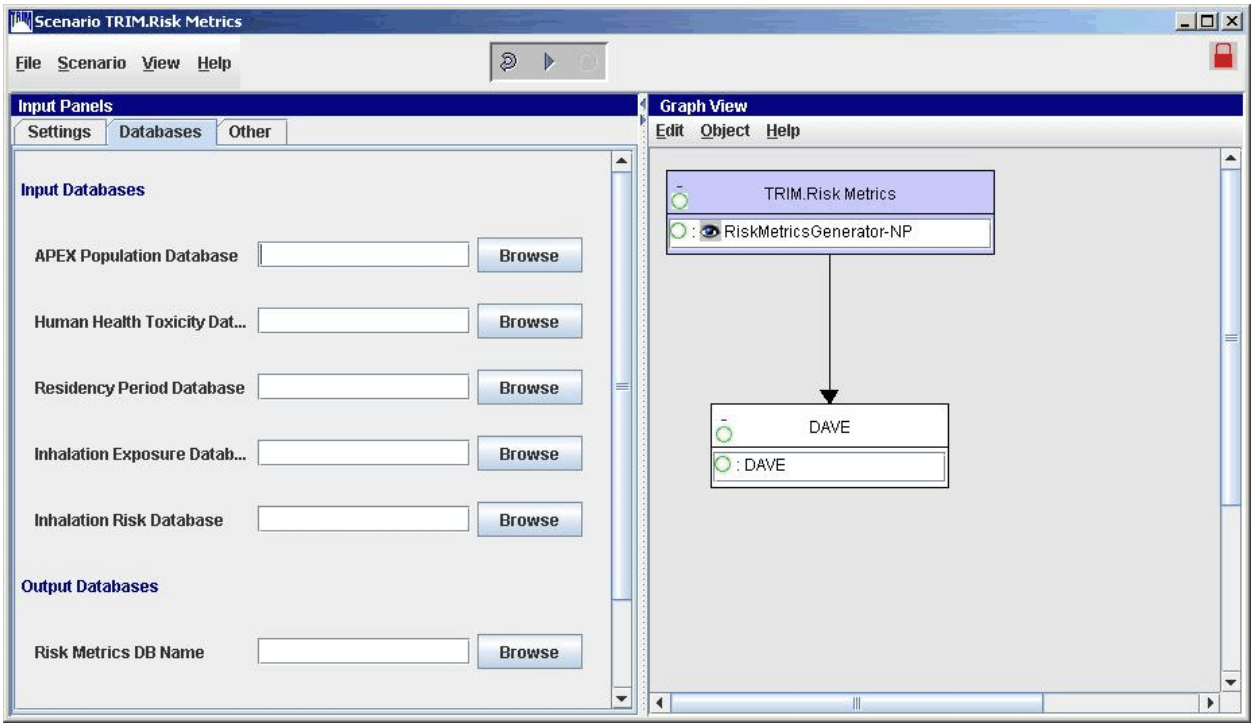
Step 2b **Set Parameters on "Databases" Tab**

Click on the "Databases" tab. The parameters that can be set on this tab are listed in Exhibits 3-37 and 3-38. Set parameters by typing in each database name.

Exhibit 3-37. Parameters on "Databases" Tab of "TRIM.Risk Metrics" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Input Databases			
APEX Population Database	–	No	Name of the MySQL database containing population data used by APEX (i.e., TRIM.Expo$_{Inhalation}$), and also used to generate risk metrics.
Human Health Toxicity Database	–	No	The name of the database containing chemical-specific information on human health effects.
Residency Period Database	–	No	The name of the database containing residency period data.
Inhalation Exposure Database	–	No	The name of the database with inhalation exposure estimates generated by TRIM.Expo$_{Inhalation}$.
Inhalation Risk Database	–	No	The name of the database with inhalation risk estimates generated by TRIM.Risk$_{HH-NP}$.
Output Databases			
Risk Metrics DB Name	–	No	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.

Exhibit 3-38. "Databases" Tab of "TRIM.Risk Metrics" Scenario



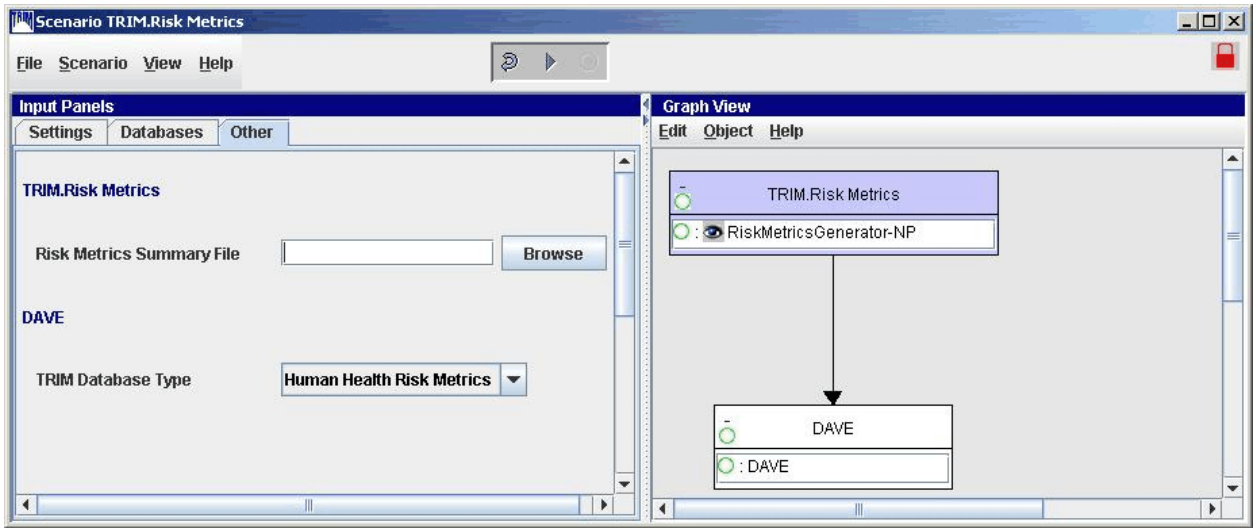
Step 2c **Set Parameters on "Other" tab**

Click on the "Other" tab. The parameters that can be set on this tab are listed in Exhibits 3-39 and 3-40. Set parameters by typing in a value, clicking the "Browse" button next to the parameter field and selecting the desired file or directory, or selecting an option from a drop-down menu.

Exhibit 3-39. Parameters on "Other" Tab of "TRIM.Risk Metrics" Scenario

Parameter Name	Default Value	Set via Installer?	Description
TRIM.Risk Metrics			
Risk Metrics Summary File	–	No	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.
DAVE			
TRIM Database Type	Human Health Risk Metrics	No	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.

Exhibit 3-40. "Other" Tab of "TRIM.Risk Metrics" Scenario



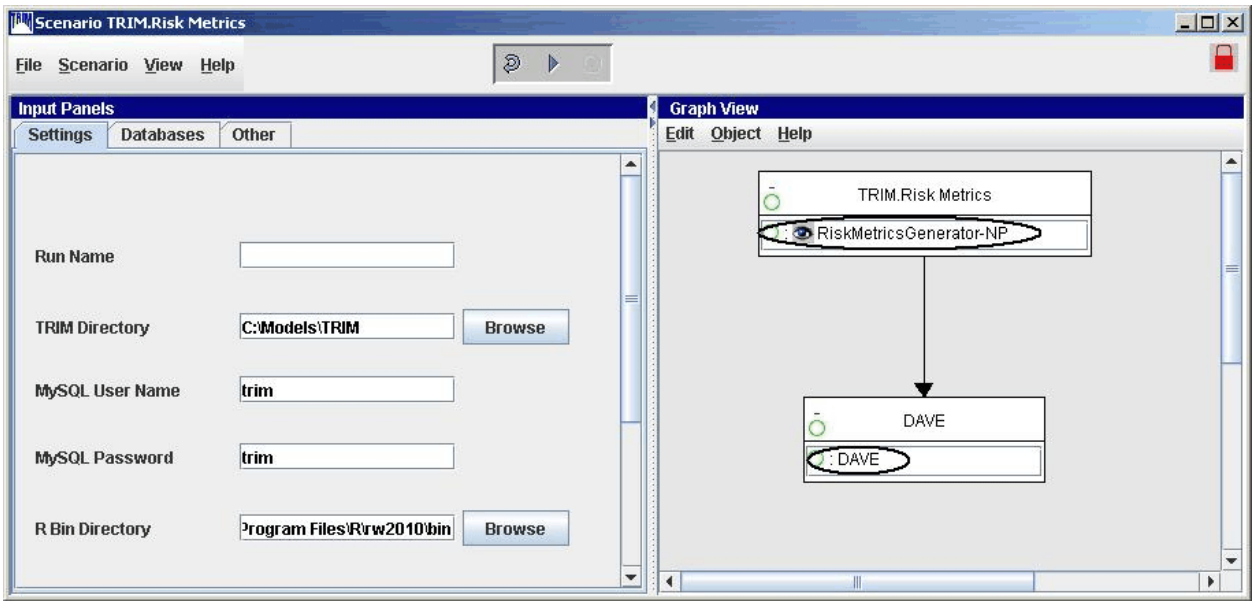
Step 3 Set Any Additional Parameters

For some applications, users may find it necessary to view or edit additional parameters beyond those in the "Input Panels." To access the scenario parameters table, select "Edit Parameter Values" from the "Scenario" menu of the scenario window. Access the parameters table for individual module instances by double-clicking on a module instance name in the "Graph View" pane to open that module instance window (Exhibit 3-41 shows circled module instance names).[9] On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, or selecting the "Browse" button to locate the file. Note that this step may not be required for some applications. No user interaction is required on the "Module" tab.

Refer to: Appendix D, Scenario Parameters

Appendix E, Module Instance Parameters

Exhibit 3-41. Module Instances in "TRIM.Risk Metrics" Scenario



[9] See Volume I, Section 3.1 for definitions of common MIMS terminology and Volume I, Section 3.1.8 for information on opening a module instance and specifying parameter values.

Step 4 Start the Scenario

Run the scenario by selecting "Execute Ready Modules" from the "Scenario" menu of the scenario window or clicking the "play" button ( ) at the top of the scenario window.

Refer to: Volume I, Section 3.1.9, Running a MIMS Scenario

Appendix G, Troubleshooting

Step 5 Specify Inputs and Run TRIM.Risk Metrics Generator

The TRIM.Risk$_{HH}$ Inhalation Metrics GUI will open automatically in MIMS as the run is executing to allow the user to specify inputs used to generate risk metrics. Only one set of metrics is generated with each run. Additional risk metrics may be generated from the same TRIM.Risk output database using the "TRIM.Risk Metrics" scenario. However, these additional metrics cannot be added to an existing database.[10]

Select the desired risk metrics and set the required inputs on the numbered tabs in the TRIM.Risk$_{HH}$ Inhalation Metrics GUI (the metrics are described in Chapter 2 and Appendix A and specification of the required inputs is described in detail in Section 5.4.2). Then, click "Validate" to verify the selections and click "Exit" to exit the GUI and continue the scenario.

Refer to: Section 5.4.2, TRIM.Risk Metrics Generator

Chapter 2, Risk Calculations

Appendix A, Human Health Risk Metrics

[10] To prevent the previous risk metrics database from being overwritten, select a different output database name on the first tab of the TRIM.Risk$_{HH}$ Inhalation Metrics GUI.

Step 6 Run DAVE

Unless the user specified a change to the TRIM database type in Step 2c, the DAVE GUI will open in MIMS after the risk metrics database has been created. If another type of TRIM database was selected, the DAVE GUI will open after that database has been created.

DAVE can be used to generate tables and charts of exposure estimates, risk estimates, and risk metrics, or to create delimited text exports of results. Exported results can then be further analyzed off-line after they have been imported into a spreadsheet or other data analysis software. Alternatively, risk estimates can be retrieved directly from the database using MySQL queries.

Refer to: Section 5.5, DAVE

Volume 1, Section 3.3, Basic Operations with DAVE

DAVE User's Guide

4. Inhalation Risk Assessment with HAPEM Scenarios

4.1 Introduction

As described in Chapter 1, TRIM.Risk can be used to perform inhalation risk assessment using non-probabilistic exposure-response values and exposure estimates generated by HAPEM. These assessments can be performed using the scenarios in the "Inhalation risk assessment using RfCs and UREs, with HAPEM" project or by creating a new MIMS scenario (see Volume I, Section 3.1.10). The set of scenarios that involve HAPEM contain different combinations of TRIM.Risk components to fit the requirements of specific assessments. Exhibit 4-1 lists each of the scenarios available for inhalation risk assessments with HAPEM and specifies which components each of these scenarios includes. A decision tree is provided in Exhibit 4-2 to assist users in determining the appropriate scenario for their needs. The appendices to Volume II contain additional information on these scenarios, including the sequence in which components are run (Appendix B), an overview of the components involved in each scenario (Appendix C), scenario parameters (Appendix D), module instance parameters for each scenario (Appendix E), and the MySQL database schema (Appendix F). Information on troubleshooting is included in Appendix G.

This chapter provides step-by-step instructions for running each of the scenarios provided in the "Inhalation risk assessment using RfCs and UREs, with HAPEM" MIMS project. Numerous tables are used to summarize the parameters required by TRIM.Risk and the default values included in the software package available from EPA. When applying TRIM.Risk, users should review parameters carefully to ensure that appropriate values are used in their scenario.

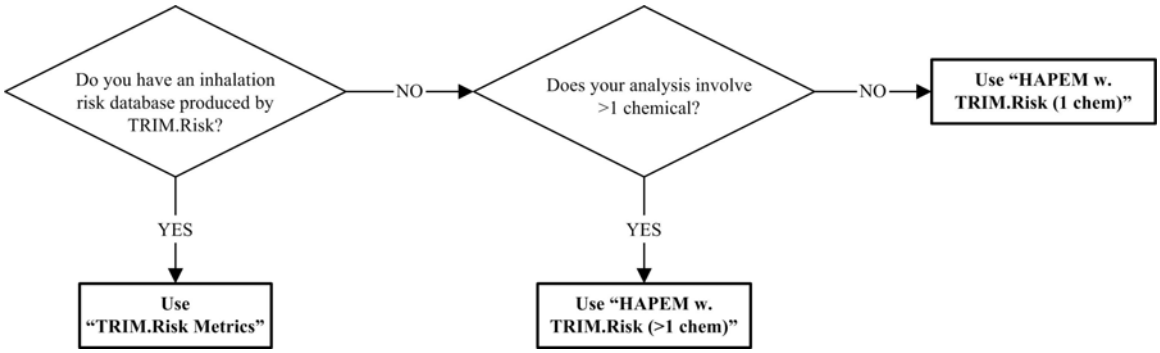
One of the scenarios listed in Exhibit 4-1, the "Internal-use only (>1 chem)" scenario, is different from the others in that this scenario is not meant to be accessed directly by TRIM.Risk users. This scenario is used internally by the "HAPEM w. TRIM.Risk (>1 chem)" scenario and should not be run separately. Because it is used internally by TRIM.Risk, a separate description of this scenario is not included in this chapter.

Exhibit 4-1. Currently Available Scenarios for "Inhalation risk assessment using RfCs and UREs, with HAPEM" Project

Scenario	Description	HAPEM[a]	HAPEM (Part 1)[b]	HAPEM (Part 2)[c]	HAPEM5 Postprocessor	TRIM.Risk$_{HH-NP}$	TRIM.Risk metrics generator	DAVE
Internal-use only (>1 chem)[d]	Used internally by the "HAPEM w. TRIM.Risk (>1 chem)" scenario to run parts of HAPEM; should not be run separately.			✓				
HAPEM w. TRIM.Risk (1 chem)	Used to perform an inhalation exposure and risk assessment for a single set of ambient concentration values for a single chemical using HAPEM and TRIM.Risk.	✓			✓	✓	✓	✓
HAPEM w. TRIM.Risk (>1 chem)	Used to perform an inhalation exposure and risk assessment for more than one set of ambient concentration values (e.g., for more than one chemical) using HAPEM and TRIM.Risk.		✓	✓	✓	✓	✓	✓
TRIM.Risk Metrics	Used to develop risk metrics using an existing TRIM.Risk output database and the TRIM.Risk metrics generator.						✓	✓

[a] Includes all five parts of the HAPEM model; "DURAV," "INDEXPOP," "COMMUTE," "AIRQUAL," and "HAPEM."
[b] Includes the "DURAV," "INDEXPOP," and "COMMUTE" parts of the HAPEM model.
[c] Includes the "AIRQUAL" and "HAPEM" parts of the HAPEM model.
[d] This scenario is not described in this User's Guide. Users should not interact with this scenario; it is used internally by the "HAPEM (Part 2)" module in the "HAPEM w. TRIM.Risk (>1 chem)" scenario and should not be run separately.

Exhibit 4-2. "Inhalation risk assessment using RfCs and UREs, with HAPEM" Scenario Decision Tree



In order to run these scenarios, users must have installed the required software (see Volume I, Chapter 2) and imported the "Inhalation risk assessment using RfCs and UREs, with HAPEM" project into MIMS (see Volume I, Section 3.1.2).

4.2 HAPEM with TRIM.Risk for a Single Chemical

This section describes the steps required to run the "**HAPEM w. TRIM.Risk (1 chem)**" MIMS scenario. This scenario allows the user to employ HAPEM and TRIM.Risk to perform an inhalation exposure and risk assessment using a single set of ambient concentration values for a single chemical. ***To run this scenario, the user must have HAPEM inputs available in the required format.*** Details regarding HAPEM inputs and associated formatting requirements are presented in the HAPEM5 User's Guide available on the EPA FERA website (http://www.epa.gov/ttn/fera/human_hapem.html).

The steps required to run this scenario are presented below. For names of the domain objects and module instances in this scenario, refer to Appendix C.2.

When Should I Run This Scenario?

This scenario is designed to be used when a combined inhalation exposure and risk assessment is carried out (i.e., the exposure and risk models are run consecutively in a single application) using a single set of ambient concentration values for a single chemical. This data set can be comprised of either ambient air concentration measurements (e.g., monitoring data) or output from an air quality model. In either case, the user will need to ensure that the concentration data set is formatted appropriately according to the requirements of HAPEM.

Step 1 Open the "HAPEM w. TRIM.Risk (1 chem)" scenario in MIMS

Start MIMS by navigating to the Start menu, Programs, TRIM, and selecting "TRIM" or by double-clicking on "runtrim.bat" in Windows Explorer. Open the "Inhalation risk assessment using RfCs and UREs, with HAPEM" MIMS project and then the "HAPEM w. TRIM.Risk (1 chem)" scenario in MIMS.

Refer to: Volume I, Section 3.1.4, Opening a MIMS Project

Volume I, Section 3.1.6, Opening, Duplicating, Renaming or Deleting a MIMS Scenario

Step 2 Complete the Input Panels

Parameters are set via the tabs located on the "Input Panels" pane, as described in Steps 2a through 2e. The "Input Panels" present those parameters that are most likely to require attention by users (see Exhibits 4-3 through 4-11). Note that some of these parameters will have been set by the user during the installation of TRIM. Users should use caution when making changes to any preset parameter values.

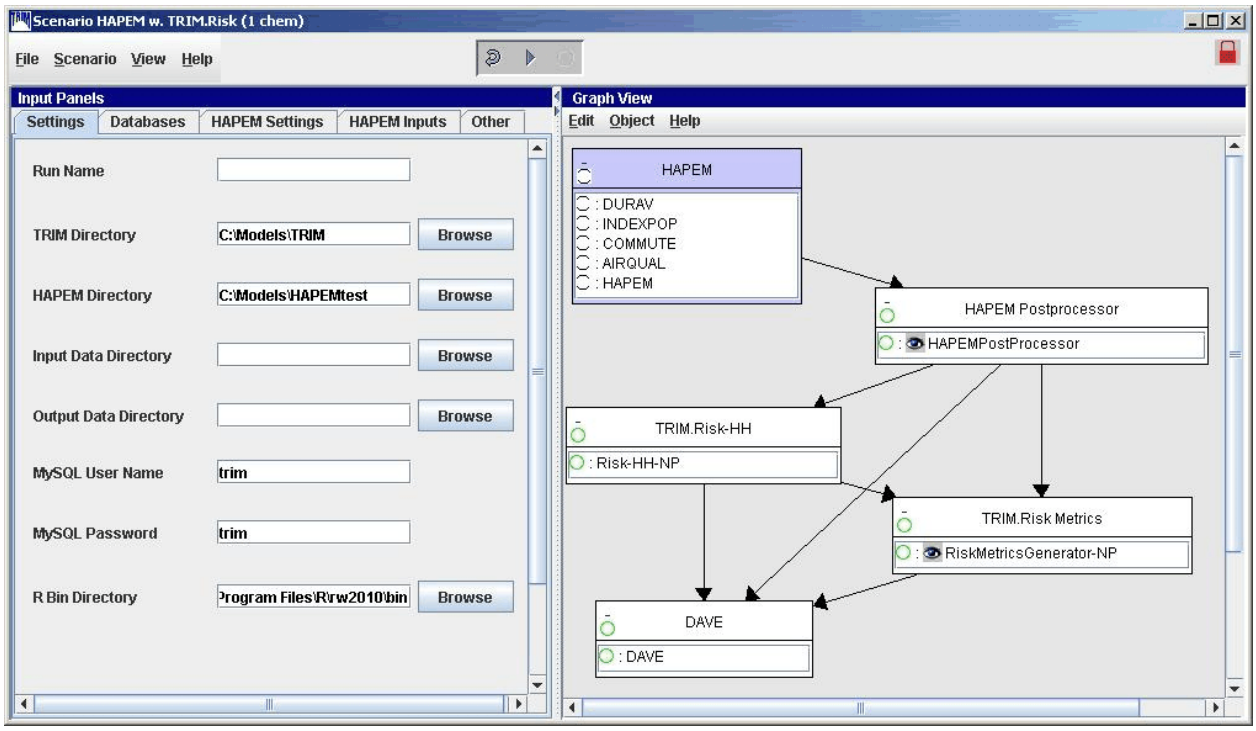
Step 2a **Set Parameters on "Settings" Tab**

Click on the "Settings" tab. The parameters that can be set on this tab are listed in Exhibits 4-3 and 4-4. Set parameters by typing in a value or clicking the "Browse" button next to the parameter field and selecting the desired file or directory.

Exhibit 4-3. Parameters on "Settings" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Run Name	–	No	Name of the unique scenario run.
TRIM Directory	–	Yes	Name and location of the TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).
HAPEM Directory	–	Yes	Name and location of the directory containing the HAPEM executable.
Input Data Directory	–	No	Name and location of the directory containing the input files for HAPEM.
Output Data Directory	–	No	Name and location of the directory containing the HAPEM output files.
MySQL User Name	–	Yes	User name for access to the MySQL databases created or used for the TRIM.Risk projects.
MySQL Password	–	Yes	Password for access to the MySQL databases created or used for the TRIM.Risk projects.
R Bin Directory	–	Yes	Location of the bin directory for the R program.

Exhibit 4-4. "Settings" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario



Step 2b **Set Parameters on "Databases" Tab**

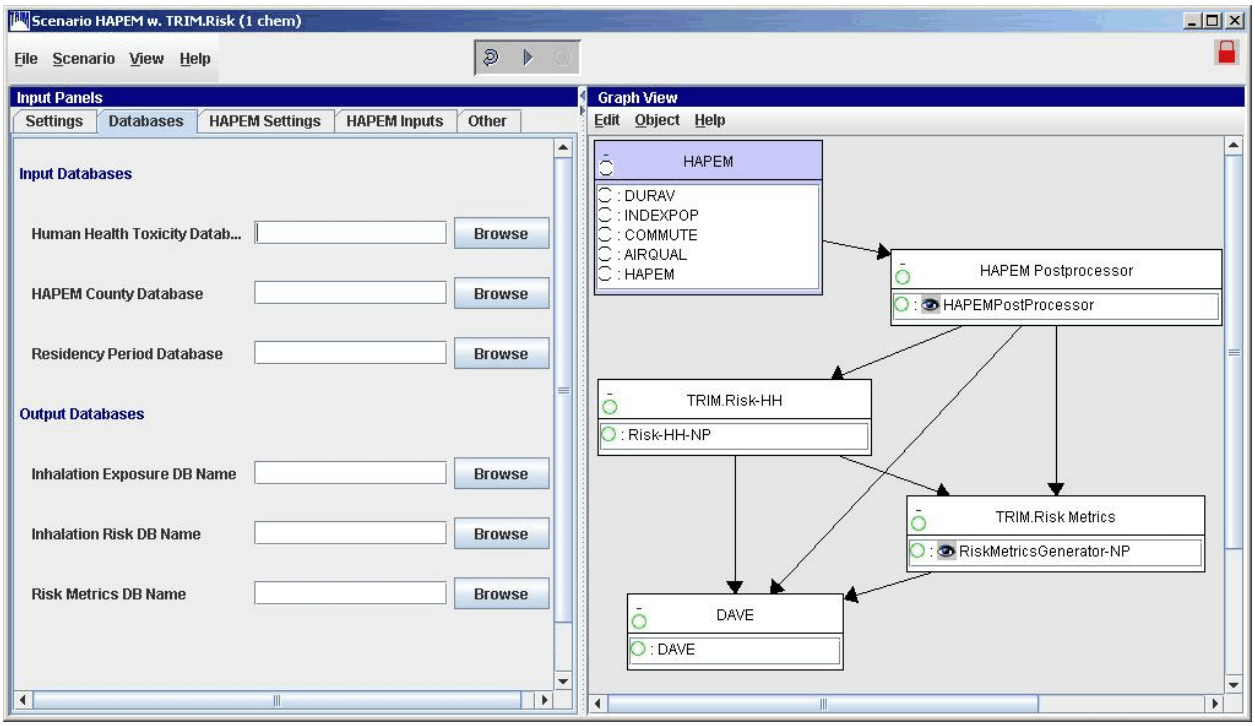
Click on the "Databases" tab. The parameters that can be set on this tab are listed in Exhibit 4-5 and 4-6. Set parameters by typing in each database name.

Exhibit 4-5. Parameters on "Databases" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Input Databases			
Human Health Toxicity Database	–	No	The name of the database containing chemical-specific information on human health effects.
HAPEM County Database	–	No	The name of the database containing the HAPEM County/State data.
Residency Period Database	–	No	The name of the database containing residency period data.

Parameter Name	Default Value	Set via Installer?	Description
Output Databases			
Inhalation Exposure DB Name	–	No	The name of the database with inhalation exposure estimates generated by HAPEM.
Inhalation Risk DB Name	–	No	The name of the database with inhalation risk estimates generated by TRIM.Risk$_{HH-NP}$.
Risk Metrics DB Name	–	No	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.

Exhibit 4-6. "Databases" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario



Step 2c **Set Parameters on "HAPEM Settings" Tab**

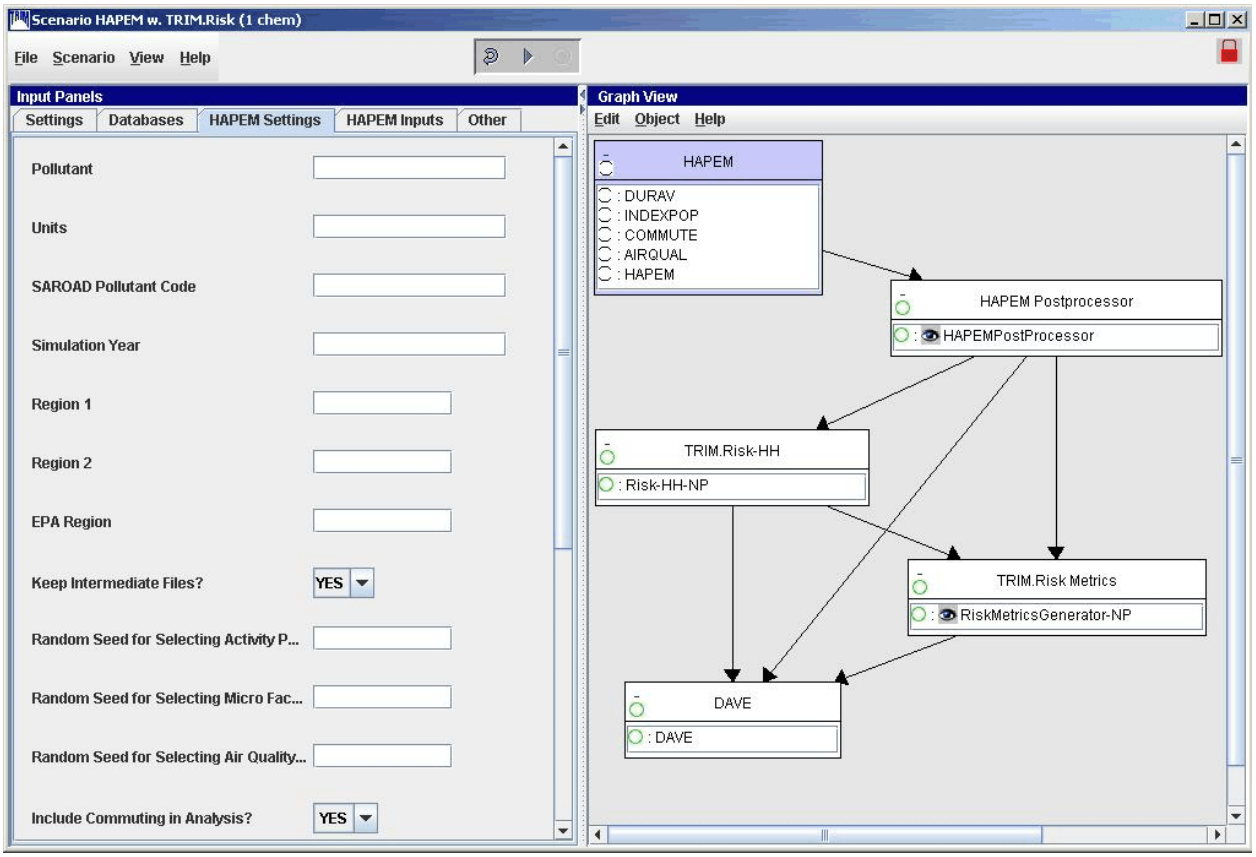
Click on the "HAPEM Settings" tab. The parameters that can be set on this tab are listed in Exhibits 4-7 and 4-8. Set parameters by typing in a value or selecting an option from a drop-down menu.

Exhibit 4-7. Parameters on "HAPEM Settings" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Pollutant	–	No	The chemical under analysis.
Units	–	No	Specifies the units for exposure concentration data.
SAROAD Pollutant Code	–	No	Specifies the SAROAD code corresponding to the chemical under analysis.
Simulation Year	–	No	Specifies the year to be simulated by the model run (the year of the air quality data).
Region 1	–	No	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).
Region 2	–	No	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).
EPA Region	–	No	The EPA region number of indoor emission source data.
Keep Intermediate Files?	Yes	No	Indicates whether temporary files generated by the HAPEM programs during execution are preserved or deleted upon completion of HAPEM.
Random Seed for Selecting Activity Pattern Data	–	No	Allows for the random selection of activity pattern data for analysis. Using the same random seed for two simulations for the same scenario will select the same activity pattern data.
Random Seed for Selecting Micro Factors	–	No	Allows for the random selection of microenvironment factors for analysis. Using the same random seed for two simulations for the same scenario will select the same microenvironment factors.
Random Seed for Selecting Air Quality Dataset	–	No	Allows for the random selection of air quality data for analysis. Using the same random seed for two simulations for the same scenario will select the same air quality data.
Include Commuting in Analysis?	Yes	No	Specifies whether commuting will be included in the analysis (input in the parameter files of DURAV and HAPEM).
Background Concentration	–	No	Specifies the uniform background concentration throughout the study area.
Number of Microenvironments	–	No	Specifies the number of microenvironments in both the Activity file and Factors file.
Number of Time Blocks in the Activity File	–	No	Specifies the number of time blocks in the Activity file.

Parameter Name	Default Value	Set via Installer?	Description
Number of Time Blocks for Analysis	–	No	Specifies the number of time blocks for the analysis; may be less than or equal to the number of time blocks in the Activity file, but must be an integral factor of the number of time blocks in the Activity file.
Number of Day Types	–	No	Specifies the number of day types (input in the parameter files of DURAV and HAPEM).
Number of Demographic Groups	–	No	Specifies the number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).
Number of Emission Source Categories	–	No	Specifies the number of outdoor emission source categories, which must match the number in the Factors file (input in the parameter files of AIRQUAL and HAPEM).
Number of Replicates	–	No	The number of replicates for each demographic group/tract.

Exhibit 4-8. "HAPEM Settings" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario



Step 2d **Set Parameters on "HAPEM Inputs" Tab**

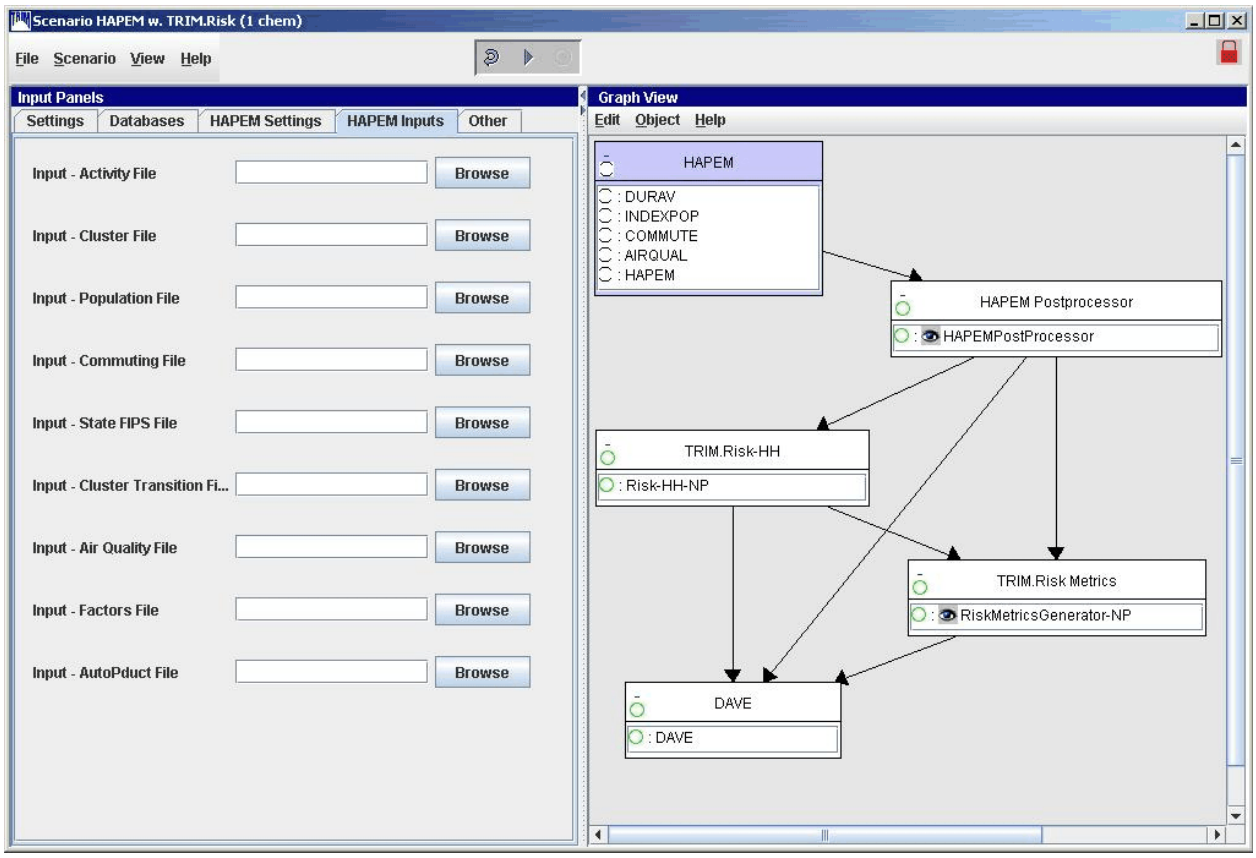
Click on the "HAPEM Inputs" tab. The parameters that can be set on this tab are listed in Exhibits 4-9 and 4-10. Set parameters by either typing in a value or clicking the "Browse" button next to the parameter field and selecting the desired file.

Exhibit 4-9. Parameters on "HAPEM Inputs" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Activity File	–	No	Describes the amount of time spent in various microenvironments by individuals; the total number of minutes spent in each microenvironment during each time block throughout the day.
Cluster File	–	No	Specifies the cluster category for each CHAD record, identified by the CHAD identification code.
Population File	–	No	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.
Commuting File	–	No	Identifies the tract of work and tract of residence for individuals.
State FIPS File	–	No	Supplies the state FIPS, county FIPS, and tract code for the population file data.
Cluster Transition File	–	No	Specifies the number of activity patterns in each group of two to three clusters and cluster-to-cluster transition probabilities for each demographic group/day type combination.
Air Quality File	–	No	Contains the ambient air concentrations as recorded concentration contributions from multiple emission source categories for multiple time blocks for a census tract; also includes location-specific background concentration data.
Factors File	–	No	Includes values for the penetration, proximity, additive, and slow diffusion factor (PEN, PROX, ADD, and LAG, respectively) for each microenvironment and emission source category combination. The number of microenvironments in the Factors file must match the number in the Activity file (i.e., *nmicro).*

Parameter Name	Default Value	Set via Installer?	Description
AutoPduct File	–	No	The full path name of any existing file (except other HAPEM input or output files) must be specified as the AutoPduct file. In the future this file will comprise part of the input for evaluating indoor source algorithms. Currently, the file is not utilized by the HAPEM program.

Exhibit 4-10. "HAPEM Inputs" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario



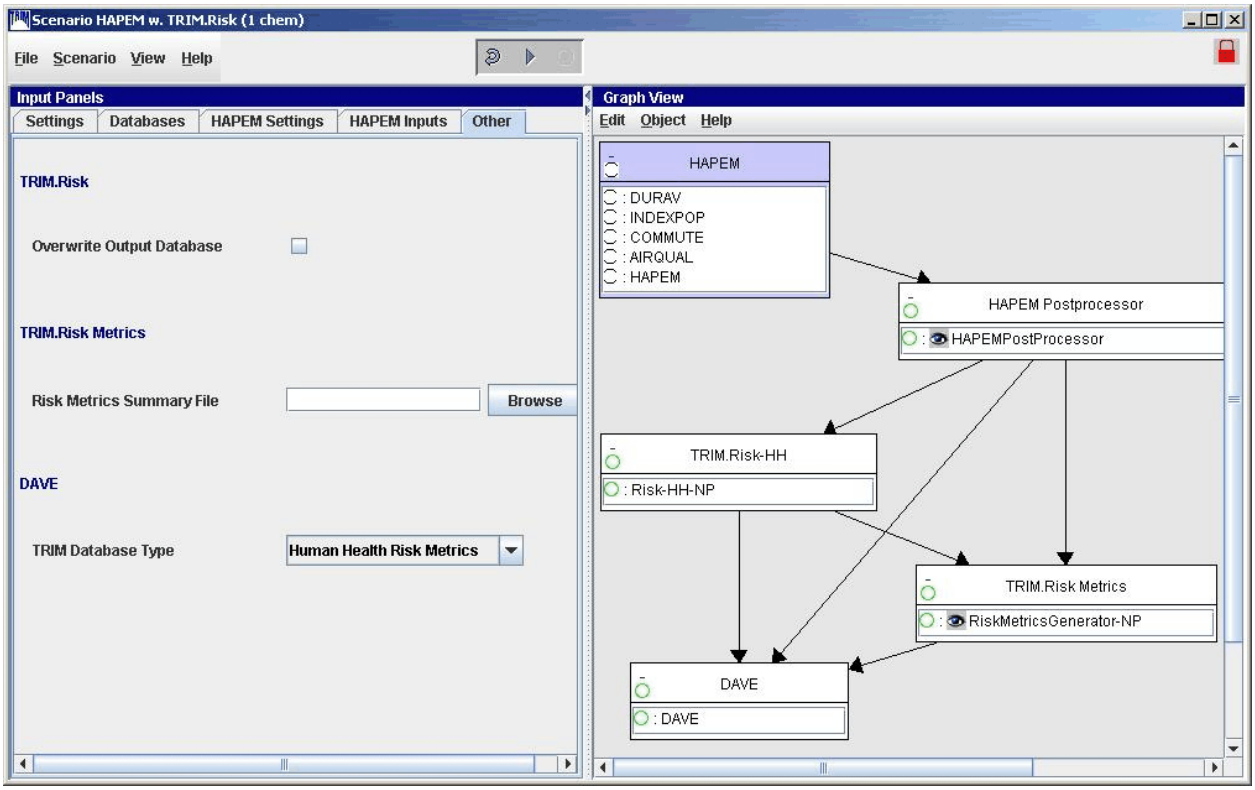
Step 2e **Set Parameters on "Other" Tab**

Click on the "Other" tab. The parameters that can be set on this tab are listed in Exhibits 4-11 and 4-12. Set parameters by either typing in a value, clicking the "Browse" button next to the parameter field and selecting the desired file or directory, selecting an option from a drop-down menu, or clicking on a check box.

Exhibit 4-11. Parameters on "Other" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
TRIM.Risk$_{HH-NP}$			
Overwrite Output Database	No	No	If yes, an output database previously generated by TRIM.Risk$_{HH-NP}$ will be overwritten if a new database is specified with an identical name.
TRIM.Risk Metrics			
Risk Metrics Summary File	–	No	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.
DAVE			
TRIM Database Type	Human Health Risk Metrics	No	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.

Exhibit 4-12. "Other" Tab of "HAPEM w. TRIM.Risk - 1 Chemical" Scenario



Step 3 Set Additional "HAPEM" Parameters

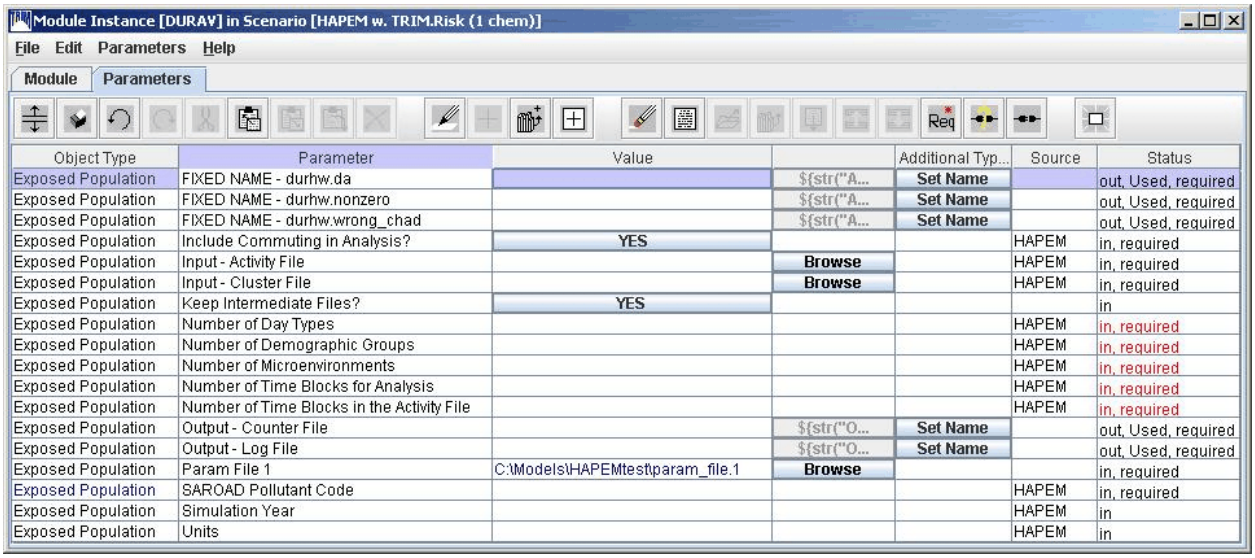
For more options (beyond those provided on the "Input Panels") in setting up HAPEM, the user will need to specify "DURAV," "INDEXPOP," "COMMUTE," "AIRQUAL," and "HAPEM" parameters. Access the parameters table for a module instance by double-clicking on that module name (e.g., "DURAV") in the "Graph View" pane.[1] This opens that module instance window. On the "Parameters" tab, set values by typing in the "Value" column, selecting an option from a drop-down menu, or selecting the "Browse" button to locate the file (Exhibits 4-13 through 4-17). Specific parameters are listed and described in Appendix E. No user interaction is required on the "Module" tab.

Refer to: Section 5.3.1, HAPEM

Appendix E, Module Instance Parameters

HAPEM5 User's Guide

Exhibit 4-13. "DURAV" Module Instance Parameters in "HAPEM w. TRIM.Risk - 1 Chemical" Scenario



Object Type	Parameter	Value		Additional Typ...	Source	Status
Exposed Population	FIXED NAME - durhw.da		${str("A...	Set Name		out, Used, required
Exposed Population	FIXED NAME - durhw.nonzero		${str("A...	Set Name		out, Used, required
Exposed Population	FIXED NAME - durhw.wrong_chad		${str("A...	Set Name		out, Used, required
Exposed Population	Include Commuting in Analysis?	YES			HAPEM	in, required
Exposed Population	Input - Activity File		Browse		HAPEM	in, required
Exposed Population	Input - Cluster File		Browse		HAPEM	in, required
Exposed Population	Keep Intermediate Files?	YES				in
Exposed Population	Number of Day Types				HAPEM	in, required
Exposed Population	Number of Demographic Groups				HAPEM	in, required
Exposed Population	Number of Microenvironments				HAPEM	in, required
Exposed Population	Number of Time Blocks for Analysis				HAPEM	in, required
Exposed Population	Number of Time Blocks in the Activity File				HAPEM	in, required
Exposed Population	Output - Counter File		${str("O...	Set Name		out, Used, required
Exposed Population	Output - Log File		${str("O...	Set Name		out, Used, required
Exposed Population	Param File 1	C:\Models\HAPEMtest\param_file.1	Browse			in, required
Exposed Population	SAROAD Pollutant Code				HAPEM	in, required
Exposed Population	Simulation Year				HAPEM	in
Exposed Population	Units				HAPEM	in

[1] See Volume I, Section 3.1 for definitions of common MIMS terminology and Volume I, Section 3.1.8 for information on opening a module instance and specifying parameter values.

Exhibit 4-14. "INDEXPOP" Module Instance Parameters in "HAPEM w. TRIM.Risk - 1 Chemical" Scenario

Module Instance [INDEXPOP] in Scenario [HAPEM w. TRIM.Risk (1 chem)]

File Edit Parameters Help

Module | Parameters

Object Type	Parameter	Value		Additional Typ...	Source	Status
Exposed Population	FIXED NAME - census.county_tract_pop_range		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census.da		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census.state_county_pop_range		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census_direct.ind		${str(...	Set Name		out, Used, required
Exposed Population	Input - Population File		Browse		HAPEM	in, required
Exposed Population	Input - State FIPS File		Browse		HAPEM	in, required
Exposed Population	Keep Intermediate Files?	YES			HAPEM	in
Exposed Population	Number of Demographic Groups				HAPEM	in, required
Exposed Population	Output - Counter File		Browse		HAPEM	inout, required
Exposed Population	Output - Log File		Browse		HAPEM	inout, required
Exposed Population	Param File 1	C:\Models\HAPEMtest\param_file.1	Browse			in, required
Exposed Population	Region 1				HAPEM	in, required
Exposed Population	Region 2				HAPEM	in, required
Exposed Population	Simulation Year				HAPEM	in
Exposed Population	Units				HAPEM	in

Exhibit 4-15. "COMMUTE" Module Instance Parameters in "HAPEM w. TRIM.Risk - 1 Chemical" Scenario

Module Instance [COMMUTE] in Scenario [HAPEM w. TRIM.Risk (1 chem)]

File Edit Parameters Help

Module | Parameters

Object Type	Parameter	Value		Additional Type...	Source	Status
Exposed Population	FIXED NAME - allcomm.da		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - allcomm.ind		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - allcomm.st_comm1_fip_range		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census.county_tract_pop_range		Browse		HAPEM	in, required
Exposed Population	FIXED NAME - census.state_county_pop_range		Browse		HAPEM	in, required
Exposed Population	FIXED NAME - census_direct.ind		Browse		HAPEM	in, required
Exposed Population	Input - Commuting File		Browse		HAPEM	in, required
Exposed Population	Input - Population File		Browse		HAPEM	in, required
Exposed Population	Input - State FIPS File		Browse		HAPEM	in, required
Exposed Population	Keep Intermediate Files?	YES			HAPEM	in
Exposed Population	Output - Counter File		Browse		HAPEM	inout, required
Exposed Population	Output - Log File		Browse		HAPEM	inout, required
Exposed Population	Output - Mistract File		${str("...	Set Name		out, Used, required
Exposed Population	Param File 1	C:\Models\HAPEMtest\param_file.1	Browse			in, required
Exposed Population	Region 1				HAPEM	in, required
Exposed Population	Region 2				HAPEM	in, required
Exposed Population	SAROAD Pollutant Code				HAPEM	in, required
Exposed Population	Simulation Year				HAPEM	in
Exposed Population	Units				HAPEM	in

Exhibit 4-16. "AIRQUAL" Module Instance Parameters in "HAPEM w. TRIM.Risk - 1 Chemical" Scenario

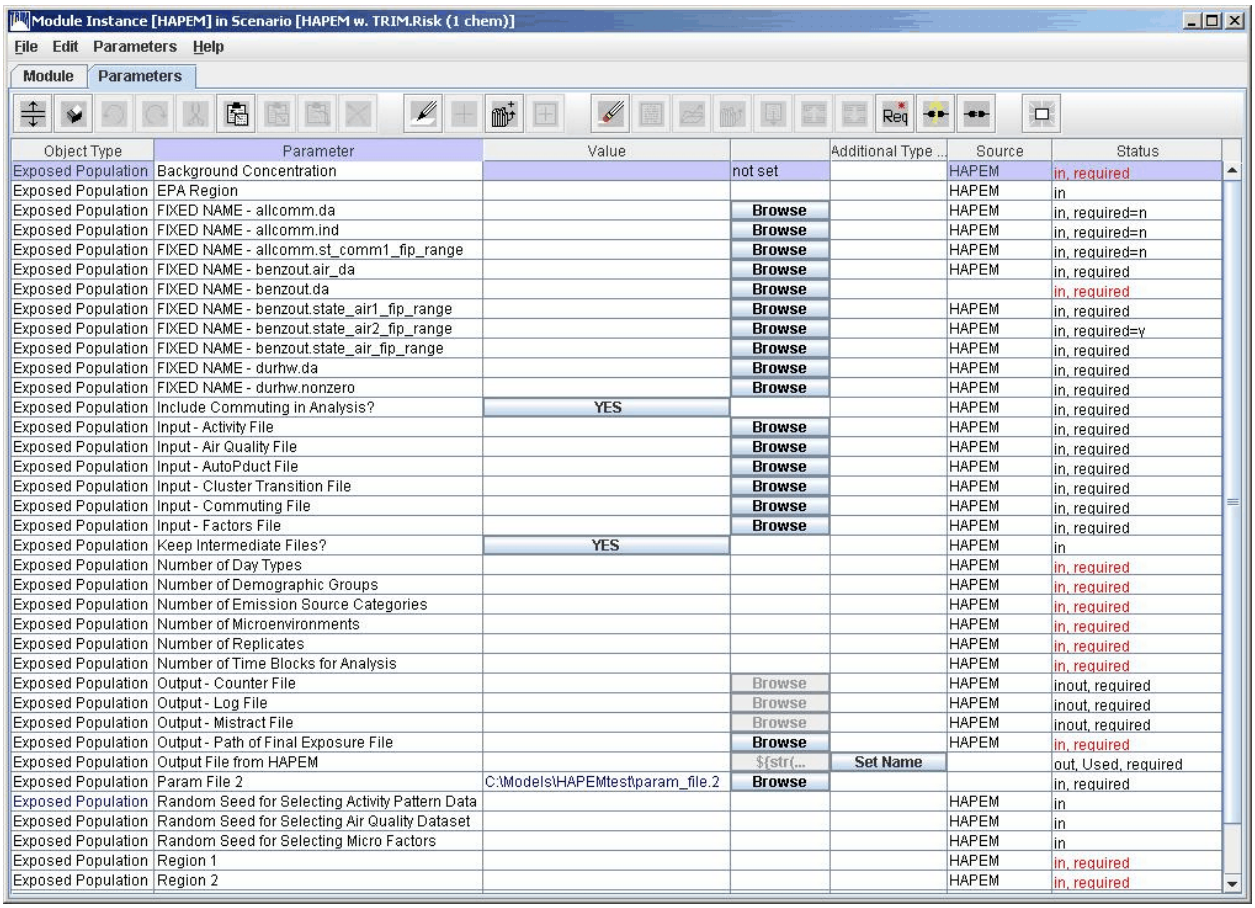
Module Instance [AIRQUAL] in Scenario [HAPEM w. TRIM.Risk (1 chem)]

File Edit Parameters Help

Module | Parameters

Object Type	Parameter	Value		Additional Type...	Source	Status
Exposed Population	EPA Region				HAPEM	in
Exposed Population	FIXED NAME - benzout.air_da		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - benzout.da		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - benzout.pop_air_da		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - benzout.state_air1_fip_range		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - benzout.state_air2_fip_range		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - benzout.state_air_fip_range		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census.da		Browse		HAPEM	in, required
Exposed Population	FIXED NAME - census_direct.ind		Browse		HAPEM	in, required
Exposed Population	Include Commuting in Analysis?	YES			HAPEM	in, required
Exposed Population	Input - Air Quality File		Browse		HAPEM	in, required
Exposed Population	Input - Population File		Browse		HAPEM	in, required
Exposed Population	Input - State FIPS File		Browse		HAPEM	in, required
Exposed Population	Keep Intermediate Files?	YES			HAPEM	in
Exposed Population	Number of Demographic Groups				HAPEM	in, required
Exposed Population	Number of Emission Source Categories				HAPEM	in, required
Exposed Population	Number of Replicates				HAPEM	in, required
Exposed Population	Number of Time Blocks for Analysis				HAPEM	in, required
Exposed Population	Output - Counter File		Browse		HAPEM	inout, required
Exposed Population	Output - Log File		Browse		HAPEM	inout, required
Exposed Population	Output - Mistract File		Browse		HAPEM	inout, required
Exposed Population	Param File 2	C:\Models\HAPEMtest\param_file.2	Browse			in, required
Exposed Population	Region 1				HAPEM	in, required
Exposed Population	Region 2				HAPEM	in, required
Exposed Population	SAROAD Pollutant Code				HAPEM	in, required
Exposed Population	Simulation Year				HAPEM	in
Exposed Population	Units				HAPEM	in

Exhibit 4-17. "HAPEM" Module Instance Parameters in "HAPEM w. TRIM.Risk - 1 Chemical" Scenario



Object Type	Parameter	Value		Additional Type ...	Source	Status
Exposed Population	Background Concentration		not set		HAPEM	in, required
Exposed Population	EPA Region				HAPEM	in
Exposed Population	FIXED NAME - allcomm.da		Browse		HAPEM	in, required=n
Exposed Population	FIXED NAME - allcomm.ind		Browse		HAPEM	in, required=n
Exposed Population	FIXED NAME - allcomm.st_comm1_fip_range		Browse		HAPEM	in, required=n
Exposed Population	FIXED NAME - benzout.air_da		Browse		HAPEM	in, required
Exposed Population	FIXED NAME - benzout.da		Browse			in, required
Exposed Population	FIXED NAME - benzout.state_air1_fip_range		Browse		HAPEM	in, required
Exposed Population	FIXED NAME - benzout.state_air2_fip_range		Browse		HAPEM	in, required=y
Exposed Population	FIXED NAME - benzout.state_air_fip_range		Browse		HAPEM	in, required
Exposed Population	FIXED NAME - durhw.da		Browse		HAPEM	in, required
Exposed Population	FIXED NAME - durhw.nonzero		Browse		HAPEM	in, required
Exposed Population	Include Commuting in Analysis?	YES			HAPEM	in, required
Exposed Population	Input - Activity File		Browse		HAPEM	in, required
Exposed Population	Input - Air Quality File		Browse		HAPEM	in, required
Exposed Population	Input - AutoPduct File		Browse		HAPEM	in, required
Exposed Population	Input - Cluster Transition File		Browse		HAPEM	in, required
Exposed Population	Input - Commuting File		Browse		HAPEM	in, required
Exposed Population	Input - Factors File		Browse		HAPEM	in, required
Exposed Population	Keep Intermediate Files?	YES			HAPEM	in
Exposed Population	Number of Day Types				HAPEM	in, required
Exposed Population	Number of Demographic Groups				HAPEM	in, required
Exposed Population	Number of Emission Source Categories				HAPEM	in, required
Exposed Population	Number of Microenvironments				HAPEM	in, required
Exposed Population	Number of Replicates				HAPEM	in, required
Exposed Population	Number of Time Blocks for Analysis				HAPEM	in, required
Exposed Population	Output - Counter File		Browse		HAPEM	inout, required
Exposed Population	Output - Log File		Browse		HAPEM	inout, required
Exposed Population	Output - Mistract File		Browse		HAPEM	inout, required
Exposed Population	Output - Path of Final Exposure File		Browse		HAPEM	in, required
Exposed Population	Output File from HAPEM		${str(...	Set Name		out, Used, required
Exposed Population	Param File 2	C:\Models\HAPEMtest\param_file.2	Browse			in, required
Exposed Population	Random Seed for Selecting Activity Pattern Data				HAPEM	in
Exposed Population	Random Seed for Selecting Air Quality Dataset				HAPEM	in
Exposed Population	Random Seed for Selecting Micro Factors				HAPEM	in
Exposed Population	Region 1				HAPEM	in, required
Exposed Population	Region 2				HAPEM	in, required

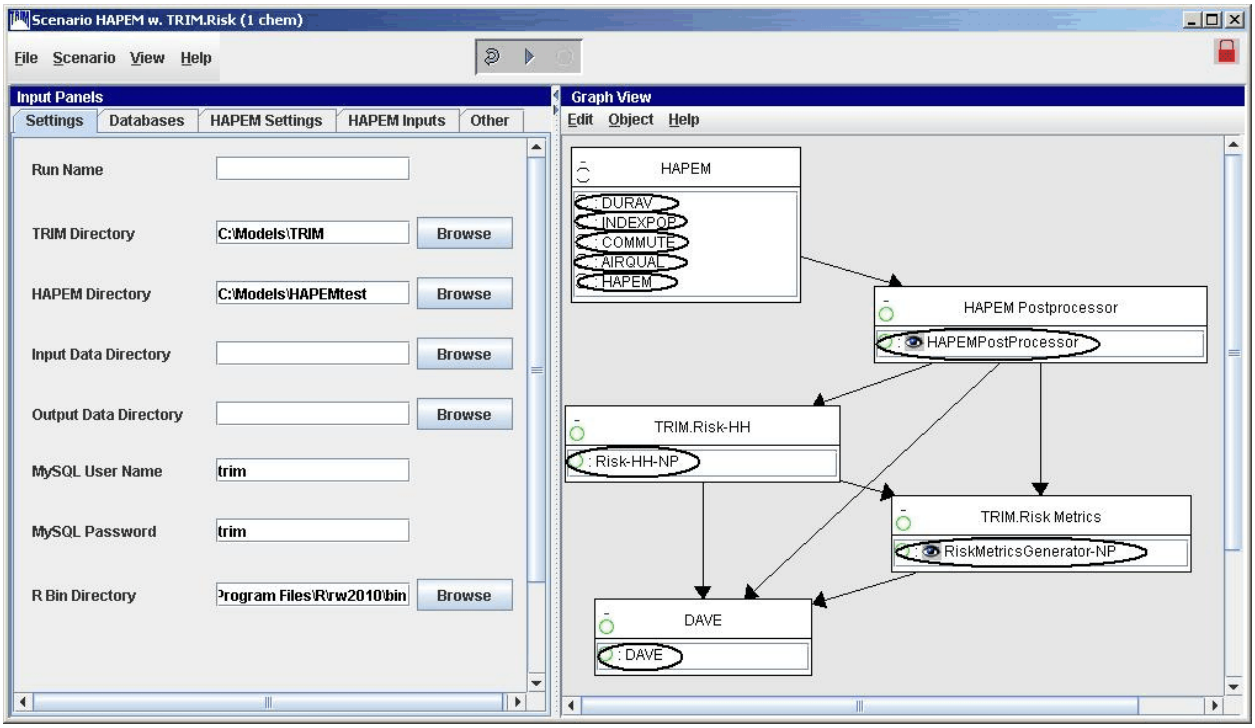
Step 4 Set Any Additional Parameters

In most cases, users will not be required to set any parameters beyond those in the "Input Panels" and in "DURAV," "INDEXPOP," "COMMUTE," "AIRQUAL," and "HAPEM." However, in some applications users may find it necessary to view or edit additional parameters. To access the scenario parameters table, select "Edit Parameter Values" from the "Scenario" menu of the scenario window. Access the parameters table for individual module instances by double-clicking on a module instance name in the "Graph View" pane to open that module instance window (Exhibit 4-18 shows circled module instance names). On the "Parameters" tab, set values by typing in the "Value" column, selecting an option from a drop-down menu, or selecting the "Browse" button to locate the file. Note that this step may not be required for some applications. No user interaction is required on the "Module" tab.

Refer to: Appendix D, Scenario Parameters

Appendix E, Module Instance Parameters

Exhibit 4-18. Module Instances in "HAPEM w. TRIM.Risk - 1 Chemical" Scenario



Step 5 Start the Scenario

Run the scenario by selecting "Execute Ready Modules" from the "Scenario" menu of the scenario window or clicking on the "play" button ( ) at the top of the scenario window.

Refer to: Volume I, Section 3.1.9, Running a MIMS Scenario

Appendix G, Troubleshooting

Step 6 Set Up the HAPEMPostProcessor

The HAPEM5 Post-Processor GUI will automatically open in MIMS as the run is executing to allow the user to select the HAPEM output files and databases used to create the HAPEM output database. Select the appropriate inputs and click "Validate" to verify the selections. Then, click "Exit" to exit the GUI and continue running the scenario.

Refer to: Section 5.3.2, HAPEM PostProcessor

Step 7 Specify Inputs and Run TRIM.Risk Metrics Generator

The TRIM.Risk$_{HH}$ Inhalation Metrics GUI will open automatically in MIMS as the run is executing to allow the user to specify inputs used to generate risk metrics. Only one set of metrics is generated with each run. Additional risk metrics may be generated from the same TRIM.Risk output database using the "TRIM.Risk Metrics" scenario. However, these additional metrics cannot be added to an existing database.[2]

Select the desired risk metrics and set the required inputs on the numbered tabs in the TRIM.Risk$_{HH}$ Inhalation Metrics GUI (the required inputs are described in detail in Section 5.4.2). Then click "Validate" to verify the selections and click "Save and Exit" to exit the GUI and continue the scenario.

Refer to: Section 5.4.2, TRIM.Risk Metrics Generator

Chapter 2, Risk Calculations

Appendix A, Human Health Risk Metrics

Step 8 Run DAVE

Unless the user specified a change to the TRIM database type in Step 2e, the DAVE GUI will open in MIMS after the risk metrics database has been created. If another type of TRIM database was selected, the DAVE GUI will open after that database has been created.

DAVE can be used to generate tables and charts of exposure estimates, risk estimates, and risk metrics, or to create delimited text exports of results. Exported results can then be further analyzed off-line after they have been imported into a spreadsheet or other data analysis software. Alternatively, risk estimates can be retrieved directly from the database using MySQL queries.

Refer to: Section 5.5, DAVE

Volume I, Section 3.3, Basic Operations with DAVE

DAVE User's Guide

[2] To prevent an existing risk metrics database from being overwritten, users will need to select a new database name on the first tab of the TRIM.Risk$_{HH}$ Inhalation Metrics GUI.

4.3 HAPEM with TRIM.Risk for Multiple Chemicals

This section describes the steps required to run the "**HAPEM w. TRIM.Risk (>1 chem)**" MIMS scenario. This scenario allows the user to employ HAPEM and TRIM.Risk to perform an inhalation exposure and risk assessment using multiple sets of concentration data. ***To run this scenario, the user must have HAPEM inputs available in the required format.*** Details regarding HAPEM inputs and associated formatting requirements are presented in the HAPEM5 User's Guide available on the EPA FERA website (http://www.epa.gov/ttn/fera/human_hapem.html).

When Should I Run This Scenario?

This scenario is designed to be used when a combined inhalation exposure and risk assessment is carried out (i.e., the exposure and risk models are run consecutively in a single application) for more than one set of ambient concentration values. This MIMS scenario includes an iterator that reruns HAPEM using a different set of inputs for each run, making it possible to generate exposure and risk estimates for more than one chemical within one scenario. The user will need to ensure that the concentration data sets are formatted correctly according to the requirements of HAPEM. The scenario produces outputs specific to each of the data sets (e.g., chemical, source, etc.) as well as outputs representative of the aggregated risks.

This MIMS scenario includes an iterator that reruns HAPEM using a different set of inputs for each run, making it possible to generate exposure and risk estimates for more than one chemical within one scenario. Due to the requirements of the iterator, the HAPEM model has been separated into two parts for this scenario (for more information on the different HAPEM components, see Section 5.3.1). The steps required to run this scenario are presented below. For names of the domain objects and module instances in this scenario, refer to Appendix C.2.

Step 1 Open the "HAPEM w. TRIM.Risk (>1 chem)" Scenario in MIMS

Start MIMS by navigating to the Start menu, Programs, TRIM, and selecting "TRIM" or by double-clicking on "runtrim.bat" in Windows Explorer. Open the "Inhalation risk assessment using RfCs and UREs, with HAPEM" MIMS project and then the "HAPEM w. TRIM.Risk (>1 chem)" scenario in MIMS.

Refer to: Volume I, Section 3.1.4, Opening a MIMS Project

Volume I, Section 3.1.6, Opening, Duplicating, Renaming or Deleting a MIMS Scenario

Step 2 Complete the Input Panels

Parameters are set via the tabs located on the "Input Panels" pane, as described in Steps 2a through 2e. The "Input Panels" present those parameters that are most likely to require attention from users (see Exhibits 4-19 through 4-28). Note that some of these parameters will have been set by the user during the installation of TRIM. Users should use caution when making changes to any preset parameter values.

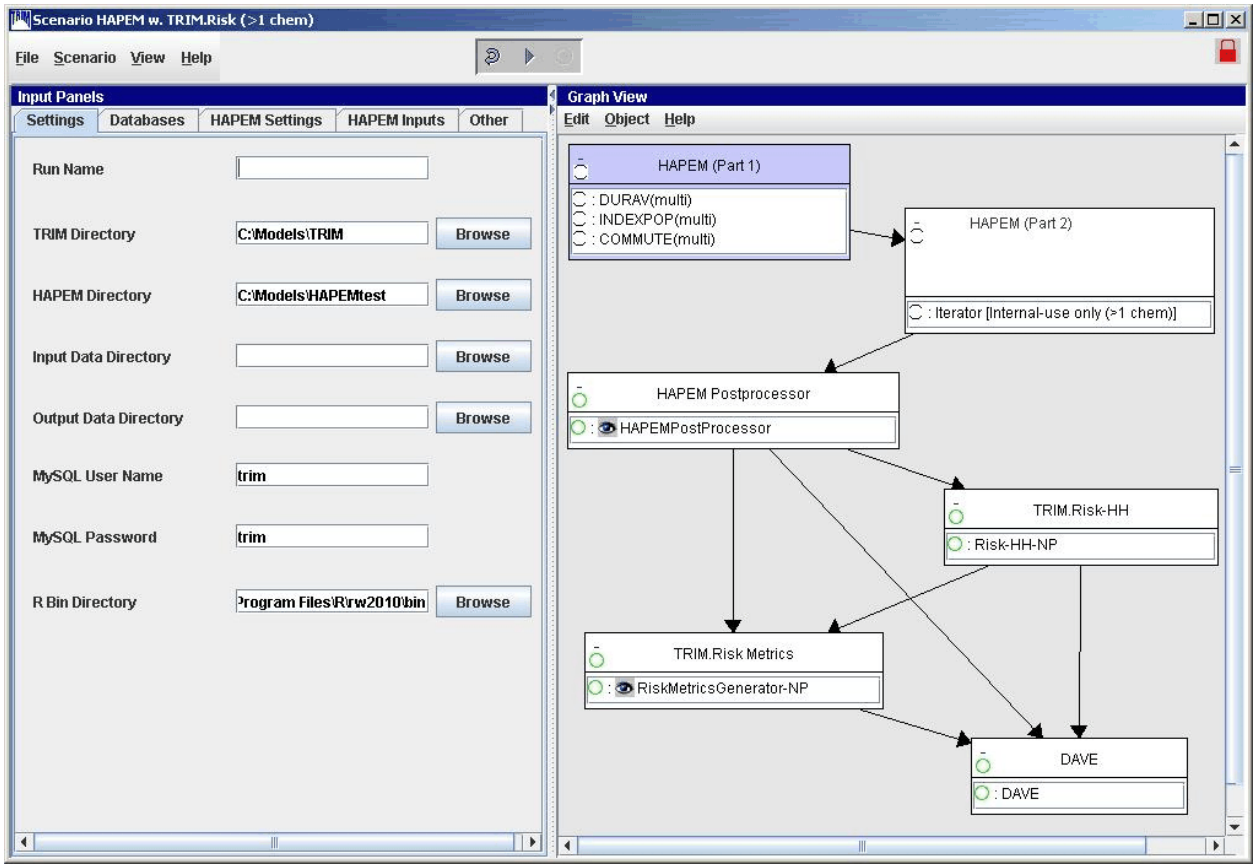
Step 2a Set Parameters on "Settings" Tab

Click on the "Settings" tab. The parameters that can be set on this tab are listed in Exhibits 4-19 and 4-20. Set parameters by typing in a value or clicking the "Browse" button next to the parameter field and selecting the desired file or directory.

Exhibit 4-19. Parameters on "Settings" Tab of "HAPEM w. TRIM.Risk - More than 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Run Name	–	No	Name of the unique scenario run.
TRIM Directory	–	No	Name and location of the TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).
HAPEM Directory	–	Yes	Name and location of the directory containing the HAPEM executable.
Input Data Directory	–	No	Name and location of the directory containing the input files for HAPEM.
Output Data Directory	–	No	Name and location of the directory containing the HAPEM output files.
MySQL User Name	–	Yes	User name for access to the MySQL databases created or used for the TRIM.Risk projects.
MySQL Password	–	Yes	Password for access to the MySQL databases created or used for the TRIM.Risk projects.
R Bin Directory	–	Yes	Location of the bin directory for the R program.

Exhibit 4-20. "Settings" Tab of "HAPEM w. TRIM.Risk - More than 1 Chemical" Scenario



Step 2b **Set Parameters on "Databases" Tab**

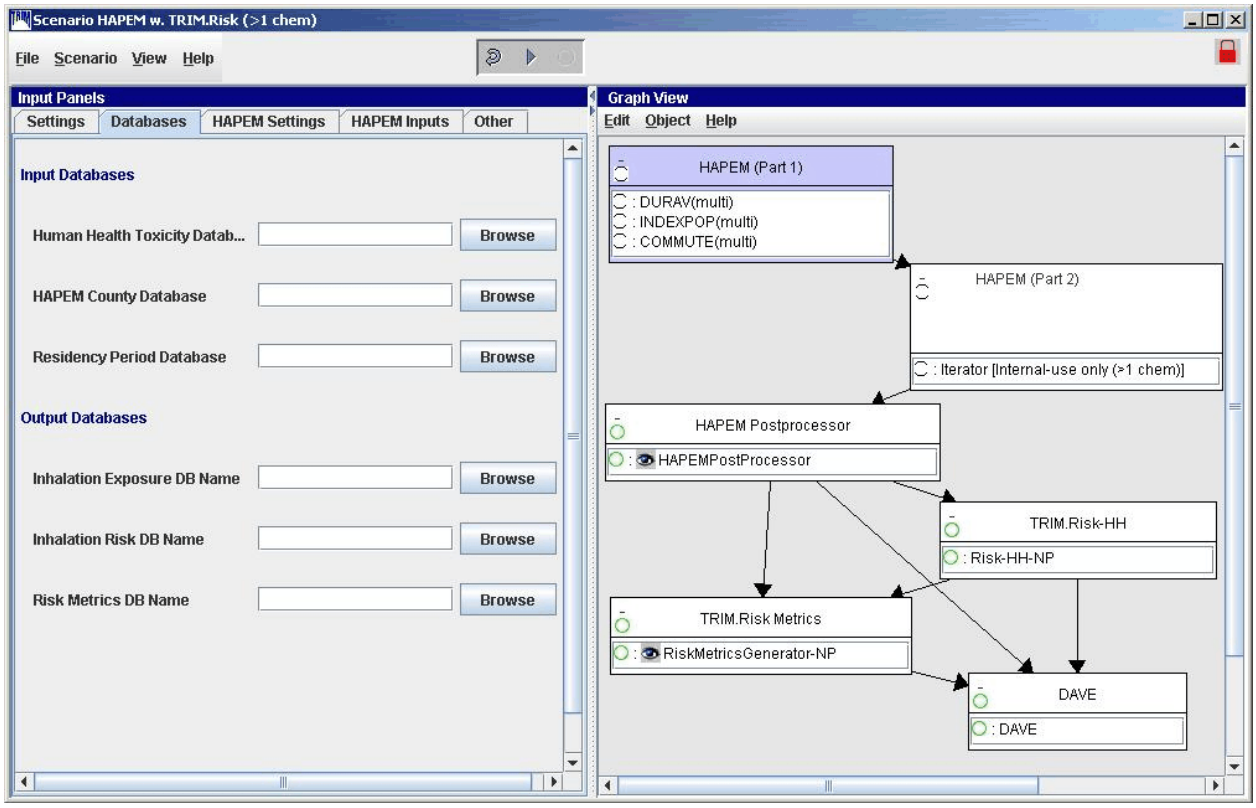
Click on the "Databases" tab. The parameters that can be set on this tab are listed in Exhibits 4-21 and 4-22. Set parameters by typing in each database name.

Exhibit 4-21. Parameters on "Databases" Tab of "HAPEM w. TRIM.Risk - More than 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Input Databases			
Human Health Toxicity Database	–	No	The name of the database containing chemical-specific information on human health effects.
HAPEM County Database	–	No	The name of the database containing the HAPEM County/State data.

Parameter Name	Default Value	Set via Installer?	Description
Residency Period Database	–	No	The name of the database containing residency period data.
Output Databases			
Inhalation Exposure DB Name	–	No	The name of the database with inhalation exposure estimates generated by HAPEM.
Inhalation Risk DB Name	–	No	The name of the database with inhalation risk estimates generated by TRIM.Risk$_{HH-NP}$.
Risk Metrics DB Name	–	No	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.

Exhibit 4-22. "Databases" Tab of "HAPEM w. TRIM.Risk - More than 1 Chemical" Scenario



Step 2c **Set Parameters on "HAPEM Settings" Tab**

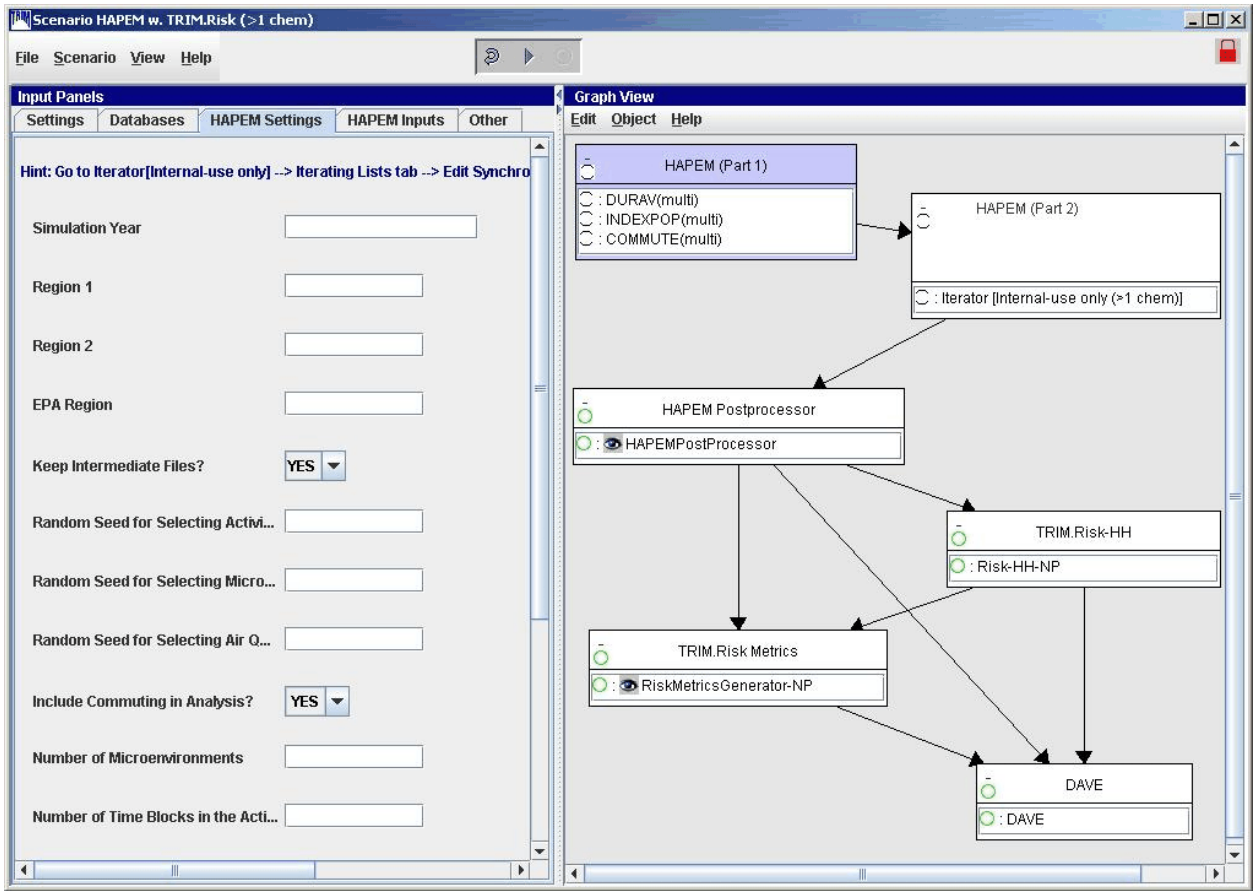
Click on the "HAPEM Settings" tab. The parameters that can be set on this tab are listed in Exhibits 4-23 and 4-24. Set parameters by typing in a value or selecting an option from a drop-down menu.

Exhibit 4-23. Parameters on "HAPEM Settings" Tab of "HAPEM w. TRIM.Risk - More than One Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Simulation Year	–	No	The year to be simulated by the model run (the year of the air quality data).
Region 1	–	No	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).
Region 2	–	No	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).
EPA Region	–	No	The EPA region number of indoor emission source data.
Keep Intermediate Files?	Yes	No	Indicates whether temporary files generated by the HAPEM programs during execution are preserved or deleted upon completion of HAPEM.
Random Seed for Selecting Activity Pattern Data	–	No	Allows for the random selection of activity pattern data for analysis. Using the same random seed for two simulations for the same scenario will select the same activity pattern data.
Random Seed for Selecting Micro Factors	–	No	Allows for the random selection of microenvironment factors for analysis. Using the same random seed for two simulations for the same scenario will select the same microenvironment factors.
Random Seed for Selecting Air Quality Dataset	–	No	Allows for the random selection of air quality data for analysis. Using the same random seed for two simulations for the same scenario will select the same air quality data.
Include Commuting in Analysis?	Yes	No	Specifies whether commuting will be included in the analysis (input in the parameter files of DURAV and HAPEM).
Number of Microenvironments	–	No	The number of microenvironments in both the Activity file and Factors file.
Number of Time Blocks in the Activity File	–	No	The number of time blocks in the Activity file.

Parameter Name	Default Value	Set via Installer?	Description
Number of Time Blocks for Analysis	–	No	The number of time blocks for the analysis; may be less than or equal to the number of time blocks in the Activity file, but must be an integral factor of the number of time blocks in the Activity file.
Number of Day Types	–	No	The number of day types (input in the parameter files of DURAV and HAPEM).
Number of Demographic Groups	–	No	The number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).
Number of Emission Source Categories	–	No	The number of outdoor emission source categories, which must match the number in the Factors file (input in the parameter files of AIRQUAL and HAPEM).
Number of Replicates	–	No	The number of replicates for each demographic group/tract.

Exhibit 4-24. "HAPEM Settings" Tab of "HAPEM w. TRIM.Risk - More than One Chemical" Scenario



Step 2d **Set Parameters on "HAPEM Inputs" Tab**

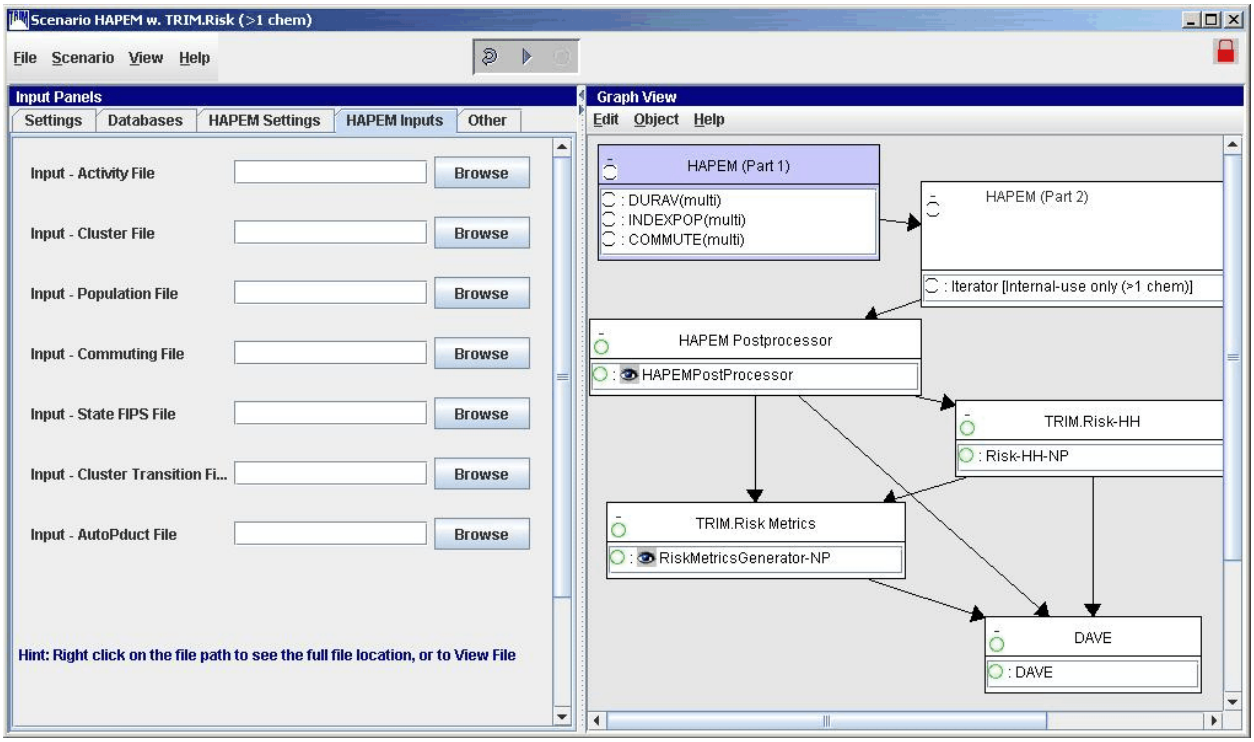
Click on the "HAPEM Inputs" tab. The parameters that can be set on this tab are listed in Exhibits 4-25 and 4-26. Set parameters by typing in a value or clicking the "Browse" button next to the parameter field and selecting the desired file.

Exhibit 4-25. Parameters on "HAPEM Inputs" Tab of "HAPEM w. TRIM.Risk - More than 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Activity File	–	No	Describes the amount of time spent in various microenvironments by individuals; the total number of minutes spent in each microenvironment during each time block throughout the day.
Cluster File	–	No	Specifies the cluster category for each CHAD record, identified by the CHAD identification code.

Parameter Name	Default Value	Set via Installer?	Description
Population File	–	No	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.
Commuting File	–	No	Identifies the tract of work and tract of residence for individuals.
State FIPS File	–	No	Supplies the state FIPS, county FIPS, and tract code for the Population file data.
Cluster Transition File	–	No	Specifies the number of activity patterns in each group of two to three clusters and cluster-to-cluster transition probabilities for each demographic group/day type combination.
AutoPduct File	–	No	The full path name of any existing file (except other HAPEM input or output files) must be specified as the AutoPduct file. In the future this file will comprise part of the input for evaluating indoor source algorithms. Currently, the file is not utilized by the HAPEM program.

Exhibit 4-26. "HAPEM Inputs" Tab of "HAPEM w. TRIM.Risk - More than 1 Chemical" Scenario



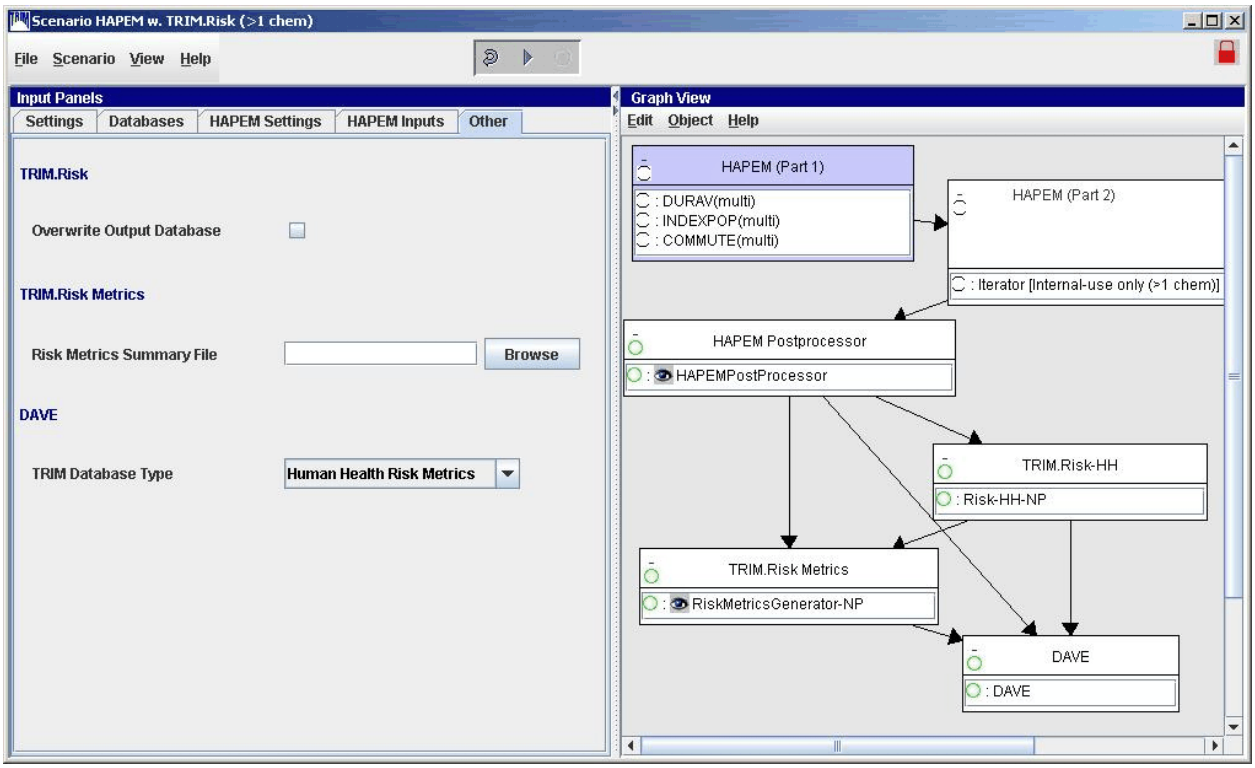
Step 2e **Set Parameters on "Other" Tab**

Click on the "Other" tab. The parameters that can be set on this tab are listed in Exhibits 4-27 and 4-28. Set parameters by typing in a value, clicking the "Browse" button next to the parameter field and selecting the desired file or directory, selecting an option from a drop-down menu, or clicking on a check box.

Exhibit 4-27. Parameters on "Other" Tab of "HAPEM w. TRIM.Risk - More than 1 Chemical" Scenario

Parameter Name	Default Value	Set via Installer?	Description
TRIM.Risk$_{HH-NP}$			
Overwrite Output Database	No	No	If yes, an output database previously generated by TRIM.Risk$_{HH-NP}$ will be overwritten if a new database is specified with an identical name.
TRIM.Risk Metrics			
Risk Metrics Summary File	–	No	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.
DAVE			
TRIM Database Type	Human Health Risk Metrics	No	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.

Exhibit 4-28. "Other" Tab of "HAPEM w. TRIM.Risk - More than 1 Chemical" Scenario



Step 3 Set "HAPEM (Part 1)" Parameters

For more options (beyond those provided on the "Input Panels") in setting up HAPEM, the user will need to specify "DURAV(multi)," "INDEXPOP(multi)," and "COMMUTE(multi)" parameters. Access the parameters table for a module instance by double-clicking on that module name (e.g., "DURAV(multi)") in the "Graph View" pane to open that module instance window.[3] On the "Parameters" tab, set values by typing in the "Value" column or selecting the "Browse" button to locate the file (Exhibits 4-29 through 4-31). Specific parameters are listed and described in Appendix E. No user interaction is required on the "Module" tab.

Refer to: Section 5.3.1, HAPEM

Appendix E, Module Instance Parameters

HAPEM5 User's Guide

[3] See Volume I, Section 3.1 for definitions of common MIMS terminology and Volume I, Section 3.1.8 for information on opening a module instance and specifying parameter values.

Exhibit 4-29. "DURAV" Module Instance Parameters in "HAPEM w. TRIM.Risk - More than One Chemical" Scenario

Module Instance [DURAV(multi)] in Scenario [HAPEM w. TRIM.Risk (>1 chem)]

File Edit Parameters Help

Module | Parameters

Object Type	Parameter	Value		Additional Typ...	Source	Status
Exposed Population	Counter File DURAV		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - durhw.da		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - durhw.nonzero		${str("...	Set Name		out, Used, required
Exposed Population	FIXED NAME - durhw.wrong_chad		${str("...	Set Name		out, Used, required
Exposed Population	Include Commuting in Analysis?	YES			HAPEM w. TRIM.Risk ...	in, required
Exposed Population	Input - Activity File		Browse		HAPEM w. TRIM.Risk ...	in, required
Exposed Population	Input - Cluster File		Browse		HAPEM w. TRIM.Risk ...	in, required
Exposed Population	Keep Intermediate Files?	Not Set				in
Exposed Population	Log File DURAV		${str("...	Set Name		out, Used, required
Exposed Population	Number of Day Types				HAPEM w. TRIM.Risk ...	in, required
Exposed Population	Number of Demographic Groups				HAPEM w. TRIM.Risk ...	in, required
Exposed Population	Number of Microenvironments				HAPEM w. TRIM.Risk ...	in, required
Exposed Population	Number of Time Blocks for Analysis				HAPEM w. TRIM.Risk ...	in, required
Exposed Population	Number of Time Blocks in the Activity File				HAPEM w. TRIM.Risk ...	in, required
Exposed Population	Param File 1	C:\Models\HAPEMtest\param_file.1	Browse			in, required
Exposed Population	Simulation Year					in
Exposed Population	Units					in

Exhibit 4-30. "INDEXPOP" Module Instance Parameters in "HAPEM w. TRIM.Risk - More than One Chemical" Scenario

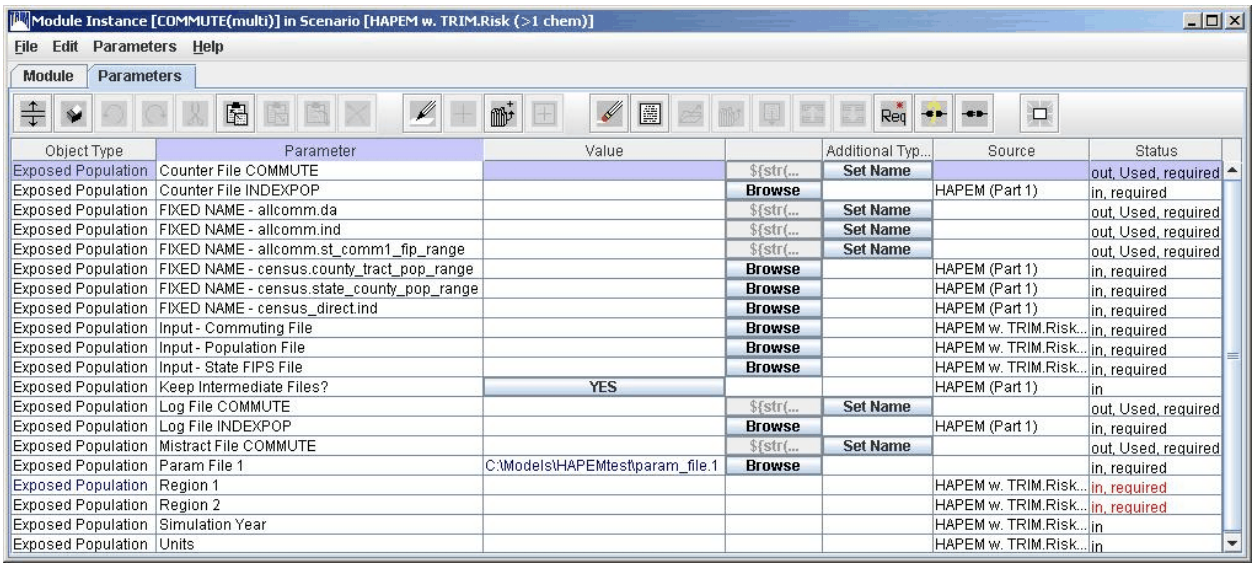
Module Instance [INDEXPOP(multi)] in Scenario [HAPEM w. TRIM.Risk (>1 chem)]

File Edit Parameters Help

Module | Parameters

Object Type	Parameter	Value		Additional Typ...	Source	Status
Exposed Population	Counter File DURAV		Browse		HAPEM (Part 1)	in, required
Exposed Population	Counter File INDEXPOP		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census.county_tract_pop_range		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census.da		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census.state_county_pop_range		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census_direct.ind		${str(...	Set Name		out, Used, required
Exposed Population	Input - Population File		Browse		HAPEM w. TRIM....	in, required
Exposed Population	Input - State FIPS File		Browse		HAPEM w. TRIM....	in, required
Exposed Population	Keep Intermediate Files?	YES			HAPEM w. TRIM....	in
Exposed Population	Log File DURAV		Browse		HAPEM (Part 1)	in, required
Exposed Population	Log File INDEXPOP		${str(...	Set Name		out, Used, required
Exposed Population	Number of Demographic Groups				HAPEM w. TRIM....	in, required
Exposed Population	Param File 1	C:\Models\HAPEMtest\param_file.1	Browse			in, required
Exposed Population	Region 1				HAPEM w. TRIM....	in, required
Exposed Population	Region 2				HAPEM w. TRIM....	in, required
Exposed Population	Simulation Year				HAPEM w. TRIM....	in
Exposed Population	Units				HAPEM w. TRIM....	in

Exhibit 4-31. "COMMUTE" Module Instance Parameters in "HAPEM w. TRIM.Risk - More than One Chemical" Scenario



Object Type	Parameter	Value		Additional Typ...	Source	Status
Exposed Population	Counter File COMMUTE		${str(...	Set Name		out, Used, required
Exposed Population	Counter File INDEXPOP		Browse		HAPEM (Part 1)	in, required
Exposed Population	FIXED NAME - allcomm.da		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - allcomm.ind		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - allcomm.st_comm1_fip_range		${str(...	Set Name		out, Used, required
Exposed Population	FIXED NAME - census.county_tract_pop_range		Browse		HAPEM (Part 1)	in, required
Exposed Population	FIXED NAME - census.state_county_pop_range		Browse		HAPEM (Part 1)	in, required
Exposed Population	FIXED NAME - census_direct.ind		Browse		HAPEM (Part 1)	in, required
Exposed Population	Input - Commuting File		Browse		HAPEM w. TRIM.Risk...	in, required
Exposed Population	Input - Population File		Browse		HAPEM w. TRIM.Risk...	in, required
Exposed Population	Input - State FIPS File		Browse		HAPEM w. TRIM.Risk...	in, required
Exposed Population	Keep Intermediate Files?	YES			HAPEM (Part 1)	in
Exposed Population	Log File COMMUTE		${str(...	Set Name		out, Used, required
Exposed Population	Log File INDEXPOP		Browse		HAPEM (Part 1)	in, required
Exposed Population	Mistract File COMMUTE		${str(...	Set Name		out, Used, required
Exposed Population	Param File 1	C:\Models\HAPEMtest\param_file.1	Browse			in, required
Exposed Population	Region 1				HAPEM w. TRIM.Risk...	in, required
Exposed Population	Region 2				HAPEM w. TRIM.Risk...	in, required
Exposed Population	Simulation Year				HAPEM w. TRIM.Risk...	in
Exposed Population	Units				HAPEM w. TRIM.Risk...	in

Step 4 Set "HAPEM (Part 2)" Parameters

Next, the user will need to specify the parameters for "Iterator [Internal-use only (> 1 chem)])." Access the Iterator [Internal-use only (> 1 chem)]) parameters table by double-clicking on "Iterator [Internal-use only (> 1 chem)])" in the "Graph View" pane. This opens the Iterator [Internal-use only (> 1 chem)]) module instance window. On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, or selecting the "Browse" button to locate the file (Exhibit 4-32). Click on the "Iterating Lists" tab to set parameters for chemical profiles. This window displays the lists of input parameters to be iterated over (Exhibit 4-33). To see which profile input parameters are associated with and to edit these values, select the "Edit Synchronized Lists" button. (Edits can also be made to input lists of parameters on the "Iterating Lists" tab by clicking "Edit," but this is not the recommended method.) Specific parameters are listed and described in Section 5.2.1. No user interaction is required on the "Module" tab.

Refer to: Section 5.3.1, HAPEM

Appendix E, Module Instance Parameters

HAPEM5 User's Guide

Exhibit 4-32. "Iterator [Internal-use only (> 1 chem)])" Module Instance Parameters in "HAPEM w. TRIM.Risk - More than One Chemical" Scenario

Module Instance [Iterator] in Scenario [HAPEM w. TRIM.Risk (>1 chem)]

File Edit Parameters Help

Iterating Lists | Module | Parameters

Object Type	Parameter	Value		Source	Status
	Activity Pattern Directory	\Activity Pattern	Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
	Additional Input Directory	\Add	Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
	Air Quality Directory	\airqual	Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
	Commuting Directory	\commute	Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Counter File COMMUTE		Browse	HAPEM (Part 1)	in
Exposed Population	Counter File Name	\counter.dat	Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
	Create Output Directories	☑		HAPEM w. TRIM.Risk (>1 chem)	in
	Default Directory	C:\Models\TRIM\logs\HAPEMWRiskmult	Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
	Delete Generated Batch Files	☐		HAPEM w. TRIM.Risk (>1 chem)	in
	Delete Generated Input Files	☐		HAPEM w. TRIM.Risk (>1 chem)	in
	Delete Intermediate Files When Done	☐		HAPEM w. TRIM.Risk (>1 chem)	in
	Delete Old Output Files	☐		HAPEM w. TRIM.Risk (>1 chem)	in
	Delete Unused Final Files	☐		HAPEM w. TRIM.Risk (>1 chem)	in
Exposed Population	EPA Region			HAPEM w. TRIM.Risk (>1 chem)	in
	Execution Method	Local Execution	Edit	HAPEM w. TRIM.Risk (>1 chem)	in
	Execution Path		Browse	HAPEM w. TRIM.Risk (>1 chem)	in
Exposed Population	FIXED NAME - allcomm.da		Browse	HAPEM (Part 1)	in
Exposed Population	FIXED NAME - allcomm.ind		Browse	HAPEM (Part 1)	in
Exposed Population	FIXED NAME - allcomm.st_comm1_fip_range		Browse	HAPEM (Part 1)	in
Exposed Population	FIXED NAME - census.da		Browse	HAPEM (Part 1)	in
Exposed Population	FIXED NAME - census_direct.ind		Browse	HAPEM (Part 1)	in
Exposed Population	FIXED NAME - durhw.da		Browse	HAPEM (Part 1)	in
Exposed Population	FIXED NAME - durhw.nonzero		Browse	HAPEM (Part 1)	in
	Factors Directory	\factor	Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
	HAPEM Directory	C:\Models\HAPEMtest	Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Include Commuting in Analysis?	YES		HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Input - Activity File		Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Input - AutoPduct File		Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Input - Cluster Transition File		Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Input - Commuting File		Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Input - Population File		Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Input - State FIPS File		Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
	Input Data Directory		Browse	HAPEM w. TRIM.Risk (>1 chem)	in, required
Exposed Population	Keep Intermediate Files?	YES		HAPEM w. TRIM.Risk (>1 chem)	in
	Keep Module Logs	Yes		HAPEM w. TRIM.Risk (>1 chem)	in
Exposed Population	Log File COMMUTE		Browse	HAPEM (Part 1)	in

Exhibit 4-33. "Iterator [Internal-use only (> 1 chem)])" Iterating Lists Parameters in "HAPEM w. TRIM.Risk - More than One Chemical" Scenario

Module Instance [Iterator] in Scenario [HAPEM w. TRIM.Risk (>1 chem)]

File Edit Parameters Help

Iterating Lists | Module | Parameters

Edit Synchronized Lists | Display Iterating Sets

Object Type	Parameter	Value		Source	Status
	input list of Background Concentration	List of 0	Edit		in, required,*
	input list of Input - Air Quality File	List of 0	Edit		in, required,*
	input list of Input - Factors File	List of 0	Edit		in, required,*
	input list of SAROAD Pollutant Code	List of 0	Edit		in, required,*
	input list of Units	List of 0	Edit		in,*
	output list of Output - Path of Final Exposure File	Empty List	Edit		Used, out, required,*
	output list of SAROAD Pollutant Code	Empty List	Edit		Used, out, required,*
	output list of Units	Empty List	Edit		Used, out,*

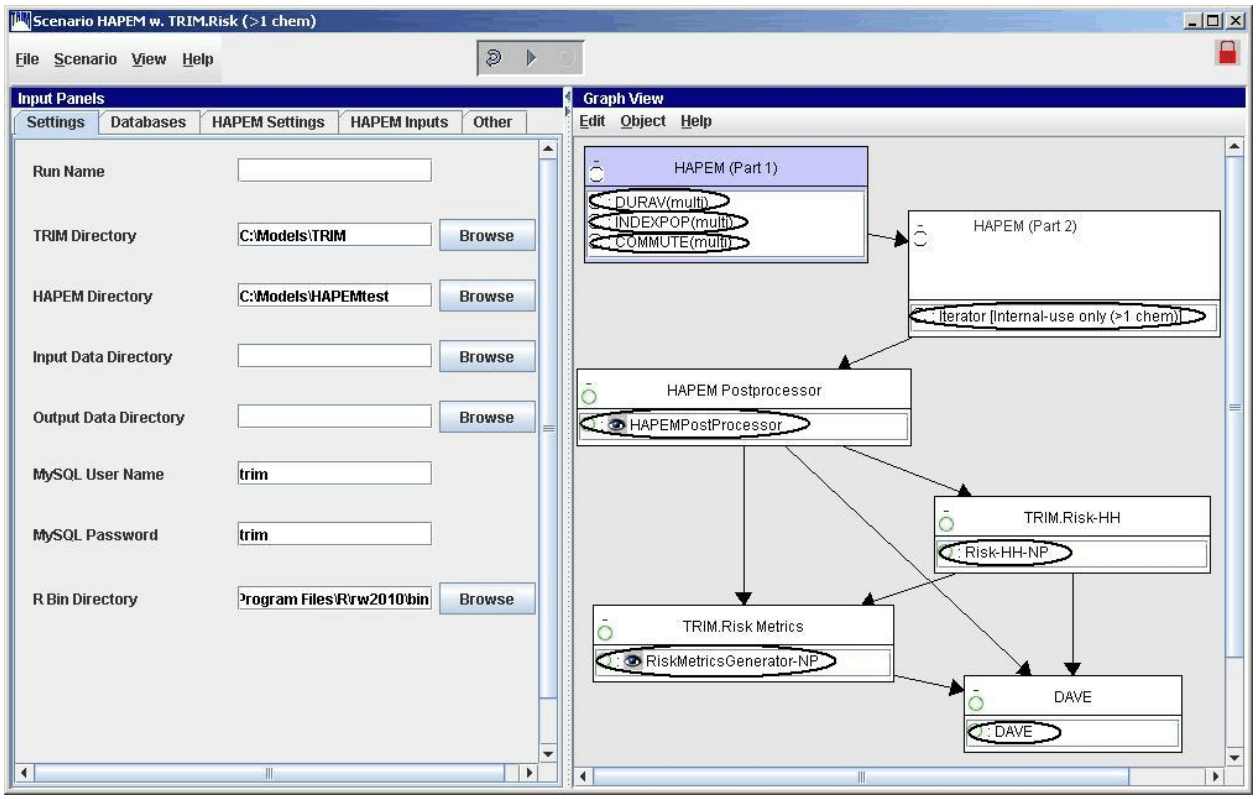
Step 5 Set Any Additional Parameters

In most cases, users will not be required to set any parameters beyond those in the "Input Panels" and "DURAV," "AIRQUAL," "COMMUTE," and the "Iterator[Internal-use only (>1 chem)]." However, in some applications users may find it necessary to view or edit additional parameters. To access the scenario parameters table, select "Edit Parameter Values" from the "Scenario" menu of the scenario window. Access the parameters table for individual module instances by double-clicking on a module instance name in the "Graph View" pane to open that module instance window (Exhibit 4-34 shows circled module instance names).[4] On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, selecting an option from a drop-down menu, or selecting the "Browse" button to locate the file. Note that this step may not be required for some applications. No user interaction is required on the "Module" tab.

Refer to: Appendix D, Scenario Parameters

Appendix E, Module Instance Parameters

Exhibit 4-34. Module Instances in "HAPEM w. TRIM.Risk - More than One Chemical" Scenario



[4] See Volume I, Section 3.1 for definitions of common MIMS terminology and Volume I, Section 3.1.8 for information on opening a module instance and specifying parameter values.

Step 6 Start the Scenario

Run the scenario by selecting "Execute Ready Modules" from the "Scenario" menu of the scenario window or clicking the "play" button ( ) at the top of the scenario window.

Refer to: Volume I, Section 3.1.9, Running a MIMS Scenario

Appendix G, Troubleshooting

Step 7 Set Up the HAPEM PostProcessor

The HAPEM5 Post-Processor GUI will automatically open in MIMS as the run is executing to allow the user to select the HAPEM output files and databases to be used to create the HAPEM output database. Select the appropriate inputs, and then click "Validate" to verify the selections. Next, click "Exit" to exit the GUI and continue the scenario.

Refer to: Section 5.3.2, HAPEM PostProcessor

Step 8 Specify Inputs and Run TRIM.Risk Metrics Generator

The TRIM.Risk$_{HH}$ Inhalation Metrics GUI will open automatically in MIMS as the run is executing to allow the user to specify inputs used to generate risk metrics. Only one set of metrics is generated with each run. Additional risk metrics may be generated from the same TRIM.Risk output database using the "TRIM.Risk Metrics" scenario. However, these additional metrics cannot be added to an existing database.[5]

Select the desired risk metrics and set the required inputs on the numbered tabs in the TRIM.Risk$_{HH}$ Inhalation Metrics GUI (the metrics are described in Chapter 2 and Appendix A and specification of the required inputs is described in detail in Section 5.4.2). Then click on "Validate" to verify the selections and click "Exit" to exit the GUI and continue the scenario.

Refer to: Section 5.4.2, TRIM.Risk Metrics Generator

Chapter 2, Risk Calculations

Appendix A, Human Health Risk Metrics

[5] To prevent an existing risk metrics database from being overwritten, users will need to select a new database name on the first tab of the TRIM.Risk$_{HH}$ Inhalation Metrics GUI.

Step 9 Run DAVE

Unless the user specified a change to the TRIM database type in Step 2e, the DAVE GUI will open in MIMS after the risk metrics database has been created. If another type of TRIM database was selected, the DAVE GUI will open after that database has been created.

DAVE can be used to generate tables and charts of exposure estimates, risk estimates, and risk metrics, or to create delimited text exports of results. Exported results can then be further analyzed off-line after they have been imported into a spreadsheet or other data analysis software. Alternatively, risk estimates can be retrieved directly from the database using MySQL queries.

Refer to: Section 5.5, DAVE

Volume I, Section 3.3, Basic Operations with DAVE

DAVE User's Guide

4.4 TRIM.Risk Metrics Scenario

When Should I Run This Scenario?

This scenario is designed to generate inhalation risk metrics using an available, previously prepared database with risk estimates. The database can contain risk estimates for a single or multiple chemicals, locations, etc.

This section describes the steps required to run the "**TRIM.Risk Metrics**" MIMS scenario within the "Inhalation risk assessment using RfCs and UREs, with HAPEM" project. The steps to carry out this scenario are analogous to those required for the scenario with the same name in the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" project. This scenario can be used to calculate inhalation risk metrics from an existing TRIM.Risk output database using the TRIM.Risk metrics generator. The steps required to run this scenario are presented below. For names of the domain objects and module instances in this scenario, refer to Appendix C.2.

Step 1 Open the "TRIM.Risk Metrics" Scenario in MIMS

Start MIMS by navigating to the Start menu, Programs, TRIM, and selecting "TRIM" or by double-clicking on "runtrim.bat" in Windows Explorer. Open the "Inhalation risk assessment using RfCs and UREs, with HAPEM" MIMS project and then the "TRIM.Risk Metrics" scenario in MIMS.

Refer to: Volume I, Section 3.1.4, Opening a MIMS Project

Volume I, Section 3.1.6, Opening, Duplicating, Renaming or Deleting a MIMS Scenario

Step 2 Complete the Input Panels

Parameters are set via the tabs located on the "Input Panels" pane, as described in Steps 2a and 2b. The "Input Panels" present those parameters that are more likely to require attention from users (see Exhibits 4-35 and 4-38). Note that some of these parameters will have been set by the user during the installation of TRIM. Users should use caution when making changes to any preset parameter values.

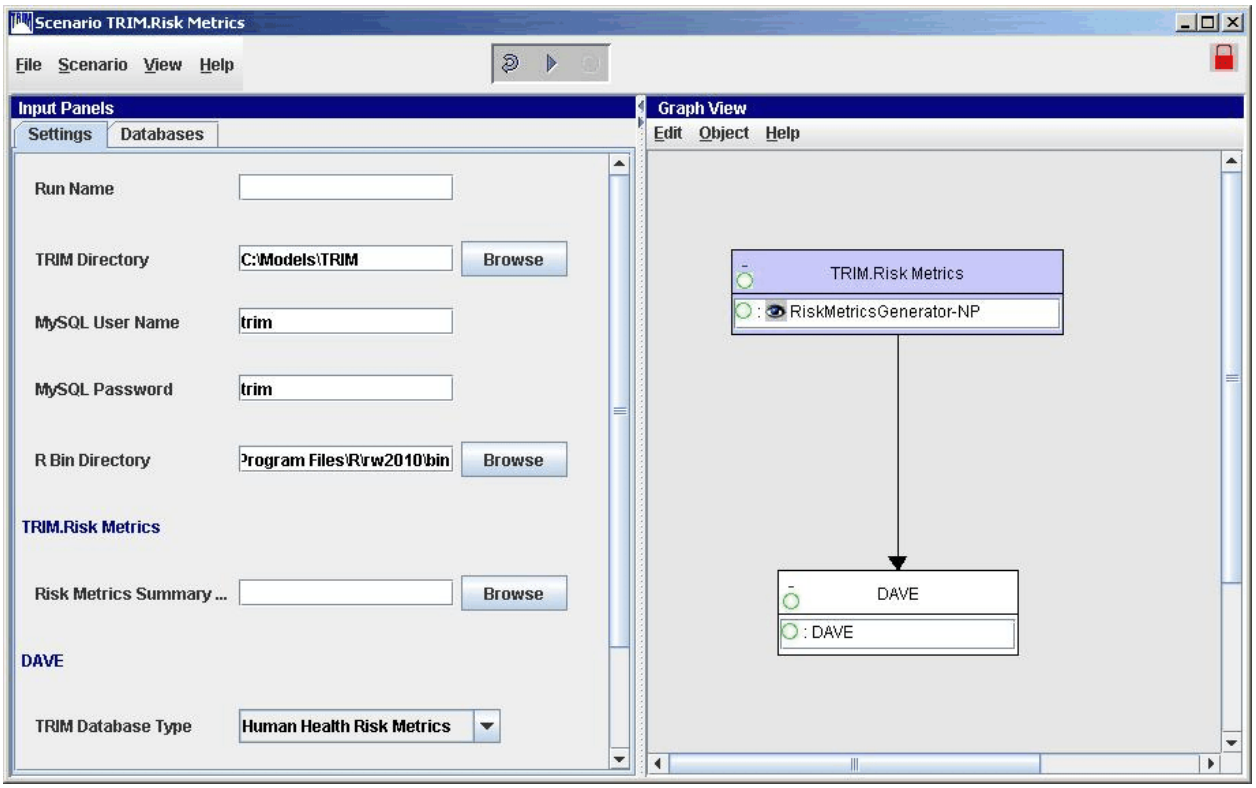
Step 2a Set Parameters on "Settings" Tab

Click on the "Settings" tab. The parameters that can be set on this tab are listed in Exhibits 4-35 and 4-36. Set parameters by typing in a value or by clicking the "Browse" button next to the parameter field and selecting the desired file or directory.

Exhibit 4-35. Parameters on "Settings" Tab of "TRIM.Risk Metrics" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Run Name	–	No	Name of the unique scenario run.
TRIM Directory	–	Yes	Name and location of the TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).
MySQL User Name	–	Yes	User name for access to the MySQL databases created or used for the TRIM.Risk projects.
MySQL Password	–	Yes	Password for access to the MySQL databases created or used for the TRIM.Risk projects.
R Bin Directory	–	Yes	Location of the bin directory for the R program.
TRIM.Risk Metrics			
Risk Metrics Summary File	–	No	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.
DAVE			
TRIM Database Type	Human Health Risk Metrics	No	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.

Exhibit 4-36. "Settings" Tab of "TRIM.Risk Metrics" Scenario



Step 2b **Set Parameters on "Databases" tab**

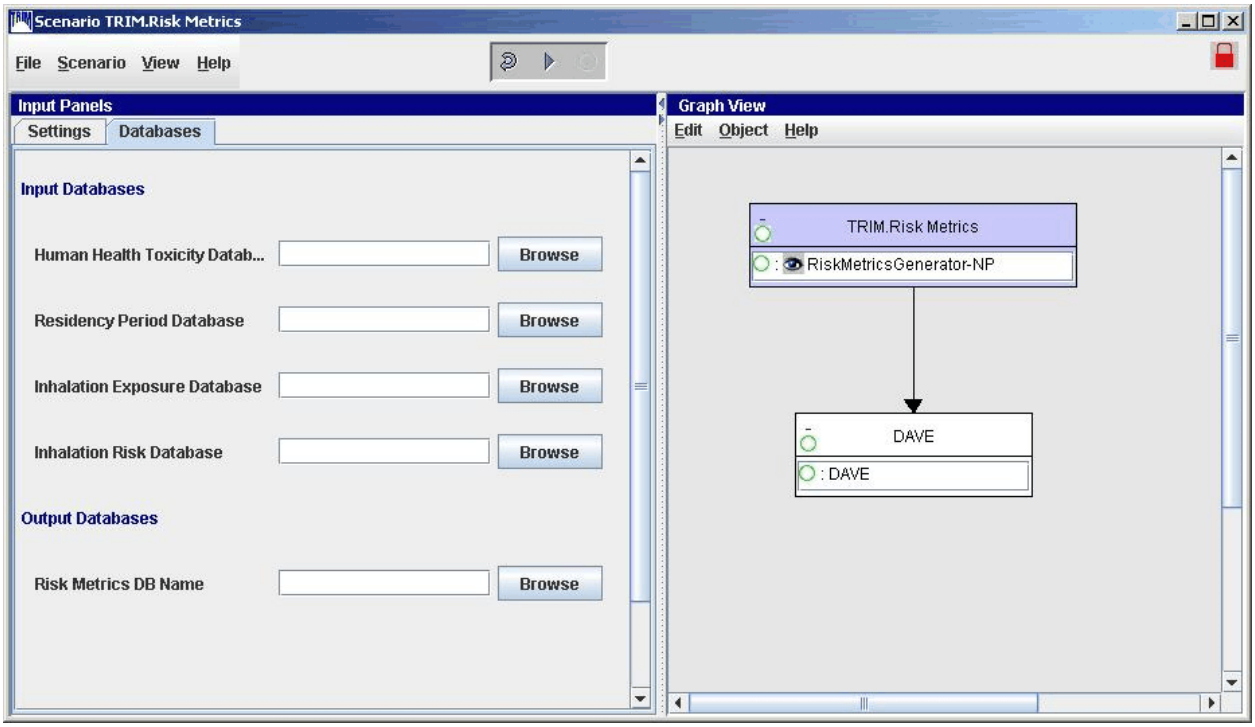
Click on the "Databases" tab. The parameters that can be set on this tab are listed in Exhibits 4-37 and 4-38. Set parameters by typing in each database name.

Exhibit 4-37. Parameters on "Databases" Tab of "TRIM.Risk Metrics" Scenario

Parameter Name	Default Value	Set via Installer?	Description
Input Databases			
Human Health Toxicity Database	–	No	The name of the database containing chemical-specific information on human health effects.
Residency Period Database	–	No	The name of the database containing residency period data.
Inhalation Exposure Database	–	No	The name of the database with inhalation exposure estimates generated by HAPEM.
Inhalation Risk Database	–	No	The name of the database with inhalation risk estimates generated by TRIM.Risk$_{HH-NP}$.

Parameter Name	Default Value	Set via Installer?	Description
Output Databases			
Risk Metrics DB Name	–	No	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.

Exhibit 4-38. "Databases" Tab of "TRIM.Risk Metrics" Scenario



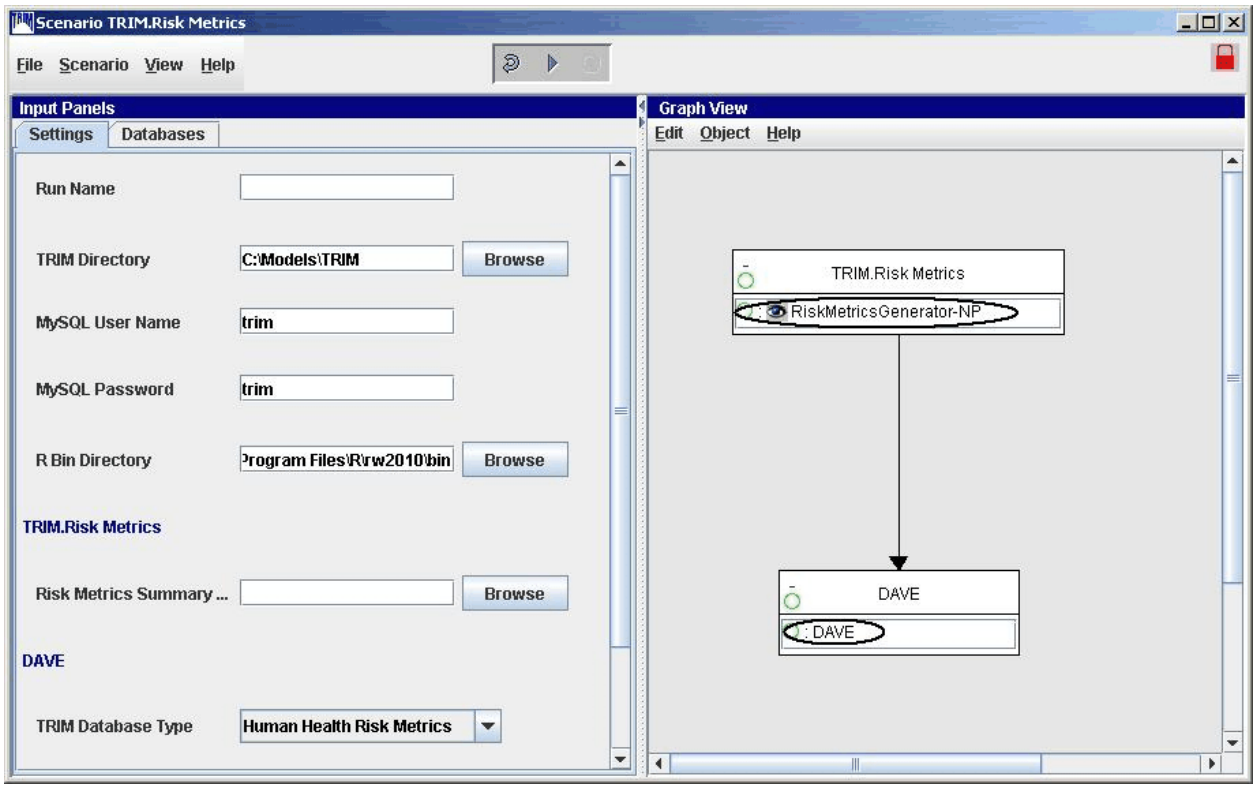
Step 3 Set Any Additional Parameters

In most cases, users will not be required to set any parameters beyond those in the "Input Panels." However, in some applications users may find it necessary to view or edit additional parameters. To access the scenario parameters table, select "Edit Parameter Values" from the "Scenario" menu of the scenario window. Access the parameters table for individual module instances by double-clicking on a module instance name in the "Graph View" pane to open that module instance window (Exhibit 4-39 shows circled module instance names).[6] On the "Parameters" tab, set values by typing in the "Value" column, clicking on a check box, selecting an option from a drop-down menu, or selecting the "Browse" button to locate the file. Note that this step may not be required for some applications. No user interaction is required on the "Module" tab.

Refer to: Appendix D, Scenario Parameters

Appendix E, Module Instance Parameters

Exhibit 4-39. Module Instances in "TRIM.Risk Metrics" Scenario



[6] See Volume I, Section 3.1 for definitions of common MIMS terminology and Volume I, Section 3.1.8 for information on opening a module instance and specifying parameter values.

Step 4 Start the Scenario

Run the scenario by selecting "Execute Ready Modules" from the "Scenario" menu of the scenario window or clicking the "play" button ( ) at the top of the scenario window.

Refer to: Volume I, Section 3.1.9, Running a MIMS Scenario

Appendix G, Troubleshooting

Step 5 Specify Inputs and Run TRIM.Risk Metrics Generator

The TRIM.Risk$_{HH}$ Inhalation Metrics GUI will open automatically in MIMS as the run is executing to allow the user to specify inputs used to generate risk metrics. Only one set of metrics is generated with each run. Additional risk metrics may be generated from the same TRIM.Risk output database using the "TRIM.Risk Metrics" scenario. However, these additional metrics cannot be added to an existing database.[7]

Select the desired risk metrics and set the required inputs on the numbered tabs in the TRIM.Risk$_{HH}$ Inhalation Metrics GUI (the metrics are described in Chapter 2 and Appendix A and specification of the required inputs is described in detail in Section 5.4.2). Then click "Validate" to verify the selections and click "Exit" to exit the GUI and continue the scenario.

Refer to: Section 5.4.2, TRIM.Risk Metrics Generator

Chapter 2, Risk Calculations

Appendix A, Human Health Risk Metrics

[7] To prevent an existing risk metrics database from being overwritten, users will need to select a new database name on the first tab of the TRIM.Risk$_{HH}$ Inhalation Metrics GUI.

Step 6 Run DAVE

Unless the user specified a change to the TRIM database type in Step 2b, the DAVE GUI will open in MIMS after the risk metrics database has been created. If another type of TRIM database was selected, the DAVE GUI will open after that database has been created.

DAVE can be used to generate tables and charts of exposure estimates, risk estimates, and risk metrics, or to create delimited text exports of results. Exported results can then be further analyzed off-line after they have been imported into a spreadsheet or other data analysis software. Alternatively, risk estimates can be retrieved directly from the database using MySQL queries.

Refer to: Section 5.5, DAVE

Volume I, Section 3.3, Basic Operations with DAVE

DAVE User's Guide

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5. Components of the Inhalation Risk Assessment Scenarios

5.1 Introduction

This chapter describes how to set up and run each component of the inhalation risk assessment scenarios in the two TRIM inhalation risk assessment projects:

- "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo;" and
- "Inhalation risk assessment using RfCs and UREs, with HAPEM."

Refer to Appendix B for illustrations of the order in which components are run in these two projects.

5.2 TRIM.Expo$_{Inhalation}$ Components

This section describes the components associated with TRIM.Expo$_{Inhalation}$:

- TRIM.Expo$_{Inhalation}$ Population Processor;
- TRIM.Expo$_{Inhalation}$; and
- TRIM.Expo$_{Inhalation}$ PostProcessor.

These components are responsible for converting population data into a MySQL database, generating exposure estimates, and then writing the exposure estimates to another MySQL database. The databases are then used by components associated with TRIM.Risk (see Section 5.4) to generate inhalation risk metrics.

5.2.1 TRIM.Expo$_{Inhalation}$ Population Processor

The TRIM.Expo$_{Inhalation}$ Population Processor is used to convert the population data used by TRIM.Expo$_{Inhalation}$ into a MySQL database. This MySQL database is subsequently used by the TRIM.Risk metrics generator to calculate population-based risk metrics.

When Is This Component Used?

This component is run **once** for each unique set of population data for the risk assessment study area. The processor converts the population data from the format used by TRIM.Expo$_{Inhalation}$ to a MySQL format compatible with TRIM.Risk and DAVE.

The inputs (i.e., module instance parameters) required by the TRIM.Expo$_{Inhalation}$ Population Processor can be set by the user in one of two ways. Users can specify values for all parameters related to the TRIM.Expo$_{Inhalation}$ Population Processor component via the "Input Panels" pane. The steps involved in setting parameter values in the "Input Panels" are provided in the step-by-step scenario instructions in Chapter 3 (see Step 2 of Section 3.2).

Alternatively, the full set of module instance parameters can be viewed and edited by double-clicking on "APEXPopProcessor" (the module instance name for this component) in the "Graph View" pane of the scenario window. This will open up the parameters table, as

described in Volume I, Section 3.1.8. Note that users can set some parameters using the "Input Panels" and others using the module instance parameters tables; users are not required to use one method exclusively. Refer to Appendix E, Exhibit E-1, for a list and description of each of the TRIM.Expo$_{Inhalation}$ Population Processor module instance parameters.

5.2.2 TRIM.Expo$_{Inhalation}$

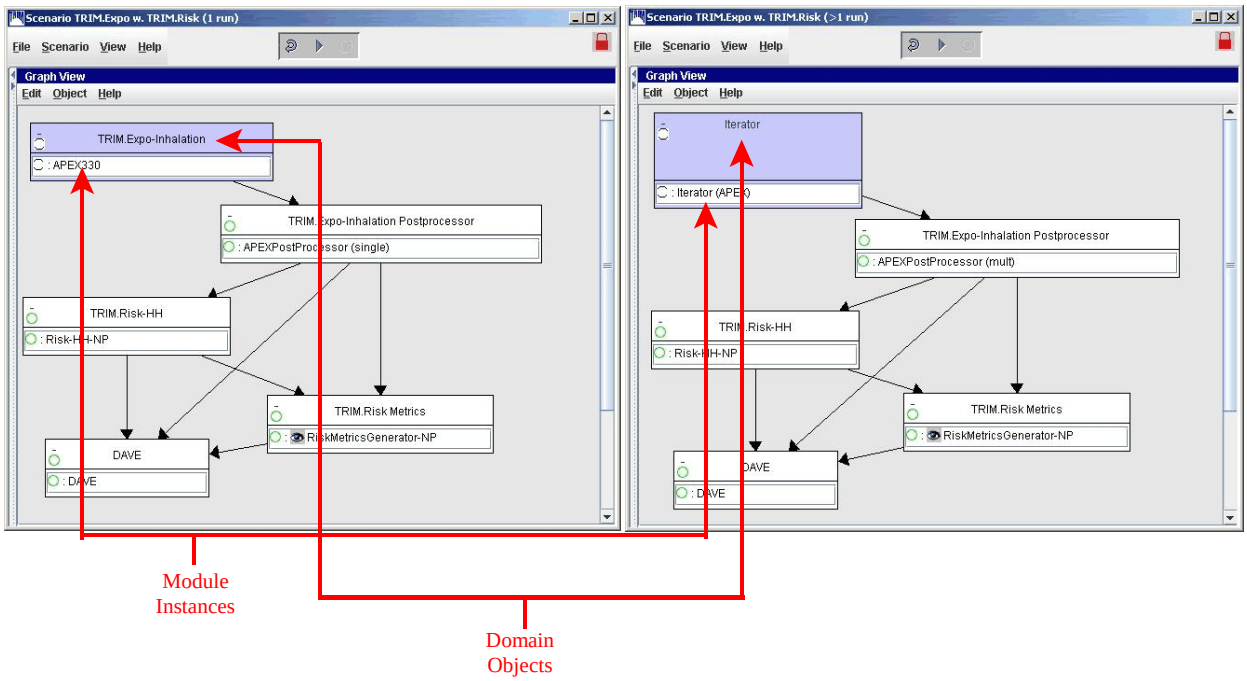
TRIM.Expo$_{Inhalation}$ is the TRIM inhalation exposure model used to estimate human exposure via inhalation for criteria pollutants and air toxics. This model is also referred to as APEX (particularly when run outside of TRIM). Exposure estimates are generated by TRIM.Expo$_{Inhalation}$ in text format and must be processed by the TRIM.Expo$_{Inhalation}$ Postprocessor to create a MySQL database that is accessible to TRIM.Risk.

When Is This Component Used?

This component is used in any scenario that includes TRIM.Expo$_{Inhalation}$ (i.e., APEX).

TRIM.Expo$_{Inhalation}$ is represented by a different MIMS domain object and module instance in the two different TRIM.Expo$_{Inhalation}$ with TRIM.Risk scenarios (see Exhibit 5-1). In the case of the "TRIM.Expo w. TRIM.Risk (1 run)" scenario, the TRIM.Expo$_{Inhalation}$ module instance is called "APEX330," while in the case of the "TRIM.Expo w. TRIM.Risk (>1 run)" scenario, the corresponding module instance is called "Iterator (APEX)."

Exhibit 5-1. TRIM.Expo$_{Inhalation}$ in TRIM.Expo with TRIM.Risk Scenarios



The inputs (i.e., module instance parameters) required by TRIM.Expo$_{Inhalation}$ are set by the user in one of two ways. Users can specify values for some, but not all, of the required parameters via the "Input Panels" pane. The remaining inputs must be specified using the parameters table of the module instance window. The "Input Panels" pane is most useful for

changing parameter values for different simulations of a given application (e.g., changing the run name, random seed, whether to include commuting in the analysis, etc.) The steps involved in setting parameter values in the "Input Panels" are provided in the step-by-step scenario instructions in Chapter 3 (see Step 2 of Section 3.3 or 3.4).

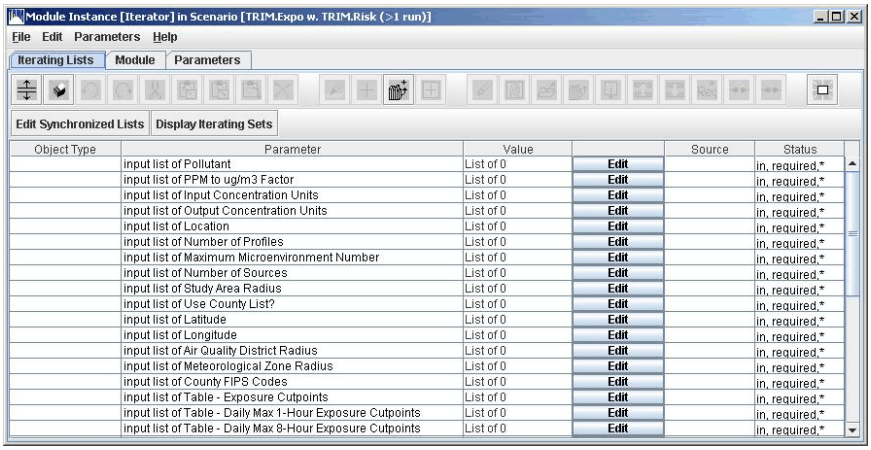
Alternatively, the full set of module instance parameters can be viewed and edited by double-clicking on the module instance name in the "Graph View" pane of the scenario window as described in Volume I, Section 3.1.8. Note that users can set some parameters using the "Input Panels" and others using the module instance parameters tables; users are not required to use one method exclusively. Refer to Appendix E for a list of these parameters and descriptions of each. Exhibit E-2 includes the parameters for the "APEX330" module instance, and Exhibits E-3 and E-4 include the parameters for the "Iterator(APEX)" module instance. The APEX User's Guide and the "Decision Points for Configuring APEX" (ICF 2005) document provide detailed instructions on how to set up the settings and input files required by $\text{TRIM.Expo}_{\text{Inhalation}}$.

In the case of the "TRIM.Expo w. TRIM.Risk (>1 run)" scenario, the module instance screen for "Iterator(APEX)" includes an additional tab labeled "Iterating Lists" (see Exhibit 5-2). The parameters included in this tab specify information needed for runs involving iteration (e.g., with multiple study areas, facilities, sources, and/or chemicals). To set these parameter values, click the "Edit Synchronized Lists " button on the "Iterating Lists" tab. **Do not edit any parameter values via the "Edit" buttons next to the list of parameters and values directly on the "Iterating Lists" tab.**

Suggestion for Initial Configuration of the Iterator

When setting up the "Iterator(APEX)" for the first time, or if a new set of input data files is being used, be sure that all input data files for the iterator are for the same time period (i.e., year). If some input files are for different years, all files with a date/time reference must be edited so the dates appearing in those files correspond to the dates entered as the "Start Date" and "End Date" on the "APEX Settings" tab of the "Input Panels."

Exhibit 5-2. "Iterating Lists" Tab of "Iterator(APEX)" Module Instance



Object Type	Parameter	Value		Source	Status
	input list of Pollutant	List of 0	Edit		in, required,*
	input list of PPM to ug/m3 Factor	List of 0	Edit		in, required,*
	input list of Input Concentration Units	List of 0	Edit		in, required,*
	input list of Output Concentration Units	List of 0	Edit		in, required,*
	input list of Location	List of 0	Edit		in, required,*
	input list of Number of Profiles	List of 0	Edit		in, required,*
	input list of Maximum Microenvironment Number	List of 0	Edit		in, required,*
	input list of Number of Sources	List of 0	Edit		in, required,*
	input list of Study Area Radius	List of 0	Edit		in, required,*
	input list of Use County List?	List of 0	Edit		in, required,*
	input list of Latitude	List of 0	Edit		in, required,*
	input list of Longitude	List of 0	Edit		in, required,*
	input list of Air Quality District Radius	List of 0	Edit		in, required,*
	input list of Meteorological Zone Radius	List of 0	Edit		in, required,*
	input list of County FIPS Codes	List of 0	Edit		in, required,*
	input list of Table - Exposure Cutpoints	List of 0	Edit		in, required,*
	input list of Table - Daily Max 1-Hour Exposure Cutpoints	List of 0	Edit		in, required,*
	input list of Table - Daily Max 8-Hour Exposure Cutpoints	List of 0	Edit		in, required,*

Clicking the “Edit Synchronized Lists ” button will open the “Synchronized Input Lists Editor” window (see Exhibits 5-3 through 5-6). Using this window, the user can specify parameter values for different “profiles,” which are sets of parameters particular to individual chemicals, sources, or facilities over which the iteration is performed. Users can add, edit, and view the different types of profiles by selecting one of the following tabs at the top of this window: “Chemical,” “SourceType,” and “Facility.”

Exhibit 5-3. “Chemical” Tab of “Synchronized Input Lists Editor” Window

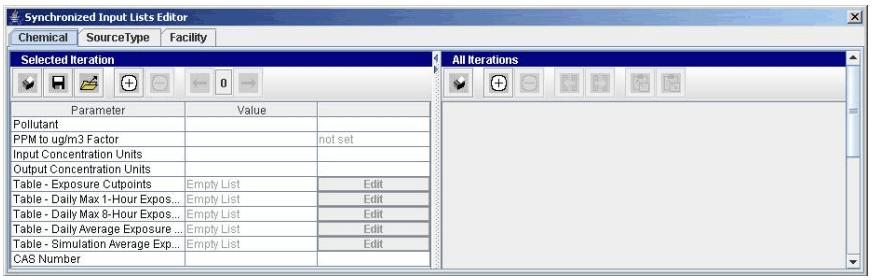


Exhibit 5-4. “SourceType” Tab of “Synchronized Input Lists Editor” Window

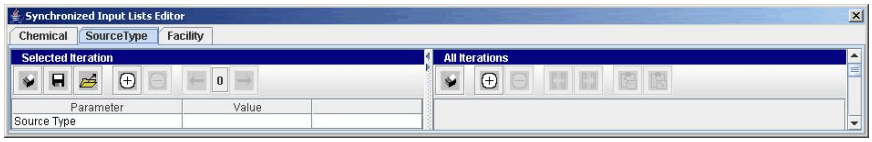
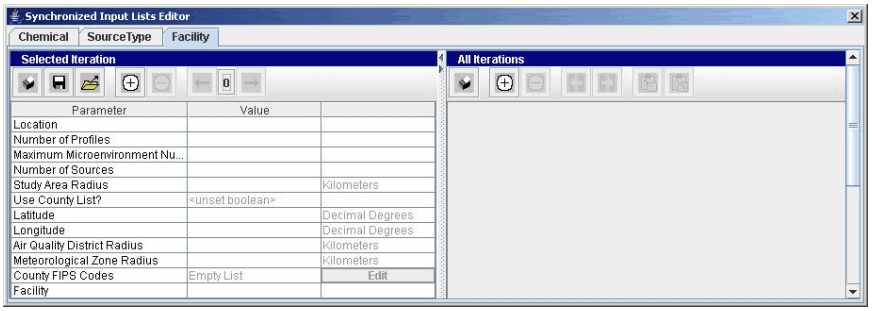
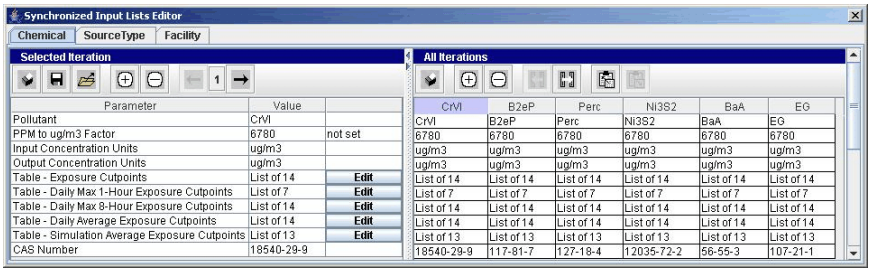


Exhibit 5-5. “Facility” Tab of “Synchronized Input Lists Editor” Window



To add a chemical, source type, or facility profile to the appropriate tab, click on the “plus” button ( ) to create a column, and type the chemical, facility, or source type name in the “New Iteration Name” window that appears. The “All Iterations” pane allows the user to view multiple profiles at one time. **Changes to individual chemical, source type, and/or facility profiles should be made only on the “Selected Iteration” pane.** After multiple profiles have been entered, click on the arrow buttons ( ) at the top of the “Selected Iteration” pane to change the profile displayed in this pane. The number in the box between the arrows will change to indicate which profile number is currently being viewed or edited. To delete a profile, navigate with the arrow buttons so that the profile to be removed is in the “Selected Iteration” pane and then click on the “minus” button ( ). An example of a “Chemical” tab with all input parameter values specified is shown in Exhibit 5-6.

Exhibit 5-6. Example of a Completed "Chemical" Tab of "Synchronized Input Lists Editor" Window



Depending on the type of input, values can be specified for profile parameters in three different ways:

- Double-clicking and typing in the "Value" column (for text or number inputs);
- Clicking on a check box (for yes/no or true/false inputs); or
- Selecting "Edit," and making changes to lists of input parameters in the resulting window (for "List" inputs).

When the "Edit" button is clicked for a list input, the "Edit Values" window will open. Parameters can be added or removed from this table by clicking on the plus and minus buttons at the top of the "Edit Values" window; edit parameter values by double-clicking and typing in the "Value" column.

Referencing and Naming Input Files to the "Iterator(APEX)"

Applications using the "Iterator(APEX)" require the user to provide multiple sets of inputs – essentially one set of inputs for each iteration performed. Users can input numeric values to be iterated over using the "Synchronized Input Lists Editor," as explained in Section 5.2.2. For input files, users must create references to the required files on the "Parameters" tab of the "Iterator(APEX)" module instance. Using environmental variables (refer to Volume I, Section 3.1.12, for information on environmental variables) enables multiple files to be iterated over if the input files being referenced are named properly. This file referencing format must be used for any single input parameter for which there are multiple input files required for running the "Iterator(APEX)" (i.e., files that are specific to a chemical, facility, or source type or combination thereof). For example, a simulation in which more than one chemical, source type, and facility are being modeled may utilize multiple air quality data files, with each file specific to a particular combination of chemical, facility, and source type. Other types of input files for which multiple files for a single input may be required include (but are not limited to) district location files, profile functions files, and microenvironment mapping and descriptions files. General guidelines for naming and referencing these input files are provided below.

Naming Files

Input files to be iterated over must be named so that they can be distinguished from one another based on parameter names defined in the three tabs ("Facility," "SourceType," and "Chemical") of the "Synchronized Input Lists Editor." For example, assume there are two facilities, Facility1 and Facility2; two source types, Point and Area; and two chemicals, TCE and benzene. If these facilities have different emissions characteristics or are in different locations, eight air quality data input files would be required (files are not needed for facility-source type-pollutant combinations that do not exist). These files could be named as follows:

AQ_Facility1_Point_TCE.txt	AQ_Facility1_Area_TCE.txt	AQ_Facility2_Point_benzene.txt
AQ_Facility1_Area_benzene.txt	AQ_Facility2_Point_TCE.txt	AQ_Facility2_Area_TCE.txt
AQ_Facility1_Point_benzene.txt	AQ_Facility2_Area_benzene.txt	

The most important consideration in naming the files in this example is that the facilities, source types, and chemicals must be named in parameters on the tabs of the "Synchronized Input Lists Editor" exactly as they are referenced in these file names.

Referencing Files

For each type of input file, only one value can be entered on the "Parameters" tab of the "Iterator(APEX)" module instance. This value must reference parameter names from the tabs of the "Synchronized Input Lists Editor" in such a way that the files will be properly referenced because the "Iterator(APEX)" replaces these parameter name references with the values for the parameters. For example, the "Input File - Air Quality Data" parameter on the "Parameters" tab could be defined as follows to reference the file names listed above:

```
${str("Input Data Directory")}\AQ_${str("Facility")}_${str("Source Type")}_${str("Pollutant")}.txt
```

where:

- All files are located in the directory defined by the "Input Data Directory" parameter.
- The "Facility" parameter on the "Facility" tab of the "Synchronized Input Lists Editor" has two values, Facility1 and Facility2.
- The "Source Type" parameter on the "SourceType" tab of the "Synchronized Input Lists Editor" has two values, Point and Area.
- The "Pollutant" parameter on the "Chemical" tab of the "Synchronized Input Lists Editor" has two values, TCE and benzene.

If invalid facility-source type-pollutant combinations are created based on the combination of file references (e.g., if Facility1 does not emit benzene from an area source type, and thus a corresponding air quality data file does not exist), the Iterator will ignore those combinations and only perform simulations for the valid ones.

Note that the naming and referencing formats are very flexible. If, for example, an application deals with multiple facilities but only one source type and one chemical, the file names and references would only need to distinguish between facilities.

5.2.3 TRIM.Expo$_{Inhalation}$ Postprocessor

The TRIM.Expo$_{Inhalation}$ Postprocessor is used to convert the exposure estimates generated by TRIM.Expo$_{Inhalation}$ in text format into a MySQL database. This database allows the exposure estimates to be accessible to TRIM.Risk components.

When Is This Component Used?

This component will be used in any TRIM.Risk scenario where TRIM.Expo$_{Inhalation}$ outputs (in text format) need to be available to downstream TRIM components (e.g., TRIM.Risk).

The inputs (i.e., module instance parameters) required by the TRIM.Expo$_{Inhalation}$ Postprocessor can be set by the user in one of two ways. Users can specify values for all parameters related to the TRIM.Expo$_{Inhalation}$ Postprocessor component via the "Input Panels" pane. The steps involved in setting parameter values in the "Input Panels" are provided in the step-by-step scenario instructions in Chapter 3 (see Step 2 of Section 3.3 or 3.4).

Alternatively, the full set of module instance parameters can be viewed and edited by double-clicking on "APEXPostProcessor" (the module instance name for this component) in the "Graph View" pane of the scenario window. This will open up the parameters table, as described in Volume I, Section 3.1.8. Note that users can set some parameters using the "Input Panels" and others using the module instance parameters tables; users are not required to use one method exclusively. Refer to Appendix E, Exhibits E-5 and E-6, for a list and description of each of the TRIM.Expo$_{Inhalation}$ Postprocessor module instance parameters.

5.3 HAPEM Components

This section describes the steps involved in setting up the HAPEM components that are used in the "Inhalation risk assessment using RfCs and UREs, with HAPEM" project. HAPEM components involved in this project include the HAPEM model itself and the HAPEM Postprocessor. In this project, these components are responsible for generating exposure estimates and writing the exposure estimates to a MySQL database that is then available to components associated with TRIM.Risk (see Section 5.4) to generate inhalation risk metrics.

5.3.1 HAPEM

HAPEM is an inhalation exposure model used to estimate human exposure via inhalation for hazardous air pollutants. It consists of five programs, listed here with the process for which each is responsible:

When Is This Component Used?

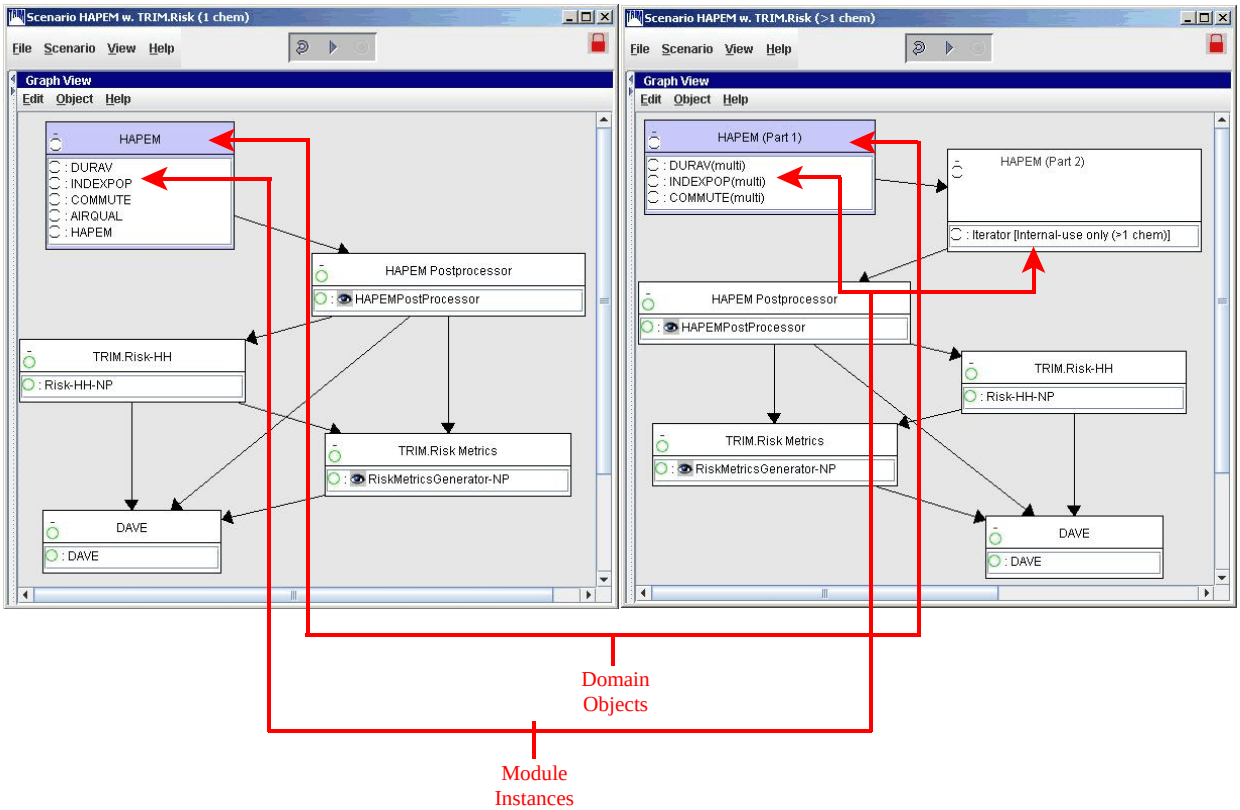
This component will be used in any scenario that includes HAPEM.

- DURAV (categorizes activity data);
- INDEXPOP (indexes population data);
- COMMUTE (identifies commutes);
- AIRQUAL (reads annual air quality estimates); and
- HAPEM (estimates annual average exposure concentrations).

HAPEM is represented by a different MIMS domain object and module instance in the two different HAPEM with TRIM.Risk scenarios (see Exhibit 5-7).

The inputs (i.e., module instance parameters) required by HAPEM can be set in different ways depending in part on the scenario being run and the type of input. The ways to set the inputs are described below separately for the two HAPEM with TRIM.Risk scenarios.

Exhibit 5-7. HAPEM in HAPEM with TRIM.Risk Scenarios



5.3.1.1 "HAPEM w. TRIM.Risk (1 chem)" Scenario

This scenario uses the "HAPEM" domain object and "DURAV," "INDEXPOP," "COMMUTE," "AIRQUAL," and "HAPEM" module instances to run HAPEM. The inputs (i.e., module instance parameters) required by HAPEM are set by the user in one of two ways. Users can specify values for all of the required parameters via the "Input Panels" pane. The steps involved in setting parameter values in the "Input Panels" are provided in the step-by-step scenario instructions in Chapter 4 (see Step 2 of Section 4.2).

Alternatively, the full set of module instance parameters for "DURAV," "INDEXPOP," "COMMUTE," "AIRQUAL," and "HAPEM" can be viewed and edited by double-clicking on the module instance names in the "Graph View" pane of the scenario window as described in Volume I, Section 3.1.8. Note that users can set some parameters using the "Input Panels" and others using the module instance parameters tables; users are not required to use one method exclusively. Refer to Appendix E, Exhibit E-10, for a list and description of each of the parameters associated with these five module instances. The HAPEM5 User's Guide provides detailed instructions on how to configure the settings and input files required by HAPEM.

5.3.1.2 "HAPEM w. TRIM.Risk (>1 chem)" Scenario

This scenario uses the "HAPEM (Part 1)" and "HAPEM (Part 2)" domain objects. The "HAPEM (Part 1)" domain object contains the "DURAV," "INDEXPOP," and "COMMUTE" module instances and the "HAPEM (Part 2)" domain object contains the "Iterator [Internal-use only (> 1 chem)]" module instance.[1] The inputs (i.e., module instance parameters) required by HAPEM are set by the user in one of two ways. Users can specify values for some, but not all, of the required parameters via the "Input Panels" pane. The remaining inputs must be specified on the "Iterating Lists" tab of the "Iterator [Internal-use only (>1 chem)]" module instance. The steps involved in setting parameter values in the "Input Panels" are provided in the step-by-step scenario instructions in Chapter 4 (see Step 2 of Section 4.3).

Alternatively, the full set of module instance parameters for "DURAV," "INDEXPOP," "COMMUTE," and "Iterator [Internal-use only (>1 chem)]" can be viewed and edited by double-clicking on the module instance names in the "Graph View" pane of the scenario window as described in Volume I, Section 3.1.8. Note that users can set some parameters using the "Input Panels" and others using the module instance parameters tables; users are not required to use one method exclusively. For the "DURAV," "INDEXPOP," and "COMMUTE" modules, all module instance parameter values can be specified on the "Parameters" tab of each module. The "Iterator [Internal-use only (>1 chem)]" module has an additional tab, "Iterating Lists," on which parameter values must be specified. The steps for specifying these parameter values are described below. Refer to Appendix E, Exhibit E-11 for a list and description of each of the parameters associated with the "DURAV," "INDEXPOP," and "COMMUTE" module instances. Exhibits E-12 and E-13 include parameters for the "Iterator[Internal-use only (>1 chem)]" module instance. The HAPEM5 User's Guide provides detailed instructions on how to set up the settings and input files required by "HAPEM (Part 1)" and "HAPEM (Part 2)."

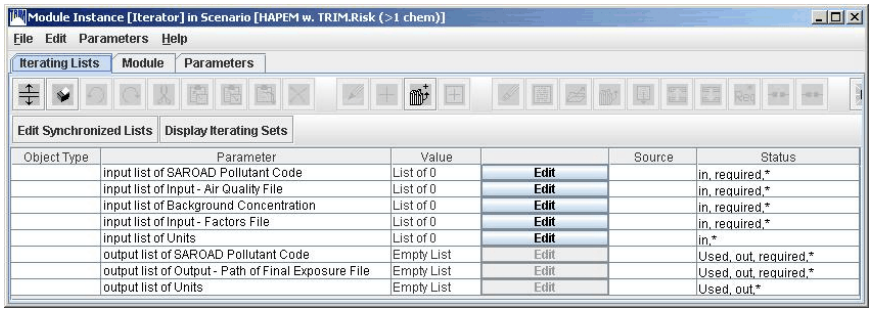
The "Iterating Lists" tab of the "Iterator [Internal-use only (>1 chem)]" module allows users to perform runs with multiple chemicals. Chemical-specific values or references to chemical-specific files for certain parameters are input on this tab, and these input values are iterated over in a multi-chemical simulation. To set the parameter values for the chemicals to be iterated over, open the "Iterator[Internal-use only (>1 chem)]" module instance, and click on the "Iterating Lists" tab (Exhibit 5-8). **Do not edit any parameter values via the "Edit" buttons next to the list of parameters and values directly on the "Iterating Lists" tab.**

Suggestions for Initial Configuration of the Iterator

When setting up the "Iterator[Internal-use only (>1 chem)]" for the first time, or if a new set of input data files is being used, be sure that all input data files for the iterator are for the same time period (e.g., year). If some input files are for different years, all files with a date/time reference must be edited so the dates appearing in those files correspond to the dates entered as the "Simulation Year" on the "HAPEM Settings" tab of the "Input Panels."

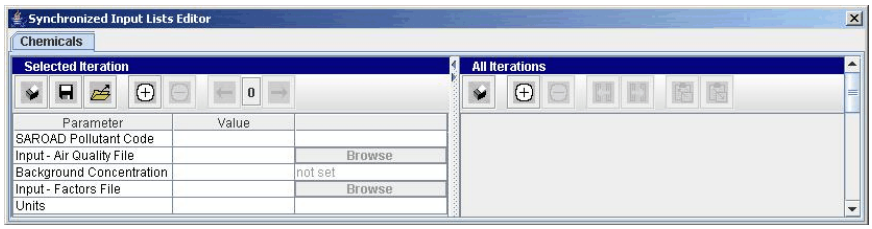
[1] The "HAPEM (Part 2)" module provides the same functionality as the "AIRQUAL" and "HAPEM" module instances in the single chemical scenario and thus requires the same module instance parameters.

Exhibit 5-8. "Iterating Lists" Tab of "Iterator [Internal-use only (>1 chem)]" Module Instance



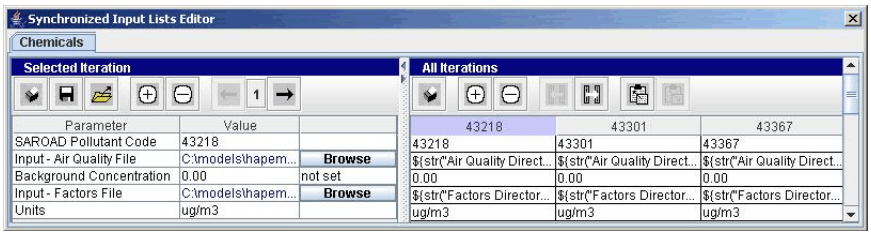
On the "Iterating Lists" tab (Exhibit 5-8), click the "Edit Synchronized Lists" button. The "Synchronized Input Lists Editor" window will open (see Exhibit 5-9). Using this window, the user can specify parameter values for different "profiles," which are individual chemicals over which the iteration is performed. To add a chemical, click on the "plus" button ( ) to create a column (for a new chemical profile), and then type the chemical name in the "New Iteration Name" window that appears. Double-click in the "Value" column on the "Selected Iteration" pane to specify parameter values. The "All Iterations" pane allows the user to view all profiles at one time.

Exhibit 5-9. "Chemicals" Tab of "Synchronized Input List Editor" Window



Chemicals with parameter values that will be iterated over when HAPEM is run are displayed in the "All Iterations" pane. **Changes to individual chemical profiles should be made only on the "Selected Iteration" pane.** Once multiple profiles have been entered, click on the arrow buttons ( ) at the top of the "Selected Iteration" pane to change the profile displayed in this pane. The number in the box between the arrows will change to indicate which profile number is currently being viewed and can be edited. To delete a profile, navigate with the arrow buttons so the profile to be removed is in the "Selected Iteration" pane and then click on the "minus" button ( ). An example of a "Chemicals" tab with all input parameter values specified is shown in Exhibit 5-10.

Exhibit 5-10. Example of Completed "Chemicals" Tab of "Synchronized Input Lists Editor" Window



Depending on the type of input, values can be specified for profile parameters in two different ways:

- Double-clicking and typing in the "Value" column (for text or number inputs); or
- Selecting "Browse," and browsing to the file location.

Referencing and Naming Multiple Files to the Iterator (HAPEM)

Users can input numeric values to be iterated over using the “Synchronized Input Lists Editor,” as explained in Section 5.3.1.2. For the two types of input files that are iterated over (air quality files and factors files), users can create references to the required files using the “Synchronized Input Lists Editor” on the “Iterating Lists” tab of the “Iterator[Internal-use only (>1 chem)]” module instance. These references can be created in three different ways. One option is to use the “Browse” button for the parameter for each chemical. To do this, the user would select the chemical (as described earlier in this section), click the “Browse” button, and then locate and select the file for this chemical. This process would be repeated for all chemicals included in the simulation. A second option is to type the file path into the “Value” column for the chemical. To do this, the user would select the chemical, double-click on the “Value” column for the parameter, and then type the file path for the file corresponding to this chemical. This process would be repeated for all chemicals included in the simulation.

The third option is to use environmental variables (refer to Volume I, Section 3.1.12, for information on environmental variables). This option is identical to the second option, except that it uses environmental variables in the file path that is entered in the “Value” column and allows users to enter the exact same file path for multiple chemicals for a given file type. For example, assume there are three chemicals with SAROAD pollutant codes of 43218, 43301, and 43367 in a particular HAPEM simulation. The “Chemicals” tab would then have three chemical profiles, each with one unique SAROAD value input for the “SAROAD Pollutant Code” parameter. For all three profiles, the “Value” for the “Input File - Air Quality data” parameter could be:

${str(“Input Data Directory”)}\AirQual\AQ_${str(“SAROAD Pollutant Code”)}.txt

For this file reference to work properly, the air quality data files must be named and located accordingly. The chemicals must be named in the “SAROAD Pollutant Code” parameter on the “Chemicals” tab of the “Synchronized Input Lists Editor” exactly as they are referenced in these file names. For the purposes of this example, the files must be located in the “AirQual” subdirectory of the “Input Data Directory” (defined on the “Settings” tab of the “Input Panels”). The three file names referenced using the above file path/reference would be:

AQ_43218.txt AQ_43301.txt AQ_43367.txt

Similarly, environmental variables could be used to reference the “SAROAD Pollutant Code” parameter in the “Input - Factors File” parameter on the “Chemicals” tab, making sure that the factors files are named accordingly.

5.3.2 HAPEM Postprocessor

The HAPEM Postprocessor is used to convert the exposure estimates generated by HAPEM in text format to a MySQL database. This database allows the exposure estimates to be accessible to the TRIM.Risk modules.

When Is This Component Used?

This component will be used in any TRIM.Risk scenario where HAPEM outputs (in text format) need to be available to downstream components (e.g., TRIM.Risk).

The inputs (i.e., module instance parameters) required by the HAPEM Postprocessor can be set by the user in one of two ways. Users can specify values for most parameters related to the HAPEM Postprocessor component via the "Input Panels" pane (some inputs must be specified via the HAPEM5 Post-Processor GUI – see below). The steps involved in setting parameter values in the "Input Panels" are provided in the step-by-step scenario instructions in Chapter 4 (see Step 2 of Section 4.2 or 4.3).

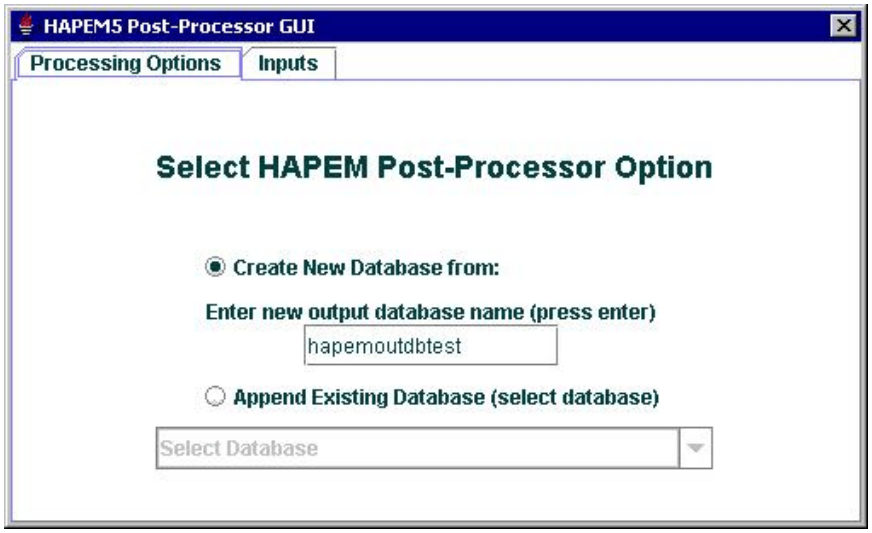
Alternatively, the full set of module instance parameters can be viewed and edited by double-clicking on "HAPEM Postprocessor" (the module instance name for this component) in the "Graph View" pane of the scenario window. This will open up the parameters table, as described in Volume I, Section 3.1.8. Note that users can set some parameters using the "Input Panels" and others using the module instance parameters tables; users are not required to use one method exclusively. Refer to Appendix E, Exhibit E-14, for a list and description of each of the HAPEM Postprocessor module instance parameters.

HAPEM5 Post-Processor GUI inputs must be set by the user via the GUI during execution of the scenario (described below), regardless of whether other inputs were set using the "Input Panels" or module instance parameters table. The HAPEM5 Post-Processor GUI will automatically appear as the run is executing, allowing the user to select the HAPEM output files and databases to be used. The GUI can be accessed by right-clicking on the HAPEM Postprocessor module instance in the MIMS "Graph View" pane, and then selecting "Open Custom GUI." However, the HAPEM5 Post-Processor GUI will open during the scenario execution, regardless. Instructions for using the GUI are provided below.

5.3.2.1 "Processing Options" Tab

Using this screen (see Exhibit 5-11), the user specifies the MySQL database to which HAPEM outputs will be written. The user must choose whether to create a new HAPEM exposure output database or to append the HAPEM exposure outputs in an existing output database.

Exhibit 5-11. "Processing Options" Tab of the HAPEM5 Post-Processor GUI



Using the radio buttons (◯) on the "Processing Options" tab, select one of the following:

- "Create New Database from:" – this selection will result in a new exposure estimates database being created from the provided HAPEM output files; or
- "Append Existing Database (select database)" – this selection will result in the exposure results from the provided HAPEM output files being appended to an existing exposure estimates database.

Valid Database Names in MySQL

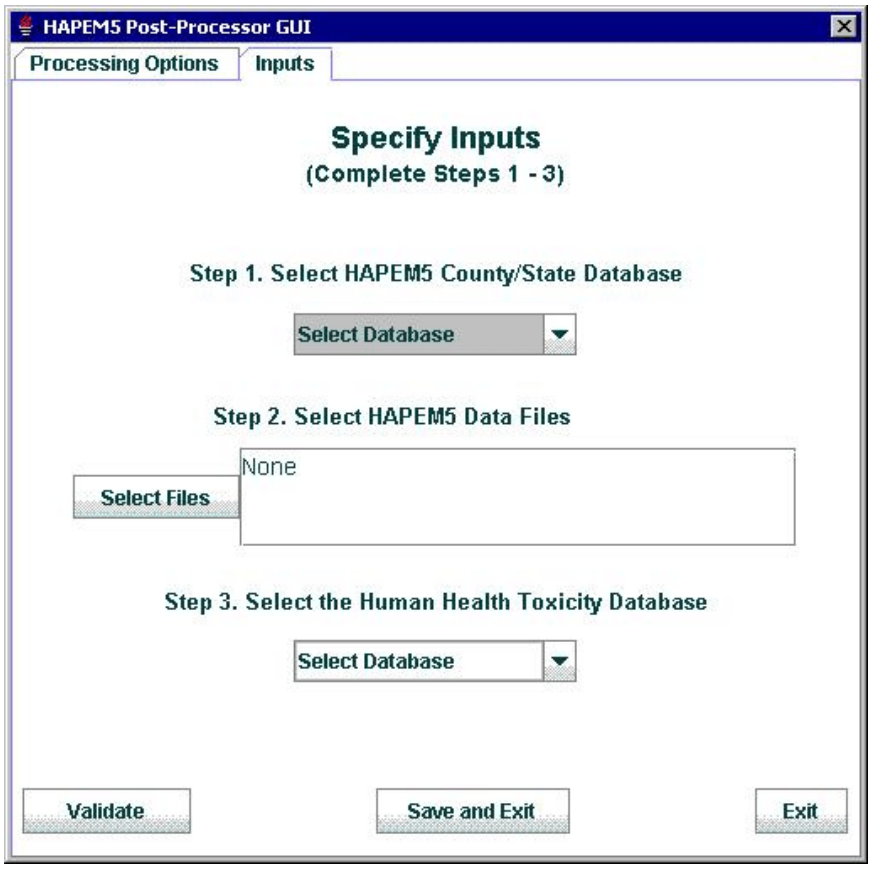
A MySQL database name must be 64 characters or less and cannot contain spaces or any of the following characters:"\", "/", or ".". In addition, the database name must not match any of the "reserved" names in MySQL (see http://www.mysql.com/doc/en/Reserved_words.html).

If "Create New Database from:" is selected, confirm that the database name entered here corresponds to the "Inhalation Exposure DB Name" already specified in the "Input Panels," or enter a name for the new database in the box below "Enter new output database name (press enter)." This name must be a valid MySQL database name (see text box). After entering the database name, press Enter. If "Append Existing Database (select database)" is selected, the user must select an existing HAPEM output database from the drop-down list. After completing this step, click on the "Inputs" tab.

5.3.2.2 "Inputs" Tab

On this tab, the user selects the databases and data files to be converted to a MySQL database of exposure estimates (see Exhibit 5-12). There are three steps to be completed to specify the inputs. After specifying inputs, they must be validated and saved before proceeding (as described below).

Exhibit 5-12. "Inputs" Tab of the HAPEM5 Post-Processor GUI



Step 1. Select the HAPEM5 County/State Database. The user first selects the MySQL database containing the HAPEM County/State data from the list of available databases (determined by MySQL). The HAPEM County/State database is not included in the TRIM or HAPEM installations. The user is responsible for downloading this database from the HAPEM download page and installing it according to the directions provided with the database. The user should select a HAPEM county or state database from the available databases in the drop-down list.

Step 2. Select HAPEM5 Data Files. In this step, the user selects the HAPEM output files that will be written to the specified MySQL exposure estimates database. Select the HAPEM data files by clicking on "Select Files" and browsing to the HAPEM output file(s) you wish to add to the output database.

Step 3. Select the Human Health Toxicity Database. In this step, the user selects the human health toxicity database that will be used by TRIM.Risk to calculate risk and hazard estimates. Select a human health toxicity database from the available databases (determined by MySQL) in the drop-down list.

Validate, Save and Exit, Exit. Once the three numbered steps on this tab have been completed, users can validate their settings, save their settings, and/or exit the GUI. There are three buttons available at the bottom of the "Inputs" tab to perform these tasks: "Validate," "Save and Exit," and "Exit." The use and functionality of each of these buttons is described below.

Validate. This button is used to confirm that user selections on the two tabs in this GUI are valid. Selections **must** be validated by clicking the "Validate" button before continuing to run the scenario. If the selections are valid, they are saved and the following message appears:

If there is a problem with any of the selections, an error message is generated alerting the user to the problems with the selections. If a new database was specified in Step 1 and a database already exists with the same name, the user will be asked to confirm they want to overwrite this database. If not, they must select "No" and return to the "Processing Options" tab to select another database name. After the user has corrected any problems that were identified during validation, they should click "Validate" again to confirm that the problems have been addressed.

Save and Exit. When this button is clicked, the current settings are saved and the GUI is exited. If the settings have already been validated, clicking this button will cause the following message to appear:

Clicking "Yes" will exit the GUI and the scenario will continue running. Clicking "No" will return the user to the GUI. The "Save and Exit" button also allows users to make some of the selections in the GUI and save these selections

without validating them. If the user's selections have not been validated, the following message will appear:

The user will have the option of exiting the GUI and saving their selections, or returning to the GUI to complete and validate these selections. If the settings are saved without validation, the scenario will fail after the GUI is exited. In this case, the user must return to the GUI later and validate their selections before re-running the scenario.

Exit. This button allows the user to exit the GUI but does not save user selections made via the GUI. If this button is clicked but selections have not been validated, the GUI will close without saving any selections and the scenario will fail. Because none of the selections will be saved, the user will have to begin the process of specifying options on the HAPEM5 Post-Processor GUI from the beginning. If this button is clicked after selections have been validated successfully, the GUI will close and the scenario will continue running. In many cases, though, the user may want to use the "Save and Exit" button rather than the "Exit" button to exit the GUI so that any selections made will be saved.

5.4 TRIM.Risk Components

This section describes TRIM.Risk and the accompanying metrics generator. As described below, these components use the exposure, risk, toxicity, residency, and/or population MySQL databases, and generate MySQL databases of annualized risk values and multi-year risk metrics. The new databases that are created are available for analysis and/or export using DAVE (see Section 5.5).

5.4.1 TRIM.Risk

TRIM.Risk combines the inhalation exposure results included in a TRIM.Expo$_{Inhalation}$ or HAPEM output database with the human toxicity data located in the human health toxicity database to calculate individual annualized human health hazard and cancer risk associated with inhalation exposures to hazardous air pollutants.

When Is This Component Used?

This component will be included in any TRIM.Risk scenario where inhalation risk estimates are generated.

The inputs (i.e., module instance parameters) required by TRIM.Risk can be set by the user in one of two ways. Users can specify values for all parameters related to the TRIM.Risk component via the "Input Panels" pane. The steps involved in setting parameter values in the "Input Panels" are provided in the step-by-step scenario instructions in Chapter 3 (see Step 2 of Section 3.3 or 4.2).

Alternatively, the full set of module instance parameters can be viewed and edited by double-clicking on "Risk-HH-NP" (the module instance name for this component) in the "Graph View" pane of the scenario window. This will open up the parameters table, as described in Volume I, Section 3.1.8. Note that users can set some parameters using the "Input Panels" and others using the module instance parameters tables; users are not required to use one method exclusively. Refer to Appendix E, Exhibits E-7 and E-15, for a list and description of each of the TRIM.Risk module instance parameters.

5.4.2 TRIM.Risk Metrics Generator

The TRIM.Risk metrics generator uses data contained in the human health toxicity database, the residency period database, the TRIM.Expo$_{Inhalation}$ (i.e., APEX) population database (TRIM.Expo$_{Inhalation}$ only), and the inhalation risk database (annualized risk and hazard outputs generated by TRIM.Risk) to calculate risk metrics specified by the user. This component allows the user to generate a number of individual and population risk metrics, and is used in all risk assessment scenarios using inhalation exposure estimates from TRIM.Expo$_{Inhalation}$ or HAPEM. It can be run multiple times for a single TRIM.Risk output database to generate different risk metrics (e.g., different combinations of chemicals, different percentiles for age bin representation) using the same annualized individual risk estimates. See Exhibit 2-1 for a list of risk metrics that can be generated by this module.

When Is This Component Used?

This component will be included in any TRIM.Risk scenario where inhalation risk metrics will be calculated.

The inputs (i.e., module instance parameters) required by the TRIM.Risk metrics generator can be set by the user in one of two ways. Users can specify values for most parameters related to the TRIM.Risk metrics generator component via the "Input Panels" pane (some inputs must be specified via the TRIM.Risk$_{HH}$ Inhalation Metrics GUI - see below). The steps involved in setting parameter values in the "Input Panels" are provided in the step-by-step scenario instructions in Chapters 3 or 4 (see Step 2 of Section 3.3 or 4.2).

Alternatively, the full set of module instance parameters can be viewed and edited by double-clicking on "RiskMetricsGenerator-NP" (the module instance name for this component) in the "Graph View" pane of the scenario window. This will open up the parameters table, as described in Volume I, Section 3.1.8. Note that users can set some parameters using the "Input Panels" and others using the module instance parameters tables; users are not required to use one method exclusively. Refer to Appendix E, Exhibits E-8 and E-16, for a list and description of each of the TRIM.Risk metrics generator module instance parameters.

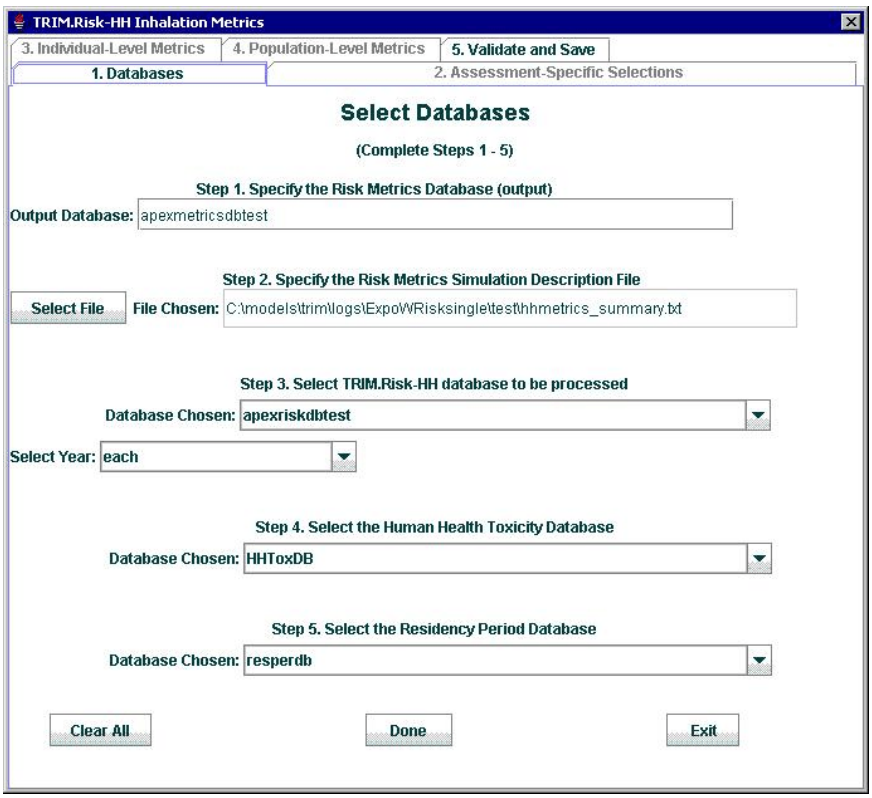
The TRIM.Risk$_{HH}$ Inhalation Metrics GUI will automatically open as the scenario is executing to allow the user to make selections, regardless of whether other inputs were set using the "Input Panels" or module instance parameters table. Although different dimensions will be associated with the inhalation risk estimates depending on whether TRIM.Expo$_{Inhalation}$ or HAPEM was used to generate inhalation exposure estimates, the process of specifying the options for the different risk metrics through the GUI is generally similar. The user will select options and enter inputs using the same five main tabs contained in the TRIM.Risk$_{HH}$ Inhalation Metrics GUI regardless of whether TRIM.Expo$_{Inhalation}$ or HAPEM was used. However, some of the options accessed through the "Assessment-Specific Selections" tab will depend on which exposure model was used to generate exposure estimates. These differences are discussed in the instructions for Tab 2.

The GUI can also be accessed prior to execution of the scenario by right-clicking on the "RiskMetricsGenerator-NP" module instance in the MIMS "Graph View" pane, and then selecting "Open Custom GUI." However, this approach will be not be as easy for users (because no fields will be filled in with entries), and the GUI will open for the user to complete during scenario execution, regardless. Step-by-step instructions for using the GUI are provided below.

5.4.2.1 "1. Databases" Tab

Using this screen, the user specifies the names of input and output databases via a series of five numbered steps (see Exhibit 5-13).

Exhibit 5-13. "Databases" Tab



Step1. Specify the Risk Metrics Database (output). In this step, the user specifies the name of the new MySQL database that will be created to contain the risk metrics outputs generated by this component. Enter an output database name next to "Output Database:". This name must be a valid MySQL database name (see text box below).

Valid Database Names in MySQL

A MySQL database name must be 64 characters or less and cannot contain spaces or any of the following characters:"\", "/", or ".". In addition, the database name must not match any of the "reserved" names in MySQL (see http://www.mysql.com/doc/en/Reserved_words.html).

Step 2. Specify the Risk Metrics Simulation Description File. In this step, the user specifies the name and location for the risk metrics simulation description file that is generated during the simulation. This file records the selected metrics generated during a particular simulation and is used by DAVE in creating tables and plots. Specify a new risk metrics simulation description file when a scenario is run for the first time or when

generating a different set of risk metrics using the same TRIM.Risk output database. **Do not specify an existing file path and name for the risk metrics simulation description file when generating a different set of risk metrics.** The existing file cannot be overwritten or updated by the module; thus, new selections made for a risk metrics database will not be recorded in the summary file.

To create a new risk metrics simulation description file, click on "Select File" and browse to the desired location for the new file, type a name next to File Name in the browsing window (remembering to include the file extension ".txt"), and then click "Select." After specifying the file name, the designated file path and name will appear next to "File Chosen:".

Step 3. Select the TRIM.Risk-HH Database and Select the Year. In this step, the user selects a TRIM.Risk output database (containing annualized cancer and hazard estimates for all modeled individuals) from the available MySQL databases that appear in the "Database Chosen:" drop-down list. The user must also select one or more years from the available years of data in the selected database using the "Select Year" drop-down list. To select all available years, select "each." Risk metrics will be calculated separately for each selected year.

Step 4. Select the Human Health Toxicity Database. In this step, the user selects a human health toxicity database from the available MySQL databases that appear in the "Database Chosen:" drop-down list. This drop-down list will include all MySQL databases that are saved to the MySQL data directory (regardless of what they contain). The selected database must be the same database used by TRIM.Risk in calculating the annualized cancer and hazard estimates.

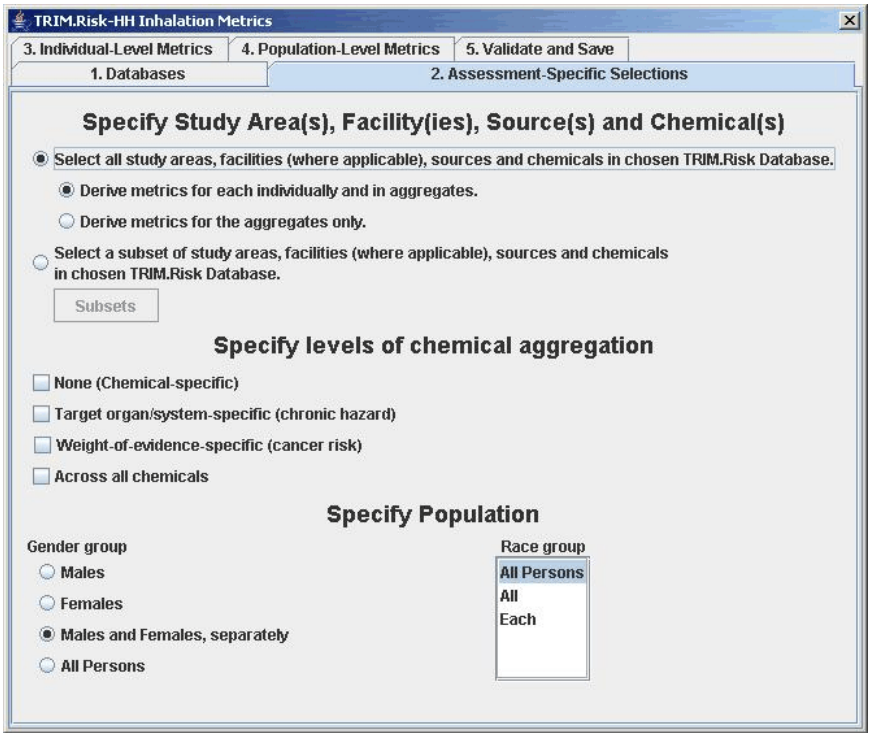
Step 5. Select the Residency Period Database. In this step, the user selects a residency period database from the available MySQL databases that appear in the "Database Chosen:" drop-down list. This drop-down list will include all MySQL databases that are saved to the MySQL data directory (regardless of what they contain). This database is described in Section 2.3.3.

After selecting the residency period database (Step 5 on the "Databases" tab), click "Done"at the bottom of the screen. Then, click the "Assessment-Specific Selections" tab and proceed to the next steps.

5.4.2.2 "2. Assessment-Specific Selections" Tab

Using this screen, the user specifies selections specific to the assessment dimensions, levels of chemical aggregation, and population (see Exhibit 5-14).

Exhibit 5-14. "Assessment-Specific Selections" Tab



Specify Study Area(s), Facility(ies), Source(s) and Chemical(s). This step allows the user to select the study areas, facilities, sources, and chemicals for which risk metrics will be calculated, and to specify aggregation across study areas, facilities, and sources as desired.[2] There are two options for making these selections: (1) select all values for these dimensions in the TRIM.Risk output database ("Select All"); or (2) select a subset of the available dimension values ("Select a Subset"). The selection options for this step are described below.

Select All: Clicking the radio button next to "Select all study areas, facilities, sources, and chemicals in the chosen TRIM.Risk Database" results in risk metrics being calculated for all study areas, facilities, sources, and chemicals in the selected TRIM.Risk output database. There are two additional options for this selection:

[2] Note that the assessment dimensions referenced at the top of the "Assessment-Specific Selections" tab and in the general instructions presented here are specific to exposure estimates generated using TRIM.Expo$_{Inhalation}$. If HAPEM was used to generate exposure estimates, the assessment dimensions available for subsetting will be state, source, and chemical rather than study area, facility, source, and chemical.

- "*Derive metrics for each individually and in aggregates*" – If this option is selected, metrics will be calculated for each unique combination of study area, facility, and source (i.e., individually) as well as calculated for all possible combinations of aggregated and individual study areas, facilities, and sources. For example, metrics would be calculated for all combinations that involve each individual study area as well as the aggregate of all study areas.

- "*Derive metrics for the aggregates, only*" – If this option is selected, metrics will be calculated for all possible combinations of aggregated and individual study areas, facilities, and sources; however, metrics for combinations involving a unique combination of only one study area, one facility, and one source will not be generated.

Note that all chemicals in the TRIM.Risk output database are selected in this step, but their aggregation method is specified on the main screen of the "Assessment-Specific Selections" tab.

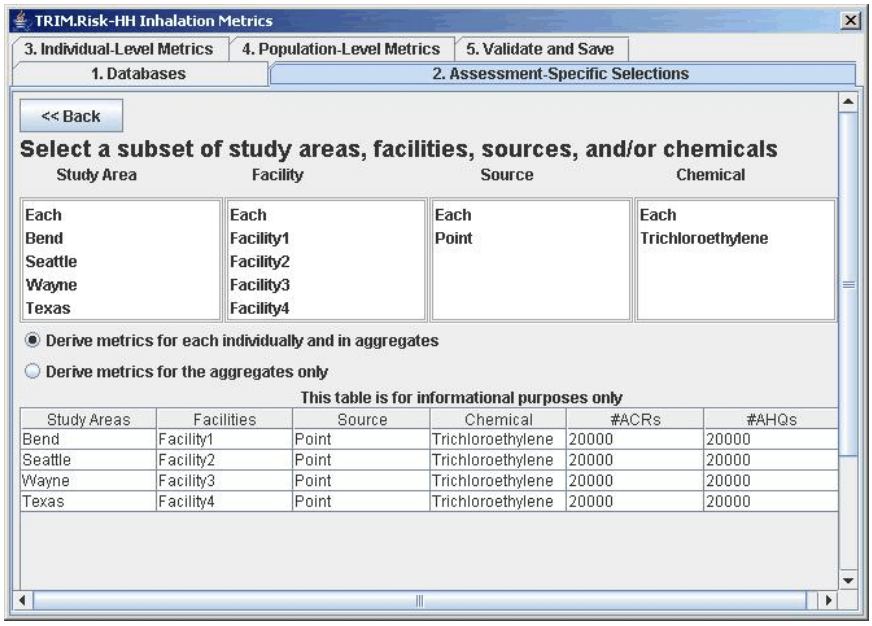
Select a Subset: Clicking "Select a subset of study areas, facilities, sources, and chemicals in the chosen TRIM.Risk Database" allows the user to select one or multiple study areas, facilities ($TRIM.Expo_{Inhalation}$ only), sources, and chemicals in the selected TRIM.Risk output database for which metrics will be generated. If this option is selected, users must click the "Subsets" button to select study areas, facilities, sources, and chemicals.

After clicking the "Subsets" button, the user is presented with one of two subset selection screens, depending on whether $TRIM.Expo_{Inhalation}$ or HAPEM was used as the exposure model. These two screens are discussed separately below.

If TRIM.Expo$_{Inhalation}$ is the exposure model:

Clicking the "Subsets" button on the "Assessment-Specific Selections" tab will bring up the following subset selection screen.

Subset Selection Screen for Metrics Using TRIM.Expo$_{Inhalation}$ Exposure Results



Using the four lists presented in the top half of the screen, the user can select one or several study areas, facilities, sources, and/or chemicals. To select all of the items in one of these lists, select "Each." The table on the bottom half of the window lists the risk data available in the input database (selected on the "Databases" tab) and is **not** updated dynamically based on user subset selections. After making selections from the four lists, the user must select one of the two options below the list for deriving metrics individually and in aggregates:

- "*Derive metrics for each individually and in aggregates*" – If this option is selected, metrics will be calculated for each unique combination of study area, facility, and source (i.e., individually) as well as calculated for all possible combinations of aggregated and individual study areas, facilities, and sources. For example, metrics would be calculated for all combinations that involve each individual study area as well as the aggregate of all study areas.

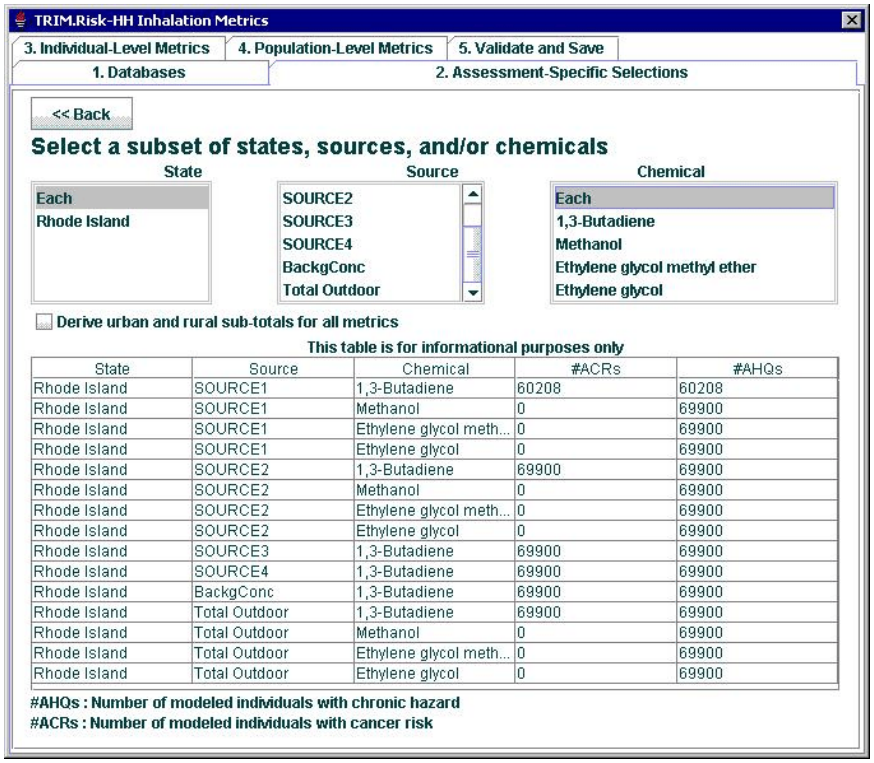
- "*Derive metrics for the aggregates, only*" – If this option is selected, metrics will be calculated for all possible combinations of aggregated and individual study areas, facilities, and sources; however, metrics for combinations involving a unique combination of only one study area, one facility, and one source will not be generated.

Note that a subset of chemicals can be selected in this step, but metrics are not *aggregated* by chemical unless specified on the main "Assessment-Specific Selections" tab. After completing these selections, click the "Back" button at the top left side of the window to return to the "Assessment-Specific Selections" tab to specify levels of chemical aggregation.

If HAPEM is the exposure model:

Clicking the “Subsets” button on the “Assessment-Specific Selections” tab will bring up the following subset selection screen.

Subset Selection Screen for Metrics Using HAPEM Exposure Results



State	Source	Chemical	#ACRs	#AHQs
Rhode Island	SOURCE1	1,3-Butadiene	60208	60208
Rhode Island	SOURCE1	Methanol	0	69900
Rhode Island	SOURCE1	Ethylene glycol meth...	0	69900
Rhode Island	SOURCE1	Ethylene glycol	0	69900
Rhode Island	SOURCE2	1,3-Butadiene	69900	69900
Rhode Island	SOURCE2	Methanol	0	69900
Rhode Island	SOURCE2	Ethylene glycol meth...	0	69900
Rhode Island	SOURCE2	Ethylene glycol	0	69900
Rhode Island	SOURCE3	1,3-Butadiene	69900	69900
Rhode Island	SOURCE4	1,3-Butadiene	69900	69900
Rhode Island	BackgConc	1,3-Butadiene	69900	69900
Rhode Island	Total Outdoor	1,3-Butadiene	69900	69900
Rhode Island	Total Outdoor	Methanol	0	69900
Rhode Island	Total Outdoor	Ethylene glycol meth...	0	69900
Rhode Island	Total Outdoor	Ethylene glycol	0	69900

Using the three lists presented in the top half of the screen, the user can select one or several states, sources, and/or chemicals. To select all of the items in one of these lists, select “Each.” The user also has the option to include urban and rural classification when generating metrics (note that checking this option would only impact the number of population-level metrics that are generated). The table on the bottom half of the window lists the risk data available in the input database (selected on the “Databases” tab) and is **not** updated dynamically based on user subset selections.

Aggregate results are generated for sources by HAPEM (not by TRIM.Risk), using the “Total Outdoor” source name to specify the aggregate risk presented by sources emitting a particular chemical. Thus, for a scenario in which more than one chemical is being analyzed (as in the screen shot above), there will be multiple “Total Outdoor” sources, each representing the risk estimates for a particular chemical from all modeled sources.

Note that a subset of chemicals can be selected in this step, but metrics are not *aggregated* by chemical unless specified on the main “Assessment-Specific Selections” tab. After completing these selections, the user should click the “Back” button at the top left side of the window to return to the “Assessment-Specific Selections” tab to specify levels of chemical aggregation.

Specify Levels of Chemical Aggregation. This step allows the user to select how risk and hazard results should be aggregated across chemicals by clicking the check boxes in the middle of the tab (see Exhibit 5-14). Decisions regarding chemical aggregation will apply to the set of chemicals specified by the user for analysis (i.e., either a subset of chemicals selected using the subset selection screen, or all chemicals if the "Select all" radio button at the top of the tab was selected).

If only one chemical was selected for analysis, or if the TRIM.Risk output database only contains results for one chemical, the user should select "None (Chemical-specific)." Otherwise, select **one or more** of the four options. Each of these options is explained below.

- "*None (Chemical-specific)*" – If this option is selected, all selected risk metrics will be calculated individually for each selected chemical.

- "*Target organ/system-specific (chronic hazard)*" – If this option is selected, chronic non-cancer hazards will be summed across chemicals based on the target organ/system-specific designations in the specified human health toxicity database.

- "*Weight-of-evidence-specific (cancer risk)*" – If this option is selected, cancer risks will be summed across chemicals based on the weight-of-evidence designations in the specified human health toxicity database.

- "*Across all chemicals*" – If this option is selected, chronic non-cancer hazards and cancer risks will each be summed across chemicals as appropriate.

Select the Population. This step allows the user to select the gender and race group(s) for which risk metrics will be calculated using the radio buttons in the lower part of the tab (see Exhibit 5-14). To designate gender group(s), select **one** of the following options:

- *Males* – Risk metrics will be generated for males only.

- *Females* – Risk metrics will be generated for females only.

- *Males and Females, separately* – Risk metrics will be generated separately for both males and females.

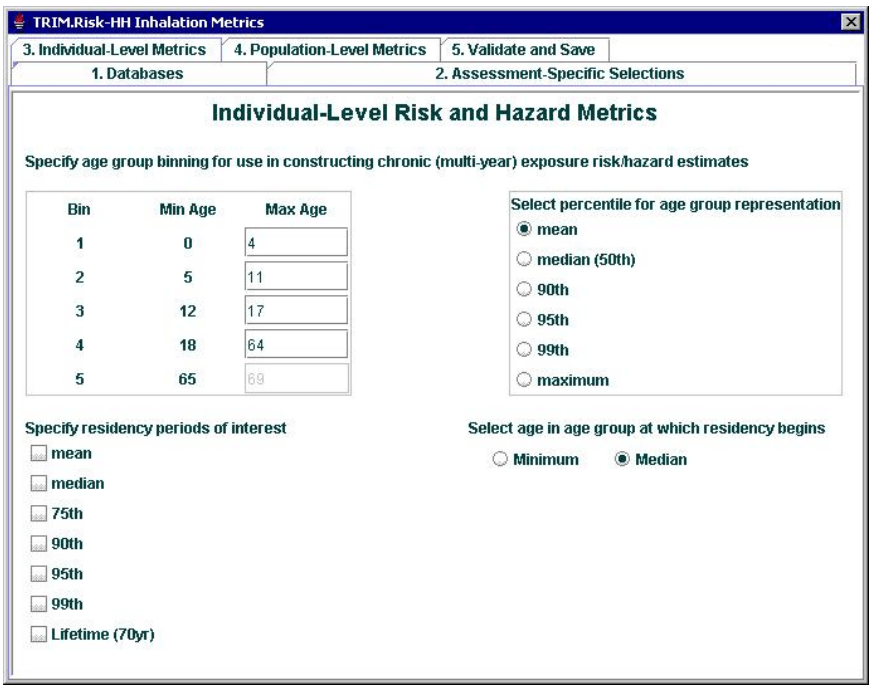
- *All Persons* – Risk metrics will be generated for all modeled individuals, but the metrics will not distinguish results for males from females.

To select the race group(s), select "All Persons" (in which case metrics will be calculated for all modeled individuals, without distinguishing between races), a specific race (in which case metrics will be calculated for that race only), or "Each" (in which case metrics will be calculated for all modeled individuals and will distinguish between races).

5.4.2.3 "3. Individual-Level Metrics" Tab

After selecting the population options, click on the "Individual-Level Metrics" tab and proceed to the four types of selections described below. Using this screen, the user specifies options that specify how individual-level risk and hazard metrics will be calculated by TRIM.Risk (see Exhibit 5-15).

Exhibit 5-15. "Individual-Level Metrics" Tab



Specify Age Group Bins. Using the boxes in the top left part of the tab, the user specifies the age bins that will be used to group modeled individuals into distributions of cancer risk and hazard estimates for calculation of multi-year metrics. The user enters a value for "Max Age" for Bins 1 through 4; as each value is entered, hit "Tab" and the "Min Age" values will automatically update. The maximum age of Bin 5 is fixed at 69 years. If HAPEM was used to generate exposure estimates, the age bins will be fixed and cannot be altered; in this case, the age boxes will be greyed out.

Select Percentile for Age Group Representation. Using the radio buttons in the top right part of the tab, the user specifies the percentile of cancer risk and hazard estimates from the age bin distributions that will be used to calculate metrics. Only one of the six percentiles can be selected. The selected percentile will be used to represent all of the individuals in the age bin in risk metrics calculations.

Specify Residency Period(s). The user specifies the residency period(s) of interest using the check boxes in the lower left part of the tab. The selected residency period(s) will be used in subsequent risk metrics calculations. Note that this option is not available in the "Inhalation risk assessment using RfCs and UREs, with HAPEM" project (it will be greyed out). Select **one or more** of the available residency periods. Selecting any of the

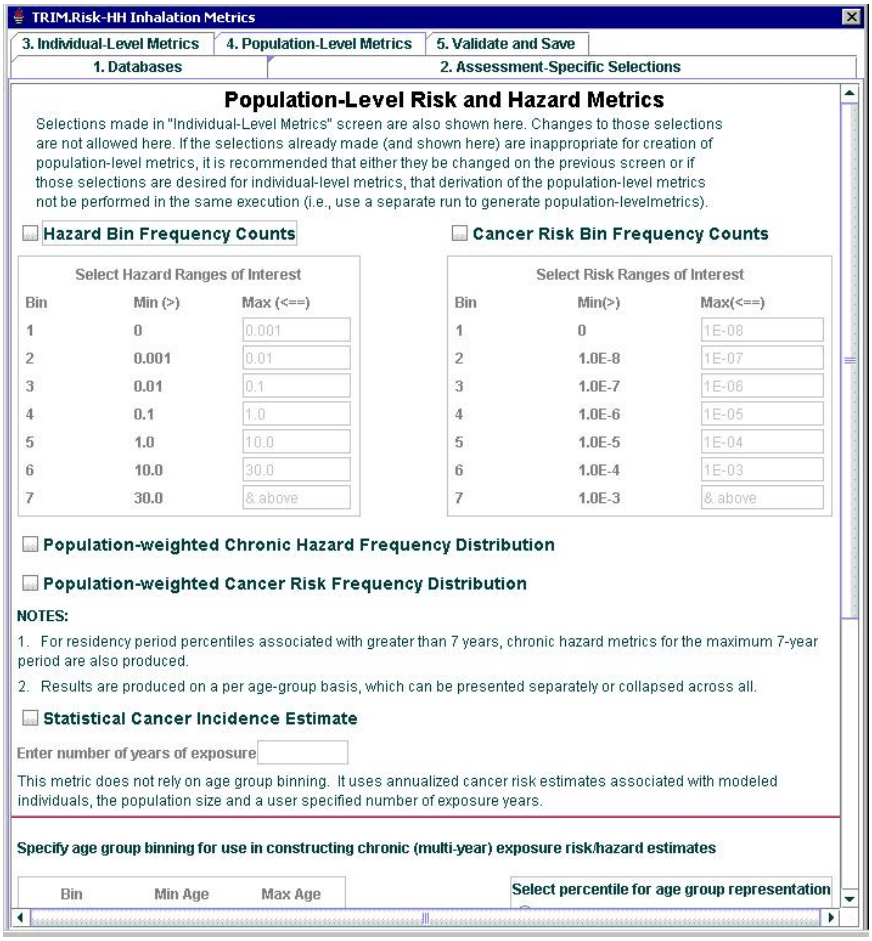
residency periods except “Lifetime (70yr)” will result in the calculation of risk metrics for less-than-lifetime exposures associated with period of residency. Selecting “Lifetime (70yr)” will result in the calculation of risk metrics based on lifetime residency in the same location.

Select Age at which Residency Begins. After selecting the residency period(s), select one of the two options for when residency should begin, either the minimum age in each age group or the median age in each age group. If only “Lifetime (70yr)” was selected for residency period, this selection will not impact the calculation of risk metrics.

5.4.2.4 “4. Population-Level Metrics” Tab

After selecting individual-level metrics, click on the “Population-Level Metrics” tab. Using the check boxes on this tab, the user specifies the population-based risk metrics to be generated (see Exhibit 5-16).

Exhibit 5-16. “Population-Level Metrics” Tab



Available population-based metrics include:

- Hazard bin frequency counts;
- Cancer risk bin frequency counts;
- Population-weighted chronic hazard frequency distribution;
- Population-weighted cancer risk frequency distribution; and
- Estimate of statistical cancer incidence.

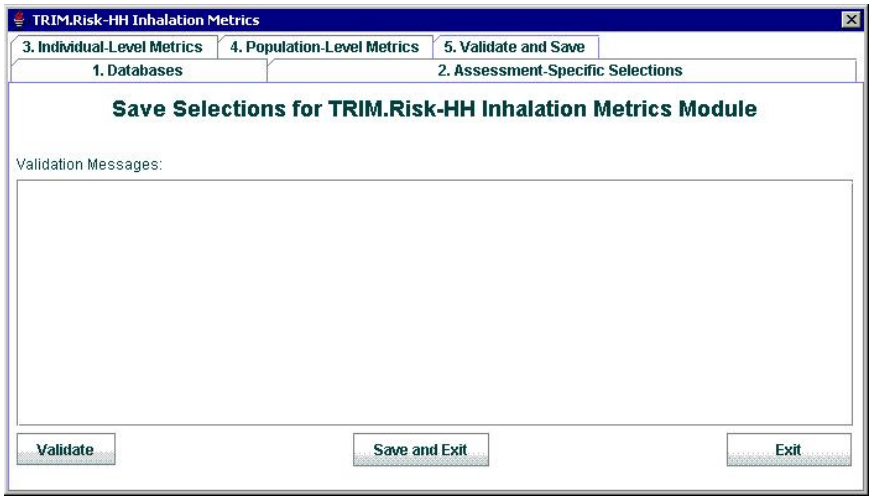
Descriptions of these metrics are provided in Chapter 2 and Appendix A. With the exception of the statistical cancer incidence estimate, any population-level metrics selected will be derived using specifications made on the previous ("Individual-Level") tab. Therefore, where different specifications (e.g., for residency period or age-group representation) are needed for individual-level metrics versus population-level metrics, the risk metrics generator will need to be run multiple times. For reference, the selections made regarding individual-level metrics can be viewed (but not edited) at the bottom of this tab (the bottom of Exhibit 5-16 shows the top piece of the summary of individual-level metrics; scroll down on the screen to view the full summary of selections made).

Note that once the boxes next to "Hazard Bin Frequency Counts" or "Cancer Risk Bin Frequency Counts" are selected (checked), the hazard and/or risk ranges of interest become accessible and the minimum and maximum bin values can be edited. After the box next to "Statistical Cancer Incidence Estimate" has been checked, the exposure duration (in years) must be specified by typing a value in the box provided.

5.4.2.5 "5. Validate and Save" Tab

Using the buttons on this tab, users can validate their settings, save their settings, and/or exit the GUI. There are three buttons at the bottom of this tab that allow the user to perform these tasks. The use and functionality of each of these buttons is described below.

Exhibit 5-17. "Validate and Save" Tab



Validate. This button is used to confirm that user selections regarding databases, assessment-specific subsetting and aggregation selections, and individual- and population-level metrics made on the four other tabs in this GUI are valid. Selections **must** be validated by clicking the "Validate" button before continuing to run the scenario. If there is a problem with any of the selections, a message will appear in the Validation Messages box. Examples of problems that will be identified during validation include:

- Failing to make selections on the subset screen if the "Select a Subset" button is filled in on the "Assessment-Specific Selections" tab;
- Not specifying a level of chemical aggregation on the "Assessment-Specific Selections" tab; or
- Failing to complete all relevant options on the "Individual-Level Metrics" tab.

Problems that are identified during validation can be addressed by going back through the tabs and making corrections. The user should then click "Validate" again to confirm that problems have been addressed.

Save and Exit. When this button is clicked, the current settings are saved and the GUI is exited. If the settings are valid, the scenario will continue running. This button also allows users to make partial selections in the GUI and save these selections without validating them. If the settings have not yet been validated and are not valid, a "validation failed" message will appear in the Validation Messages box. In this case, the user can make necessary corrections and validate their selections before re-running the scenario.

Exit. This button allows the user to exit the GUI but does not save user selections made via the GUI. If this button is clicked but selections have not been validated, the GUI will close without saving any selections and the scenario will fail. Because none of the selections will be saved, the user will have to begin the process of specifying risk metrics options from the beginning. If this button is clicked after selections have been validated successfully, the GUI will close and the scenario will continue running. In many cases, though, the user may want to use the "Save and Exit" button rather than the "Exit" button to exit the GUI so that any selections made will be saved.

5.5 DAVE

When Is This Component Used?

This component will be used after running a TRIM.Risk inhalation risk assessment scenario to export results, create tables and charts, and analyze data.

After running one of the inhalation risk assessment scenarios in MIMS, the human health risk estimates are contained in the inhalation risk and human health risk metrics databases (the names of these databases are specified by the user prior to running the scenario) in MySQL format. Users familiar with writing SQL database queries may wish to access the data directly using MySQL. Alternatively, DAVE can create tables and plots using data from MySQL databases generated by the various TRIM modules. With the export function, DAVE can export databases into delimited text files for analysis and display in other programs. Refer to Volume I, Sections 3.3.1 and 3.3.2 for additional instruction on exporting and analyzing data with DAVE, and the DAVE User's Guide for detailed instructions. The DAVE User's Guide is accessible via the EPA FERA website (http://www.epa.gov/ttn/fera).

Appendix A
Human Health Risk Metrics

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A.1 Introduction

This appendix describes the risk metrics that are generated when TRIM.Risk is applied in a human health inhalation risk assessment using non-probabilistic exposure-response values. The purpose of this appendix is to complement the conceptual discussion in Chapter 2 by providing computational details of each metric presented in Exhibit 2-1 and walking through a hypothetical example for these risk metrics.

In this introductory section, two tables are presented that summarize the dimensions associated with each risk metric and the outputs included with each metric. Dimensions and outputs are summarized for cancer and chronic hazard metrics in Exhibits A-1 and A-2, respectively. Following these tables, Section A.2 presents demographic data on a sample population for a hypothetical site consisting of three home sectors. This information is used in the sections that follow in sample calculations and tables that illustrate how cancer and chronic hazard metrics are calculated and the types of outputs generated for each metric. Section A.3 provides information on the cancer risk metrics, and Section A.4 provides details on the chronic hazard metrics. Section A.5 presents additional information related to the representative value assigned to age bins.

In Section A.6, a series of flow charts illustrate the sequence of computational steps carried out for each risk metric. Each step is performed based on a set of user-specified parameters that include chemical or group of chemicals, demographic characteristics (race and gender), age groupings, and residency period percentile (as discussed in Chapter 2, Sections 2.2 and 2.3.3). The first set of flow charts illustrate the computation of the cancer risk metrics (Exhibits A-30 through A-36), followed by a set of flow charts illustrating the computation of the chronic hazard metrics (Exhibits A-37 through A-50).

Exhibit A-1. Dimensions and Outputs of TRIM.Risk Cancer Risk Metrics

			Individual Metrics		***Population Metrics***			
			Lifetime Cancer Risk		***Population-Weighted Risk Distribution***		***Risk Bin Frequency Count***	
	Annualized Cancer Risk (ACR)	Statistical Cancer Incidence (SCI)	Lifetime Residency Period (LCR)	Less-than-Lifetime Residency Period (LCR_LT)	Lifetime Residency Period (PRD)	Less-than-Lifetime Residency Period (PRD_LT)	Lifetime Residency Period (RBF)	Less-than-Lifetime Residency Period (RBF_LT)
Dimensions of Metrics [a]								
Modeled Individual	●							
Home Sector[b]	●	●	●	●	●	●		
Age[c]	●							
Age Bin				●		●		●
Residency Period Percentile				●		●		●
Risk Bin							●	●
Calculated Outputs Included with Metrics								
Cancer Risk	●		●	●	●	●		
Number of People					●	●	●	●
Percentage of Population					●	●		
Cumulative Percentile of Population					●	●		
Rank					●	●		
Annual SCI		●						
Total SCI		●						

[a] Other dimensions that can be associated with *any* risk metric if selected by the user for subsetting risk outputs include **race**, **gender**, **chemical/group of chemicals**, and **assessment dimensions** (i.e., study area, facility, and source if TRIM.Expo$_{Inhalation}$ is used; state, source, and urban/rural classification if HAPEM is used). In addition, cancer metrics can include **cancer weight-of-evidence classification** as a dimension if selected by the user for subsetting.

[b] In this table, the term "home sector" refers to a risk metric dimension derived from exposure results generated by TRIM.Expo$_{Inhalation}$. If HAPEM is used to estimate exposures, the term "home tract" would apply; however, the basic conceptual dependence of metrics on this dimension would be the same as described here for "home sector." See Section 2.2 for additional details.

[c] Age is a dimension of the ACR if exposure estimates from TRIM.Expo$_{Inhalation}$ are used. If exposure estimates are generated by HAPEM, the ACR will be associated with age bin.

Exhibit A-2. Dimensions and Outputs of TRIM.Risk Chronic Hazard Metrics

		Individual Metrics				***Population Metrics***									
		Hazard		***Max. 7-yr Haz.***		***Population-Weighted Hazard***					***Hazard Bin Frequency Count***				
	Annualized Hazard Quotient (AHQ)	Lifetime (HQ_L)	Less-than-Lifetime (HQ_LT)	Lifetime (MAX7HQ_L)	Less-than-Lifetime (MAX7HQ_LT)	Annual (PHD)	Lifetime (PHD_L)	Less-than-Lifetime (PHD_LT)	Lifetime (PHD_7_L)	Less-than-Lifetime (PHD_7_LT)	Annual (HBF)	Lifetime (HBF_L)	Less-than-Lifetime (HBF_7_L)	Lifetime (HBF_LT)	Less-than-Lifetime (HBF_7_LT)
Dimensions of Metrics [a]															
Modeled Individual	●														
Home Sector[b]	●	●	●	●	●	●	●	●	●	●					
Age[c]	●														
Age Bin					●			●		●				●	●
Residency Period Percentile					●			●		●				●	●
Hazard Bin											●	●	●	●	●
Calculated Outputs Included with Metrics															
Hazard	●	●	●	●	●	●	●	●	●	●					
Number of People							●	●	●	●	●	●	●	●	●
% of Population							●	●	●	●					
Cumulative Percen-tile of Population							●	●	●	●					
Rank							●	●	●	●					

[a] Other dimensions that can be associated with *any* risk metric if selected by the user for subsetting risk outputs include **race**, **gender**, **chemical/group of chemicals**, and **assessment dimensions** (i.e., study area, facility, and source if TRIM.Expo$_{Inhalation}$ is used; state, source, and urban/rural classification if HAPEM is used). In addition, hazard metrics can include **target organ** as a dimension if selected by the user for subsetting.

[b] In this table, the term "home sector" refers to a risk metric dimension derived from exposure results generated by TRIM.Expo$_{Inhalation}$. If HAPEM is used to estimate exposures, the term "home tract" would apply; however, the basic conceptual dependence of metrics on this dimension would be the same as described here for "home sector." See Section 2.2 for additional details.

[c] Age is a dimension of the ACR if exposure estimates from TRIM.Expo$_{Inhalation}$ are used. If exposure estimates are generated by HAPEM, the ACR will be associated with age bin.

A.2 Hypothetical Example: Demographics Information and Mean Residency Periods

This example uses a site with three home sectors – A, B, and C – with individuals in each home sector falling into the age bins and demographics as shown in Exhibit A-3. For the purposes of this example, we will focus on the lifetime cancer and non-cancer metrics for Home Sector A.

Exhibit A-3. Demographic Information for Home Sectors A, B, and C

	Population Count in Home Sector			
Age Bin	**A**	**B**	**C**	**Totals**
0 - 5	120	90	210	***420***
6 - 12	230	160	280	***670***
13 - 20	250	200	320	***770***
21 - 55	500	320	430	***1,250***
56 - 69	190	110	225	***525***
Total, All Ages	***1,290***	***880***	***1,465***	***3,635***
Individual Demographic Filters				
male	610	435	780	***1,825***
female	680	445	685	***1,810***
white	1,032	528	586	***2,146***
non-white	258	352	879	***1,489***
Combined Demographic Filters				
white males	489	260	353	***1,102***
white females	543	268	294	***1,105***
non-white males	121	175	427	***723***
non-white females	137	177	391	***705***

TRIM.Risk uses two types of residency periods: lifetime (assuming a 70-year lifespan) and less-than-lifetime, where each constructed individual resides within one home sector for a period of time and does not reside in that home sector or in the study area(s) during the remainder of the lifespan. A database of residency periods is provided with TRIM.Risk that includes residency values for the mean plus five percentiles (i.e., 50th [i.e., median], 75th, 90th, 95th, and 99th). Mean residency periods are used throughout this example and are provided in Exhibit A-4.

Exhibit A-4. Mean Residency Periods by Age

Beginning Age	Ending Age	Duration (years)	Mean Residency Period (years)
0	3	4	7
4	6	3	8
7	9	3	9
10	12	3	9
13	15	3	9
16	18	3	8
19	21	3	6
22	24	3	5
25	27	3	6
28	30	3	7
31	33	3	9
34	36	3	10
37	39	3	12
40	42	3	14
43	45	3	15
46	48	3	17
49	51	3	17
52	54	3	18
55	57	3	19
58	60	3	20
61	63	3	20
64	66	3	21
67	69	3	21
70	72	3	22

Data excerpted from Table 15-168 of the EPA Exposure Factors Handbook (EPA 1997).

A.3 Hypothetical Example: Cancer Metrics Calculations

Each of the cancer metrics is illustrated in this section. The first metric presented in Section A.3.1 is the annualized cancer risk (ACR). The filtering and aggregation that are selected for the ACR calculations are used in all subsequent cancer metrics calculations. Section A.3.2 provides an example calculation of the statistical cancer incidence, which is based directly on ACR estimates. Subsequent sections illustrate the calculation of the cancer risk individual-level metrics (Section A.3.4) and cancer risk population-level metrics (Section A.3.5).

The percentile value used in these examples for representation of risk for a home sector age group and the value used for residency period (mean) are purely for purposes of illustration. For simplicity in preparation and presentation of examples, the same values were chosen for all metrics derived. ***These selections are not intended to convey any recommendations to users.*** Users will need to select age group representation and residency period values that are appropriate to the purposes of their assessment, as well as to the metrics being derived. Further,

this selection, along with the associated rationale, should be clearly and transparently described in the risk characterization for the assessment.

A.3.1 Annualized Cancer Risk (ACR)

In the initial release of TRIM.Risk, the ACR is calculated as follows:

$$ACR = EC * URE / 70$$

where:

ACR	=	excess lifetime cancer risk per modeled individual associated with one year of modeled inhalation exposure
EC	=	annual average exposure concentration for the modeled individual (ug/m^3)
URE	=	chemical-specific unit risk factor $(ug/m^3)^{-1}$
70	=	assumed lifespan associated with the unit risk factor (years)

A.3.2 Statistical Cancer Incidence (SCI)

The statistical cancer incidence (SCI) is an estimate of the number of statistical cancer cases within a user-defined demographic group resulting from a user-specified number of years of population inhalation exposure to a particular chemical or group of chemicals. SCIs are based on ACR estimates and, therefore, reflect choices made by the user in developing that risk metric. Data used to estimate the SCI for individual home sectors are provided in Exhibit A-5.

Exhibit A-5. Data for Estimating SCIs

Home Sector	Population Count	No. Of Modeled Individuals	Sum of ACR Values[a]
A	1,290	200	1E-03
B	880	200	6E-02
C	1,465	200	2E-05

[a] Each value calculated as the sum of ACR values derived for each of 200 modeled individuals. The 200 individual ACRs for each Home Sector are not shown here.

The SCI for one year of inhalation exposure is calculated as follows:

$$SCI_{(one\ year\ of\ exposure)} = \sum ACR * Population\ Count / No.\ Modeled\ Individuals$$

The SCI representative of one year of inhalation exposure can then be used to calculate the SCI for 30 years of inhalation exposure as follows for this example.

SCI (Home Sector A): 1E-03 * 1290 / 200 = **6E-03** * 30 years = **2E-01**
SCI (Home Sector B): 6E-02 * 880 / 200 = **3E-01** * 30 years = **8E+00**
SCI (Home Sector C): 2E-05 * 1465 / 200 = **1E-04** * 30 years = **4E-03**

The total SCI across all home sectors for 30 years of inhalation exposure is the sum of the individual SCIs, or 8E+00. Therefore, there would be approximately 8 additional statistical cancer cases (attributed primarily to Home Sector B) for all races and both genders across Home Sectors A, B, and C resulting from 30 years of inhalation exposure.

A.3.3 Age Binning of ACRs for Derivation of Multi-year Risk Metrics

To generate cumulative (multi-chemical) cancer estimates, risks can be summed across all chemicals or summed across chemicals by weight-of-evidence characterization for the inhalation route. Results may also be filtered to only include risk estimates for those individuals that belong to a particular demographic group or aggregated across demographic groups.

In this example, ACRs for all races and both genders are carried through the calculations (i.e., metrics are not calculated separately for individual races or genders). The TRIM.Risk metrics generator assigns each of the ACR estimates (aggregated for multiple HAPs) for modeled individuals in Home Sector A to one of the user-specified age bins. For each bin, a cumulative probability distribution is derived to enable selection of specific percentiles for each age bin. The Home Sector A ACRs for specified percentiles for each age bin are shown in Exhibit A-6. The duration column indicates the number of years represented by each age bin.

Exhibit A-6. Annualized Cancer Risk Estimates for Home Sector A

Age Bin	Age Range (yrs of age)	Duration (yrs)	Annualized Cancer Risk Estimates at Selected Percentiles			
			50th	90th	95th	99th
0	0 - 5	6	1E-11	4E-07	2E-06	3E-06
1	6 - 12	7	6E-10	8E-06	4E-05	6E-05
2	13 - 20	8	3E-12	2E-09	1E-07	9E-06
3	21 - 55	35	5E-09	3E-06	6E-05	7E-05
4	56 - 69	14	3E-09	1E-07	8E-06	1E-05

A.3.4 Individual Risk – Cancer Metrics Calculations

A.3.4.1 Lifetime Cancer Risk for Lifetime Residency Period (LCR)

To derive the excess lifetime cancer risk (LCR) for Home Sector A (assuming a lifetime residency period), TRIM.Risk sums "representative" ACRs for each age bin (where one percentile is selected to represent each age bin), weighting each age group's ACR by the number of years represented by that age bin. In this example, the 95th percentile has been selected to represent each age group (values below are from Exhibit A-6). The resultant LCR represents the cumulative (multiple HAP) cancer risk for lifetime exposure in Home Sector A, based on 95th percentile risk estimates for each of five population age groups.

$$LCR = (2E\text{-}06 * 6) + (4E\text{-}05 * 7) + (1E\text{-}07 * 8) + (6E\text{-}05 * 35) + (8E\text{-}06 * 14) = 3E\text{-}03$$

A.3.4.2 Lifetime Cancer Risk for Less-Than Lifetime Residency Period (LCR_LT)

For this metric, a value for cancer risk associated with less-than-lifetime exposure (LCR_LT) is calculated and assigned to each age bin. The value for each age bin is the cancer risk associated with exposure over the number of years corresponding to the selected residency period. If the residency period for an age bin is longer than the number of years in the age bin, the LCR_LT estimate is inclusive of additional years risk at the level of the subsequent age bin (i.e., risks for both age bins are added together).

For this example, we have used the same data (e.g., population counts), selections (representation of age group by the 95th percentile), and descriptors (i.e., all races and both genders) as used for the lifetime metrics (shown in Section A.3.4.1) for Home Sector A. Additionally, we have selected the mean residency period (provided in Exhibit A-4) to calculate the LCR_LT for age bins 1 through 5 starting at the *minimum* age for each age bin.[1] The derivation of LCR_LT values for each bin for Home Sector A is illustrated in Exhibit A-7, with the values in the last column representing the sum of the two preceding columns.

Note than the LCR_LT calculation does not assume that the constructed individual dies at age 69 if the residency period percentile selected is longer than the duration of the final age bin (with a maximum age of 69 years). Rather, the LCR_LT value reflects the cancer risk based on the assumption that residency begins with the selected age (either minimum or median; see footnote below) and continues for the entire residency period duration.

[1] The user has the option of selecting the minimum or median age for each age bin. The minimum age for each age bin and associated residency periods (selected from Exhibit A-4) are provided below in Exhibit A-7. Note that the mean residency period associated with the *median* age may differ from that associated with the minimum age (presented in Exhibit A-7). For example, using Exhibit A-23, the mean residency period associated with median age of 9 for age bin 2 (age 6-12) is 9 years (versus 8 years when using the minimum age of 6).

Exhibit A-7. Minimum Age and Associated Residency Period by Age Bin and Corresponding Lifetime Cancer Risk for Home Sector A

Age Bin	Minimum Age for Age Bin	Mean Residency Period (years)	Cancer Risk for Years within Age Bin	Cancer Risk for Additional Years in Next Age Bin	Cancer Risk for Residency Period Starting with Minimum Age for Age Bin
0	0	7	[2E-06*6] = 1E-05	[4E-05*1] = 4E-05	5E-05
1	6	8	[4E-05*7] = 3E-04	[1E-07*1] = 1E-07	3E-04
2	13	9	[1E-07*8] = 8E-07	[6E-05*1] = 6E-05	6E-05
3	21	6	[6E-05*6] = 4E-04	NA	4E-04
4	56	19	[8E-06*19] = 2E-04	NA	2E-04

NA = Not applicable; i.e., years in next age bin are not applicable because entire residency period is shorter than range of age bin.

A.3.5 Population Risk – Cancer Metrics Calculations

A.3.5.1 Population-Weighted Cumulative Frequency Distribution of Cancer risk for Lifetime Residency Period (PRD)

The population-weighted cumulative frequency distribution of cancer risk (PRD) is derived from the LCR estimates for each home sector. Home sectors are ordered according to LCR rank (in order of ascending risk) and then the percentage of the total population represented by each sector is calculated. Cumulative percentiles (i.e., the fraction of the total population across all home sectors for which the LCR is at or below the level associated with that sector) are then calculated based on these percentages, as presented in Exhibit A-8 for this example. The frequency distribution is the collection of these percentiles, and it is accompanied by the corresponding population counts and percent population values for each home sector. Because PRD results are based on LCR estimates (see Section A.3.4.1), they reflect a lifetime residency period for the demographics chosen by the user in generating the LCR estimates (e.g., for this example, all races and both genders, and representation of each age group by the 95th percentile).

Exhibit A-8. Determination of the PRD for Example Study Area

Home Sector	Population Count	LCR [a]	Rank	Population %[b]	Cumulative Fraction
C	1,465	7E-06	1	40%	0.40
A	1,290	3E-03	2	35%	0.76
B	880	9E-02	3	24%	1.00

[a] See Section A.3.4.1 for LCR sample calculation for Home Sector A.
[b] Population values presented here have been rounded to nearest percent.

A.3.5.2 Population-Weighted Cumulative Frequency Distribution of Cancer Risk for Less-than-Lifetime Residency Period (PRD_LT)

The population-weighted cumulative frequency distribution of cancer risk for a less-than-lifetime residency period (PRD_LT) is derived from the LCR_LT estimates for each home sector for a given age bin. The home sectors are ordered according to LCR_LT rank (in order of ascending risk) and then the percentage of the total population represented by each sector is calculated. Cumulative percentiles (i.e., the fraction of the total population across all home sectors for which the LCR_LT is at or below the level associated with that sector) are then calculated based on these percentages, as presented in Exhibit A-9 for this example (note that this example presents sample values for the first age bin (ages 0-5) only). Similar to the PRD, the frequency distribution is the collection of these percentiles, and it is accompanied by the corresponding population counts and cumulative percent population values for home sector and age bin. Because PRD_LT results are based on LCR_LT estimates (see Section A.3.4.2), they reflect the residency period percentile and the demographics and chemical aggregation chosen by the user in generating the LCR_LT estimates (e.g., for this example, all races and both genders, and representation of each age group by the 95th percentile).

Exhibit A-9. Determination of the PRD_LT for Study Area Population Aged 0-5

Home Sector	Population Count (Age Bin 0-5)	LCR_LT [a]	Rank	Population %	Cumulative Fraction
C	210	1E-05	1	50%	0.50
A	120	5E-05	2	29%	0.79
B	90	9E-04	3	21%	1.00

[a] See Section A.3.4.2 for LCR_LT sample calculation for Home Sector A.

A.3.5.3 Risk Bin Frequency Count for Lifetime Residency Period (RBF)

The risk bin frequency count for lifetime residency (RBF) is the total number of people associated with LCR values that fall within user-specified risk bins. Because the risk bin frequency count values are based on LCR estimates (see Section A.3.4.1), they reflect a lifetime residency period as well as the demographics and chemical aggregation chosen by the user in generating the LCR estimates. As noted in Section A.3.4.1, one LCR is calculated for each home sector. In deriving the RBF, the number of people for each risk bin is summed across all home sectors within the study area (i.e., home sector is not a dimension of the RBF metric). The user sets the limits delineating each risk bin individually; however, the number of risk bins is fixed at seven.

For this example, the RBF for the study area of interest (i.e., Home Sectors A, B, and C) is derived using the LCR and population counts, where LCR values reflect the user selections for this example (i.e., values represent all races and both genders; representation of each age group by the 95th percentile). See Exhibit A-8 for LCR and population for each of the three home

sectors. Risk bins were set for this example to encompass orders of magnitude between 1E-07 and 1E-02 (and above and below these risk values). RBF results for this example are summarized by the population counts presented in Exhibit A-10. Note that no more than three risk bins could have non-zero population counts for this example because there are only three home sectors in the study area.

Exhibit A-10. RBF for Example Study Area

User-Defined Risk Bins	Number of People
LCR < 1E-07	0
1E-07 ≤ LCR < 1E-06	0
1E-06 ≤ LCR < 1E-05	880
1E-05 ≤ LCR < 1E-04	0
1E-04 ≤ LCR < 1E-03	0
1E-03 ≤ LCR < 1E-02	1,290
1E-02 ≤ LCR	1,465

A.3.5.4 Risk Bin Frequency Count for Less-than-Lifetime Residency Period (RBF_LT)

The risk bin frequency count for less-than-lifetime residency period (RBF_LT) is the total number of people associated with LCR_LT values (see Section A.3.4.2) that fall within user-specified risk bins, for a given age bin. Because this metric is associated with less-than-lifetime exposures, the counts for this metric would include an additional dimension – age bin – versus those for the lifetime values described in the previous section. The population counts comprising the RBF_LT reflect the demographics and chemical aggregation chosen by the user in generating the LCR_LT. In addition, the RBF_LT is specific to the residency starting age within each age bin (i.e., minimum or median) and the residency period percentile selected by the user to represent each age bin in generating the LCR_LT.

The hypothetical RBF_LT for the five age bins in the example study area are presented in Exhibit A-11. For this example, these counts reflect user decisions that have been implemented for the LCR_LT values (i.e., the selections of the minimum age as the starting age for residency within each bin, the mean residency period, and the 95th percentile as the representative percentile for risk) as well as the user decisions regarding risk bin delineation. As noted in Section A.3.4.2, there is one LCR_LT calculated per age group per home sector. Consequently, because there are only three home sectors in the example study area, there are never more than three risk bins with a non-zero population for each age bin, and sometimes there are fewer than three (i.e., when LCR_LT values for more than one home sector fall within the same risk bin for a given age range).

Exhibit A-11. RBF_LT for Example Study Area

User-Defined Risk Bins	Number of People by Age Bin				
	0-5	**6-12**	**13-20**	**21-55**	**56-69**
LCR_LT < 1E-07	0	0	0	0	0
1E-07 ≤ LCR_LT < 1E-06	0	0	200	0	0
1E-06 ≤ LCR_LT < 1E-05	0	0	320	0	225
1E-05 ≤ LCR_LT < 1E-04	330	280	250	430	110
1E-04 ≤ LCR_LT < 1E-03	90	230	0	820	190
1E-03 ≤ LCR_LT < 1E-02	0	160	0	0	0
1E-02 ≤ LCR_LT	0	0	0	0	0

A.4 Hypothetical Example: Chronic Hazard Metrics Calculations

Each of the chronic hazard metrics is illustrated in this section.[2] The first metric presented (in Section A.4.1 below) is the annualized hazard quotient (AHQ). The filtering and aggregation that are selected for the AHQ calculations are used in all subsequent chronic hazard metrics calculations. Section A.4.2 presents a description of the age binning process that is implemented to derive multi-year hazard metrics. Sections A.4.3 and A.4.4 illustrate the calculation of the chronic hazard individual- and population-level metrics, respectively.

The percentile value used in these examples for representation of hazard for a home sector age group and the values used for residency period are purely for purposes of illustration. For simplicity in preparation and presentation of examples, the same hazard percentile value was chosen for all metrics derived, and mean or 90th percentile residency period values are used. ***These selections are not intended to convey any recommendations to users.*** Users will need to select age group representation and residency period values that are appropriate to the purposes of their assessment, as well as to the metrics being derived. Further, this selection, along with the associated rationale, should be clearly and transparently described in the risk characterization for the assessment.

[2] Hazard values presented in the examples in this appendix are presented with varying numbers of significant digits for different metrics to effectively demonstrate TRIM.Risk calculations. It is the user's responsibility to use the appropriate number of significant digits in presenting final risk and hazard results using DAVE or other methods.

A.4.1 Annualized Hazard Quotient

TRIM.Risk calculates the AHQ as follows:

$$AHQ = EC / RfC$$

where:

AHQ = chronic non-cancer hazard quotient per modeled individual associated with the annual inhalation exposure estimate

EC = annual average exposure concentration for the modeled individual (ug/m^3)

RfC = chemical-specific reference concentration (ug/m^3)

A.4.2 Age Binning of AHQs for Derivation of Multi-year Risk Metrics

To generate cumulative (multi-chemical) hazard quotients (i.e., hazard indices), hazard quotients can be summed across all chemicals or summed across chemicals with similar health endpoints to generate target organ-specific hazard indices (HIs). Results can also be filtered to only include HQs or HIs for individuals belonging to a particular demographic group.

In this example, AHQs for all races and both genders are carried through the calculations. The TRIM.Risk metrics generator assigned each of the AHQs (aggregated for multiple HAPs) for modeled individuals in Home Sector A to one of the user-specified age bins. For each bin, a cumulative probability distribution is derived to enable selection of a specific percentile for that age bin. The Home Sector A AHQs for specified percentiles for each age bin are shown in Exhibit A-12. The duration column indicates the number of years represented by each age bin.

Exhibit A-12. Annualized Hazard Quotients for Home Sector A

Age Bin	Duration (yrs)	Annualized Hazard Quotients at Selected Percentiles			
		50th	90th	95th	99th
0 - 5	6	0.02	0.12	2.1	7.6
6 - 12	7	0.008	0.07	1.2	2.3
13 - 20	8	0.005	0.01	0.6	1.1
21 - 55	31	0.0008	0.007	0.08	0.9
56 - 69	14	0.0002	0.002	0.01	0.1

A.4.3 Individual Chronic Hazard – Metrics Calculations

A.4.3.1 Hazard Quotient for Lifetime Residency Period (HQ_L)

The HQ_L represents the chronic non-cancer hazard quotient generated for a specific demographic group and home sector assuming a lifetime residency period. This metric derives the weighted average hazard across all age bins experienced over the lifetime of the constructed individual using the AHQ values (for a selected percentile) and durations. It reflects any grouping and subsetting of dimensions selected by the user in calculating the AHQ values.

In this example, the 95th percentile was selected to represent each age group. To derive the HQ_L for Home Sector A, a time-weighted average of the hazards is calculated across all age bins, as presented in the equation below (note that durations and 95th percentile AHQs used here can be found in Exhibit A-12; hazards represent AHQ aggregated for multiple HAPs). The resultant HQ_L represents the estimated hazard for lifetime exposure in Home Sector A, based on 95th percentile AHQ values for each of the five population age groups.

$$HQ_L = \frac{\left(2.1(6) + 1.2(7) + 0.6(8) + 0.08(35) + 0.01(14)\right)}{70} = 0.41$$

A.4.3.2 Hazard Quotient for Less-than-Lifetime Residency Period (HQ_LT)

For this metric, a value for hazard quotient associated with less-than-lifetime exposure (HQ_LT) is calculated and assigned to each age bin. The value for each age bin is the HQ associated with exposure over the number of years associated with the selected residency period. If the residency period for an age bin is longer than the number of years in the age bin, the HQ_LT estimate is inclusive of additional years risk at the level of the subsequent age bin. A time-weighted average hazard quotient specific to that residency period is then calculated (versus over the lifetime for the HQ_L).

For this example, we have selected the mean residency period (see Exhibit A-4) to calculate the weighted average hazard quotients, starting at the minimum age for each age bin (see Exhibit A-7). To derive the HQ_LT for Home Sector A, age bin 0-5, and the 95th percentile group, the weighted average is calculated as presented below. This HQ_LT represents the cumulative hazard from multiple HAPs for all races and both genders for age bin 0-5 years in Home Sector A, and it is derived using the mean residency period of 7 years corresponding to the minimum age within the age bin (i.e., 0 years old).

$$HQ_LT_{bin0-5} = \frac{(2.1*6) + (1.2*1)}{7} = 1.97$$

An example calculation for HQ_LT for age bin 6-12 is shown below, using the mean residency period of 8 years and starting at the minimum corresponding to the minimum age within the age bin (i.e., 6 years old).

$$HQ_LT_{bin6-12} = \frac{(1.2*6)+(0.6*2)}{8} = 1.05$$

The age bin-specific HQ_LT values for the other three bins would be calculated in similar fashion.

A.4.3.3 Maximum 7-Year Hazard Quotient for Lifetime Residency Period (MAX7HQ_L)

The maximum 7-year hazard quotient for the lifetime residency period (MAX7HQ_L) is the highest 7-year moving average HQ for a home sector over the course of a lifetime (i.e., 70-year) residency period. To calculate the moving average for a home sector, the AHQ for a specified percentile for each age bin is used, and each AHQ is weighted according to the duration of the corresponding age bin in order to calculate a series of 7-year averages. For example, for the age bins presented in Exhibit A-12, the first 7-year average would be calculated by multiplying the AHQ for ages 0-5 times by 6 years, adding this to the product of the AHQ for ages 6-12 by 1 year, and then dividing the sum by 7 years. Seven-year averages would continue to be calculated for every other 7-year period over the lifetime residency period. The *maximum* 7-year average (out of the set of 7-year averages calculated for the entire lifetime) would be the MAX7HQ_L. Because MAX7HQ_L results are based on the AHQ, they reflect the user-specified percentile for age group averaging as well as the demographics and chemical aggregation chosen by the user in generating AHQ estimates. Note that the MAX7HQ_L is *not* calculated using HQ_L values – although these metrics are similar in that they involve time-weighted average hazards, the MAX7HQ_L is not directly dependent on the HQ_L metric (or vice versa).

Exhibit A-13 shows some of the calculations that the metrics generator would step through for an example using the first three age bins in Exhibit A-12 (i.e., 0-5; 6-12; 13-20). This example presents calculations for Home Sector A using the 95th percentile AHQ values presented in Exhibit A-12 (therefore reflecting the demographic and chemical aggregation selections chosen by the user for these AHQs). In the example, AHQ1 refers to the AHQ for the first age bin (0-5 years), AHQ2 refers to the AHQ for the second age bin (6-12 years), and so on. Example calculations are presented here through age 20 only. TRIM.Risk would continue to calculate 7-year averages up through age 70, and then the maximum 7-year average would be output as the MAX7HQ_L for Home Sector A. Because 95th percentile AHQ values decrease with increasing age for Home Sector A (see Exhibit A-12), it is apparent that the 7-year average calculated for age 0-6 (i.e., 1.97) would be the MAX7HQ_L for this home sector.

Exhibit A-13. Example Calculations for the MAX7HQ_L for Ages 0-20 [a]

Age	7-Year Average Calculations for Home Sector A
0-6	(AHQ1*6 + AHQ2*1)/7 = (2.1*6 + 1.2*1)/7 = 1.97
1-7	(AHQ1*5 + AHQ2*2)/7 = (2.1*5 + 1.2*2)/7 = 1.84
2-8	(AHQ1*4 + AHQ2*3)/7 = (2.1*4 + 1.2*3)/7 = 1.71
3-9	(AHQ1*3 + AHQ2*4)/7 = (2.1*3 + 1.2*4)/7 = 1.59
4-10	(AHQ1*2 + AHQ2*5)/7 = (2.1*2 + 1.2*5)/7 = 1.46
5-11	(AHQ1*1 + AHQ2*6)/7 = (2.1*1 + 1.2*6)/7 = 1.33
6-12	(AHQ2*7)/7 = (1.2*7)/7 = 1.20
7-13	(AHQ2*6 + AHQ3*1)/7 = (1.2*6 + 0.6*1) = 1.11
8-14	(HQ2*5 + HQ3*2)/7 = (1.2*5 + 0.6*2) = 1.03
9-15	(HQ2*4 + HQ3*3)/7 = (1.2*4 + 0.6*3) = 0.94
10-16	(HQ2*3 + HQ3*4)/7 = (1.2*3 + 0.6*4) = 0.86
11-17	(HQ2*2 + HQ3*5)/7 = (1.2*2 + 0.6*5) = 0.77
12-18	(HQ2*1 + HQ3*6)/7 = (1.2*1 + 0.6*6) = 0.66
13-19	(HQ3*7)/7 = (0.6*7)/7 = 0.60
14-20	(HQ3*7)/7 = (0.6*7)/7 = 0.60

[a] Calculations for 7-year averages up through age 20 are presented here as a partial example; when calculating the MAX7HQ_L, TRIM.Risk would calculate moving 7-year averages over a lifetime (i.e., up through age 70) and then output the highest of these averages as the MAX7HQ_L.

A.4.3.4 Maximum 7-Year Hazard Quotient for Less-Than-Lifetime Residency Period (MAX7HQ_LT)

The maximum 7-year hazard quotient for less-than-lifetime residency period (MAX7HQ_LT) is similar to the HQ_LT in that a time-weighted 7-year moving average hazard quotient is calculated. However, the MAX7HQ_LT is calculated separately for each age bin, and it is the maximum 7-year average HQ that "fits" within a specific residency period (based on the residency period percentile selected by the user). If the residency period corresponding to a selected residency period percentile is shorter than seven years for an age bin, TRIM.Risk does not calculate a MAX7HQ_LT for that age bin (and will report "-999" as an output).

Example calculations for the 0-5 age bin in Home Sector A are presented in Exhibit A-14. In this example, a 90th percentile residency period was assumed, (i.e., 13 years); this residency percentile was chosen instead of the mean residency period of 7 years to better illustrate the calculations involved. Residency was assumed to start at the minimum age within the age bin (birth, or age 0 for this bin), and the 95th percentile AHQ values were used. Given

these selections, the MAX7HQ_LT would be calculated for age bin 0-5 for a constructed individual that lives at this location until 13 years of age. Note that AHQ1 refers to the 95th percentile AHQ for the first age bin (0-5 years), AHQ2 refers to the 95th percentile AHQ for the second age bin (6-12 years), and so on.

Exhibit A-14. Example Calculations for the MAX7HQ_LT, Age Bin 0-5

Age	7-Year Average Calculations for Home Sector A, Age Bin 0-5
0-6	(AHQ1*6 + AHQ2*1)/7 = (2.1*6 + 1.2*1)/7 = 1.97
1-7	(AHQ1*5 + AHQ2*2)/7 = (2.1*5 + 1.2*2)/7 = 1.84
2-8	(AHQ1*4 + AHQ2*3)/7 = (2.1*4 + 1.2*3)/7 = 1.71
3-9	(AHQ1*3 + AHQ2*4)/7 = (2.1*3 + 1.2*4)/7 = 1.59
4-10	(AHQ1*2 + AHQ2*5)/7 = (2.1*2 + 1.2*5)/7 = 1.46
5-11	(AHQ1*1 + AHQ2*6)/7 = (2.1*1 + 1.2*6)/7 = 1.33
6-12	(AHQ2*7)/7 = (1.2*7)/7 = 1.20
7-13	(AHQ2*6 + AHQ3*1)/7 = (1.2*6 + 0.6*1) = 1.11

The eight values calculated for each 7-year period within the 13-year residency period for age bin 0-5 are then compared, and the maximum value (i.e., 1.97, corresponding to the 7-year period between birth and age 6) is reported as the MAX7HQ_LT for this age bin. Similar calculations would be carried out for each remaining age bin using the 90th percentile residency period for each bin. For the residency period selection corresponding to this example, it would be possible to calculate a MAX7HQ_LT for every age bin because the 90th percentile residency period for each age bin is greater than 7 years. Therefore, there would be five values in all corresponding to the MAX7HQ_LT for Home Sector A (i.e., one for each age bin) for this set of demographic and chemical aggregation selections (see Exhibit A-15).

Exhibit A-15. Example MAX7HQ_LT Results for Home Sector A

Age Bin	MAX7HQ_LT
0-5	2.0
6-12	1.2
13-20	0.6
21-55	0.08
56-69	0.01

A.4.4 Population Chronic Hazard – Metric Calculations

Two types of population chronic hazard metrics are calculated:

- *Population-weighted cumulative hazard frequency distributions*, which are metrics that calculate the cumulative fraction of the study area population with values at or below a given level for a specified individual hazard metric (discussed in Sections A.4.4.1 through A.4.4.5); and

- *Hazard bin frequency counts*, which are metrics that indicate the number of individuals in the study area population with values falling within user-specified bins for a specified individual hazard metric (discussed in Sections A.4.4.6 through A.4.4.10).

As indicated here, both types of population-level metrics are calculated using individual-level hazard metrics (i.e., they are dependent on the metrics described in Section A.4.3). Note that frequency distributions and counts are based on the population numbers for a selected study area, not the number of modeled individuals (which may be different from the actual population).

A.4.4.1 Population-Weighted Cumulative Hazard Frequency Distribution (PHD)

To generate the population-weighted cumulative frequency distribution of hazard (PHD), home sectors are sorted by "percentile AHQ." The percentile AHQ is the AHQ value corresponding to a selected percentile from the cumulative distribution of AHQ values for all modeled individuals (all ages) for the selected demographic groups at that home sector. Home sectors are ranked in ascending order by their percentile AHQs, and the corresponding population counts are used to calculate the percentage of the total population represented by each sector. Cumulative percentiles (i.e., the fraction of the total population across all home sectors for which the percentile AHQ is at or below the value associated with that sector) are then calculated based on these percentages. The frequency distribution is the collection of these percentiles, and it is accompanied by the corresponding population counts and percent population values for each home sector. Because PHD results are based on AHQ values, they reflect the user-specified percentile as well as the demographics and chemical aggregation chosen by the user in generating AHQ estimates.

Sample results for this example are illustrated in Exhibit A-16. The 95th percentile AHQ was selected as the percentile AHQ for this example. Values presented in this table are specific to the summary descriptors listed above and reflect the selections chosen by the user for the AHQ.

Exhibit A-16. Determination of the PHD for Home Sectors A, B, and C, Using the 95th Percentile AHQ

Home Sector	Population	95th Percentile AHQ	Rank	Population %	Cumulative Fraction
C	1,465	0.9	1	40%	0.40
A	1,290	1.2	2	36%	0.76
B	880	1.6	3	24%	1.00

A.4.4.2 Population-Weighted Cumulative Hazard Frequency Distribution for Lifetime Residency Period (PHD_L)

The population-weighted cumulative frequency distribution of hazard for a lifetime residency period (PHD_L) is also derived by sorting home sectors. For the PHD_L, the HQ_L is used to rank home sectors in ascending order in the same way that the selected percentile AHQ is used to rank sectors in deriving the PHD. Accordingly, this metric reflects the user-specified percentile for age each group chosen for the HQ_L as well as demographics and chemical aggregation chosen by the user.

Derivation of the PHD_L for home sectors A, B, and C for this example is illustrated in Exhibit A-17. The sample values presented here are specific to the summary descriptors listed above, including the use of the 95th percentile AHQ in calculating the HQ_L.

Exhibit A-17. Determination of the PHD_L for Home Sectors A, B, and C

Home Sector	Population	HQ_L [a]	Rank	Population %	Cumulative Fraction
A	1,290	0.41	1	36%	0.36
C	1,465	0.88	2	40%	0.76
B	880	1.2	3	24%	1.00

[a] See Section A.4.3.1 for sample HQ_L calculation for home sector A.

A.4.4.3 Population-Weighted Cumulative Hazard Frequency Distributions for Less-than-Lifetime Residency Period (PHD_LT)

The population-weighted cumulative frequency distribution of hazard for a less-than-lifetime residency period (PHD_LT) is also derived by sorting home sectors. For the PHD_LT, the HQ_LT is used to rank home sectors in ascending order in the same way that the selected percentile AHQ is used to rank sectors in deriving the PHD. Accordingly, this metric reflects the user-specified percentile for each age group chosen for the HQ_LT metric as well as demographics and chemical aggregation chosen by the user. Because the duration of a less-than-

lifetime residency period is specified for each age bin (and therefore the HQ_LT is calculated separately for each age bin), the PHD_LT includes an additional dimension for age bin (and is also calculated separately for each age bin).

Derivation of the PHD_LT for home sectors A, B, and C for age bin 6-12 for this example is illustrated in Exhibit A-18. The sample values presented here are specific to the summary descriptors selected for this example, including the use of the 95th percentile AHQ for each age group and the mean residency period (i.e., 8 years for this age bin).

Exhibit A-18. Determination of the PHD_LT, Age Bin 6-12

Home Sector	Population (Age Bin 6-12)	HQ_LT [a]	Rank	Population %	Cumulative Fraction
A	230	1.1	1	34%	0.34
C	280	1.5	2	42%	0.76
B	160	1.9	3	24%	1.00

[a] See Section A.4.3.2 for sample HQ_LT calculation for home sector A.

A.4.4.4 Population-Weighted Cumulative Hazard Frequency Distribution for Greatest 7-Year Hazard Quotient for Lifetime Residency Period (PHD_7_L)

The population-weighted cumulative frequency distribution of hazard for the greatest 7-year hazard quotient for a lifetime residency period (PHD_7_L) is also derived by sorting home sectors. For the PHD_7_L, the MAX7HQ_L is used to rank home sectors in ascending order in the same way that the selected percentile AHQ is used to rank sectors in deriving the PHD. Accordingly, this metric reflects the demographics and chemical aggregation chosen by the user for the MAX7HQ_L metric.

Derivation of the PHD_7_L for home sectors A, B, and C for this example is illustrated in Exhibit A-19. The sample results presented here are specific to the summary descriptors listed above, including the use of the 95th percentile AHQ for each age group in calculating the MAX7HQ_L.

Exhibit A-19. Determination of the PHD_7_L for Home Sectors A, B, and C

Home Sector	Population	MAX7HQ_L [a]	Rank	Population %	Cumulative Fraction
A	1,290	2.0	1	36%	0.36
C	1,465	2.2	2	40%	0.76
B	880	2.9	3	24%	1.00

[a] See Section A.4.3.3 for sample MAX7HQ_L calculation for home sector A.

A.4.4.5 Population-Weighted Cumulative Hazard Frequency Distributions for the Maximum 7-Year Hazard Quotient for Less-than-Lifetime Residency Period (PHD_7_LT)

The population-weighted distribution of hazard for the maximum 7-year hazard quotient for less-than-lifetime residency period (PHD_7_LT) is also derived by sorting home sectors. For the PHD_7_LT, the MAX7HQ_LT is used to rank home sectors in ascending order in the same way that the selected percentile AHQ is used to rank sectors in deriving the PHD. Accordingly, this metric reflects the user-specified percentile for each age group chosen for the MAX7HQ_LT metric as well as demographics and chemical aggregation chosen by the user. Because the duration of a less-than-lifetime residency period is specified for each age bin (and therefore the MAX7HQ_LT is calculated separately for each age bin), the PHD_7_LT includes an additional dimension for age bin (and is also calculated separately for each age bin).

Derivation of the PHD_7_LT for home sectors A, B, and C for age bin 0-5 for this example is illustrated in Exhibit A-20. The sample values presented here are specific to the summary descriptors selected for this example, including the use of the 95th percentile AHQs and the 90th percentile residency period (note that this percentile, rather than the mean, was selected for sample MAX7HQ_LT calculations as described in Section A.4.3.4).

Exhibit A-20. Determination of the PHD_7_LT, Age Bin 0-5, Using 90th Percentile Residency Period Estimates

Home Sector	Population (Age Bin 0-5)	MAX7HQ_LT	Rank	Population %	Cumulative Fraction
A	120	2.0	1	29%	0.29
C	210	2.2	2	50%	0.79
B	90	2.9	3	21%	1.00

A.4.4.6 Hazard Bin Frequency Count (HBF)

The hazard bin frequency count (HBF) allocates the population in a study area (including all home sectors within that area) into user-specific hazard bins according to percentile AHQ values for each home sector. As described in Section A.4.4.1, the percentile AHQ is the AHQ value corresponding to a selected percentile from the cumulative distribution of AHQ values for all modeled individuals (all ages) for the selected demographic groups at that home sector. The HBF is derived by assigning the population for each home sector to one hazard bin according to percentile AHQ and then summing the population for each hazard bin. Because HBF results are based on AHQ values, they reflect the user-specified percentile as well as the demographics and chemical aggregation chosen by the user in generating AHQ estimates. As with the risk bins, the user sets the limits delineating each hazard bin individually, but the number of bins is again fixed at seven.

For this example, the 95th percentile AHQ was used for each home sector, with AHQ values reflecting the selection of all races and both genders. The 95th percentile AHQs for all three home sectors are presented in Exhibit A-16 (see Section A.4.4.1) along with population totals for each home sector. Using these values and the hazard bin delineations presented below, the HBF for the study area that would be generated for this example is illustrated in Exhibit A-21. Note that the Home Sectors A and B with 95th percentile AHQs of 1.2 and 1.6 are both grouped into the same hazard bin (i.e., greater than or equal to 1.0 but less than 2.0) for the HBF.

Exhibit A-21. HBF for Example Study Area

User-Defined Hazard Bins (95th Percentile AHQ)	Number of People
AHQ < 0.01	0
0.01 ≤ AHQ < 0.1	0
0.1 ≤ AHQ < 0.5	0
0.5 ≤ AHQ < 1.0	1,465
1.0 ≤ AHQ < 2.0	2,170
2.0 ≤ AHQ < 5.0	0
5.0 ≤ AHQ	0

A.4.4.7 Hazard Bin Frequency Count for Lifetime Residency Period (HBF_L)

The hazard bin frequency count for lifetime residency period (HBF_L) allocates the population in a study area (including all home sectors within that area) into user-specific hazard bins according to the hazard quotient for lifetime residency (HQ_L) for each home sector. The HBF_L is derived by assigning the population for each home sector to one hazard bin according to HQ_L and then summing the population for each hazard bin. Because HQ_L values are based on AHQ values, they reflect the demographics and chemical aggregation chosen by the user in generating AHQ estimates (as well as the user-specified percentile used to calculate the HQ_L for each home sector).

For this example, the 95th percentile was selected to represent each age group in calculating the HQ_L, with AHQ values reflecting the selection of all races and both genders. HQ_L values and population numbers are summarized in Exhibit A-22 (see Section A.4.3.1 for a description of the HQ_L calculations for Home Sector A). These data would be used to generate the HBF_L as presented in Exhibit A-23, assuming the hazard bin delineations described in Section A.4.4.6.

Exhibit A-22. Summary of HQ_L Values Used to Calculate HBF_L

Home Sector	Population	HQ_L
A	1,290	0.41
B	880	0.50
C	1,465	0.080

Exhibit A-23. HBF_L for Example Study Area

User-Defined Hazard Bins (95th Percentile AHQ)	Number of People
AHQ < 0.01	0
0.01 ≤ AHQ < 0.1	1,465
0.1 ≤ AHQ < 0.5	1,290
0.5 ≤ AHQ < 1.0	880
1.0 ≤ AHQ < 2.0	0
2.0 ≤ AHQ < 5.0	0
5.0 ≤ AHQ	0

A.4.4.8 Hazard Bin Frequency Count for Less-Than-Lifetime Residency Period (HBF_LT)

The hazard bin frequency count for a less-than-lifetime residency period (HBF_LT) allocates the population for a specific age group in a study area (including all home sectors within that area) into user-specific hazard bins according to the hazard quotient for less-than-lifetime residency period (HQ_LT) for each home sector. The HBF_LT is derived by assigning that age group's population for each home sector to one hazard bin according to HQ_LT and then summing the population for each hazard bin. This metric is calculated according by age bin because a less-than-lifetime residency period is assigned according to age bin, as described in Section A.4.3.2. Because HQ_LT values are based on AHQ values, they reflect the demographics and chemical aggregation chosen by the user in generating AHQ estimates (as well as the user-specified percentile used to calculate the HQ_LT for each home sector and the residency period percentile as described above).

For this example, the 95th percentile hazard value was selected to represent each age group in calculating the HQ_LT, with AHQ values reflecting the selection of all races and both genders. The mean residency period was assumed in calculating the HQ_LT. HQ_LT values and population numbers for age bin 0-5 are summarized in Exhibit A-24 (see Section A.4.3.2 for

a description of the HQ_LT calculations for Home Sector A). These data would be used to generate the HBF_LT for age bin 0-5 as presented in Exhibit A-25, assuming the hazard bin delineations described in Section A.4.4.6.

Exhibit A-24. Summary of HQ_LT for Age Bin 0-5 Values Used to Calculate HBF_LT

Home Sector	Population, Age Bin 0-5	HQ_LT
A	120	1.97
B	90	2.14
C	210	0.88

Exhibit A-25. HBF_LT, Age Bin 0-5, for Example Study Area

User-Defined Hazard Bins	Number of People
HQ_LT < 0.01	0
0.01 ≤ HQ_LT < 0.1	0
0.1 ≤ HQ_LT < 0.5	0
0.5 ≤ HQ_LT < 1.0	210
1.0 ≤ HQ_LT < 2.0	120
2.0 ≤ HQ_LT < 5.0	90
5.0 ≤ HQ_LT	0

A.4.4.9 Hazard Bin Frequency Count for Greatest 7-Year Hazard Quotient for Lifetime Residency Period (HBF_7_L)

The hazard bin frequency count for the greatest 7-year hazard quotient for lifetime residency period (HBF_7_L) allocates the population in a study area (including all home sectors within that area) into user-specific hazard bins according to the maximum 7-year hazard quotient assuming a lifetime residency period (MAX7HQ_L) for each home sector. The HBF_7_L is derived by assigning the population for each home sector to one hazard bin according to MAX7HQ_L and then summing the population for each hazard bin. Because MAX7HQ_L values are based on AHQ values, they reflect the demographics and chemical aggregation chosen by the user in generating AHQ estimates (as well as the user-specified percentile used to calculate the MAX7HQ_L for each home sector).

For this example, the 95th percentile was selected to represent each age group in calculating the MAX7HQ_L, with AHQ values reflecting the selection of all races and both genders. MAX7HQ_L values and population numbers are summarized in Exhibit A-26 (see

Section A.4.3.3 for a description of the HQ_L calculations for Home Sector A). These data would be used to generate the HBF_L as presented in Exhibit A-27, assuming the hazard bin delineations described in Section A.4.4.6.

Exhibit A-26. Summary of MAX7HQ_L Values Used to Calculate HBF_7_L

Home Sector	Population	MAX7HQ_L
A	1,290	1.97
B	880	2.14
C	1,465	1.01

Exhibit A-27. HBF_7_L for Example Study Area

User-Defined Hazard Bins	Number of People
MAX7HQ_L < 0.01	0
0.01 ≤ MAX7HQ_L < 0.1	0
0.1 ≤ MAX7HQ_L < 0.5	0
0.5 ≤ MAX7HQ_L < 1.0	0
1.0 ≤ MAX7HQ_L < 2.0	2,755
2.0 ≤ MAX7HQ_L < 5.0	880
5.0 ≤ MAX7HQ_L	0

A.4.4.10 Hazard Bin Frequency Count for Greatest 7-Year Hazard Quotient for Less-Than-Lifetime Residency Period (HBF_7_LT)

The hazard bin frequency count for the maximum 7-year hazard quotient for less-than-lifetime residency period (HBF_7_LT) is derived in the same way as the HBF_LT metric; however, the HBF_7_LT table would be based on the MAX7HQ_LT instead of the HQ_LT. Specifically, for the HBF_LT, TRIM.Risk allocates the population for a specific age group in a study area (including all home sectors within that area) into user-specific hazard bins according to MAX7HQ_LT for each home sector. The HBF_7_LT is derived by assigning that age group's population for each home sector to one hazard bin according to MAX7HQ_LT and then summing the population for each hazard bin. This metric is calculated according by age bin because a less-than-lifetime residency period is assigned according to age bin, as described in Section A.4.3.4. Because MAX7HQ_LT values are based on AHQ values, they reflect the demographics and chemical aggregation chosen by the user in generating AHQ estimates (as well as the user-specified percentile used to calculate the MAX7HQ_LT for each home sector and the residency period percentile as described above).

For this example, the 95th percentile hazard value was selected to represent each age group in calculating the MAX7HQ_LT, with AHQ values reflecting the selection of all races and both genders. The 90th residency period (not the mean) was assumed in calculating the MAX7HQ_LT, as described in Section A.4.3.4. MAX7HQ_LT values and population numbers for age bin 0-5 are summarized in Exhibit A-28 (see Section A.4.3.4 for a description of the MAX7HQ_LT calculations for Home Sector A). These data would be used to generate the HBF_LT for age bin 0-5 as presented in Exhibit A-29, assuming the hazard bin delineations described in Section A.4.4.6.

Exhibit A-28. Summary of MAX7HQ_LT for Age Bin 0-5 Values Used to Calculate HBF_7_LT

Home Sector	Population, Age Bin 0-5	MAX7HQ_LT
A	120	1.97
B	90	2.14
C	210	0.88

Exhibit A-29. HBF_7_LT, Age Bin 0-5, for Example Study Area

User-Defined Hazard Bins	Number of People
MAX7HQ_LT < 0.01	0
0.01 ≤ MAX7HQ_LT < 0.1	0
0.1 ≤ MAX7HQ_LT < 0.5	0
0.5 ≤ MAX7HQ_LT < 1.0	210
1.0 ≤ MAX7HQ_LT < 2.0	120
2.0 ≤ MAX7HQ_LT < 5.0	90
5.0 ≤ MAX7HQ_LT	0

A.5 Aggregation of Assessment Selections

As described in Chapter 2 and Chapter 5, dimensions of assessment are taken into account when calculating metrics. The user specifies how metrics will be calculated for dimensions of assessment by selecting options on Tab 2, the "Assessment-Specific Selections" tab, of the TRIM.Risk Metrics generator. If desired, the user can opt to select a subset of assessment dimensions for which aggregated risk metrics will be calculated. Alternatively, the user can elect to select all assessment dimensions and then either (a) derive metrics for each dimension individually and in aggregates, or (b) derive metrics for the aggregates only. When calculating metrics "for the aggregates," the calculations are carried out for the entire range of possible aggregates – i.e., for each combination that involves the aggregation of at least two assessment options. The example presented in this section may help the user to understand how metrics for aggregates of assessment options are calculated.

For this hypothetical example, $\text{TRIM.Expo}_{\text{Inhalation}}$ was used to calculate exposures resulting from emissions from two facilities, the Acme Manufacturing facility and the Ronco Equipment facility. Each facility emits both benzene and ethylene oxide, and each facility has emissions from point sources (i.e., stacks) and area sources (i.e., fugitive emissions). The facilities are located close to each other, and the region included in the assessment is divided into two study areas, the Pinedale district and the Rosedale district. All of these characteristics were tracked in the exposure modeling. Therefore, the dimensions of assessment can be summarized as follows:

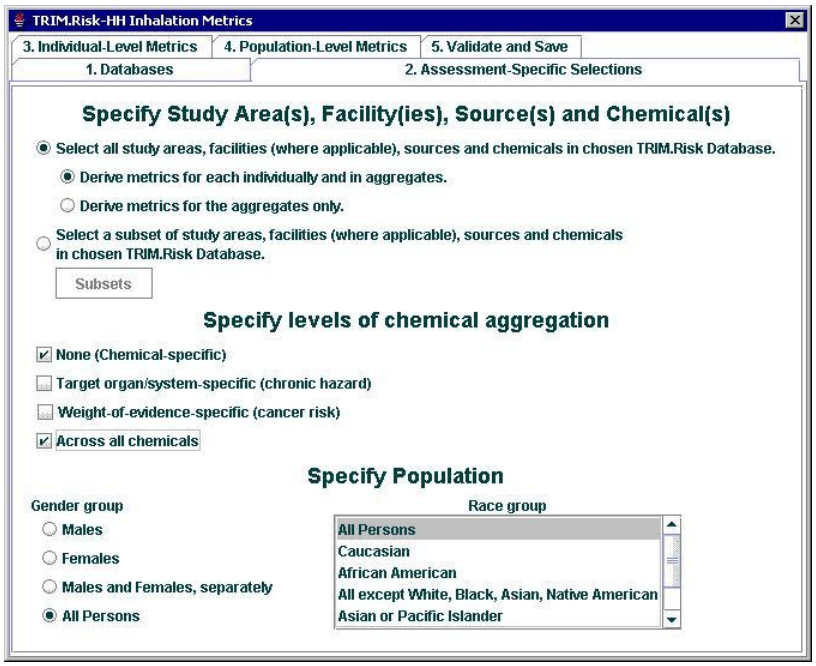
Dimensions Associated with Hypothetical Example

Assessment Dimension	Number of Values for this Assessment	Relevant Values for Dimension (Abbreviation)
Study area	2	Pinedale (Pd) Hillandale (Hd)
Facility	2	Acme Manufacturing (AM) Ronco Equipment (RE)
Source	2	Point sources (P) Area sources (A)
Chemical	2	Benzene (BZ) Ethylene oxide (EtO)

For this example, the user has clicked the following radio buttons on the "Assessment-Specific Selections" tab in the TRIM.Risk Inhalation Metrics GUI:

- "Select all study areas, facilities, sources and chemicals in chosen TRIM.Risk Database;" and
- "Derive metrics for each individually and in aggregates."

In addition, the user has elected to aggregate across all chemicals and calculate metrics for all persons (i.e., no subsetting by gender group or by race group) using the check boxes on this tab under the "Specify levels of chemical aggregation" and "Specify Population" subheadings. After making these selections, the tab would look like the following screen shot:



As a result, risk metrics would be calculated for the combinations of assessment dimensions described below, with 16 combinations of individual dimension values (no aggregation) and 65 combinations of dimension values where results were aggregated for at least one dimension. In all, a total of 81 metrics would be calculated for this example.

Metrics Calculated for Individual Dimensions (No Aggregation)

First, metrics would be calculated for each combination of dimension values individually. Because there are four dimensions to take into account, and two possible values for each dimension, there are 16 (i.e., 2^4) possible combinations for which risk metrics will be calculated.

Individual Combinations (16 Total)

Number[a]	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Study area	Pd	Pd	Pd	Pd	Pd	Pd	Pd	Pd	Hd	Hd	Hd	Hd	Hd	Hd	Hd	Hd
Facility	AM	AM	AM	AM	RE	RE	RE	RE	AM	AM	AM	AM	RE	RE	RE	RE
Source	P	P	A	A	P	P	A	A	P	P	A	A	P	P	A	A
Chemical	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO

[a] Combination numbers are presented here and in subsequent tables for informational purposes; TRIM.Risk does not include a combination number as an output.

Metrics Calculated for Aggregates

For the aggregates, the risk metrics generator would calculate metrics for all possible combinations of dimension values. Because the user has opted to consider four dimensions in this assessment, metrics would be calculated in the aggregate across each dimension singly (32 possible combinations), across two dimensions (24 possible combinations), across three dimensions (8 possible combinations), and across all four dimensions (one single combination). These combinations are presented in the tables that follow.

Combinations that Aggregate Across One Dimension (32 Total)

Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Study area	Aggregated (both Rosedale and Hillandale)								Pd	Pd	Pd	Pd	Hd	Hd	Hd	Hd
Facility	AM	AM	AM	AM	RE	RE	RE	RE	Aggregated (both Acme and Ronco)							
Source	P	P	A	A	P	P	A	A	P	P	A	A	P	P	A	A
Chemical	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO

Number	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Study area	Pd	Pd	Pd	Pd	Hd	Hd	Hd	Hd	Pd	Pd	Pd	Pd	Hd	Hd	Hd	Hd
Facility	AM	AM	RE	RE	AM	AM	RE	RE	AM	AM	RE	RE	AM	AM	RE	RE
Source	Aggregated (both point and area sources)								P	A	P	A	P	A	P	A
Chemical	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	Aggregated (both benzene and ethylene oxide)							

Combinations that Aggregate Across Two Dimensions (24 Total)

Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Study area	Aggregated (both)				Aggregated (both)				Aggregated (both)			
Facility	Aggregated (both)				RE	RE	AM	AM	RE	RE	AM	AM
Source	P	P	A	A	Aggregated (both)				P	A	P	A
Chemical	BZ	EtO	BZ	EtO	BZ	EtO	BZ	EtO	Aggregated (both)			

Number[a]	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Study area	Pd	Pd	Hd	Hd	Pd	Pd	Hd	Hd	Pd	Pd	Hd	Hd
Facility	Aggregated (both)				Aggregated (both)				RE	AM	RE	AM
Source	Aggregated (both)				P	A	P	A	Aggregated (both)			
Chemical	BZ	EtO	BZ	EtO	Aggregated (both)				Aggregated (both)			

Combinations that Aggregate Across Three Dimensions (8 Total)

Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Study area	Aggregated (both)		Aggregated (both)		Aggregated (both)		Hd	Pd
Facility	Aggregated (both)		Aggregated (both)		AM	RE	Aggregated (both)	
Source	Aggregated (both)		P	A	Aggregated (both)		Aggregated (both)	
Chemical	BZ	EtO	Aggregated (both)		Aggregated (both)		Aggregated (both)	

Combination that Aggregates Across All Four Assessment Dimensions (1 Total)

Number	**1**
Study area	Aggregated (both Rosedale and Hillandale)
Facility	Aggregated (both Acme and Ronco)
Source	Aggregated (both point and area sources)
Chemical	Aggregated (both benzene and ethylene oxide)

Additional Notes

- If one of the assessment dimensions has more than two values, the number of combinations for which metrics will be calculated will increase accordingly.

- If the user clicks the first radio button, thereby directing TRIM.Risk to select all study areas, facilities, sources, and chemicals, risk metrics reflecting aggregated dimensions will aggregate across all possible values of a dimension. If risk metrics are desired for an aggregate of some but not all of the values for a dimension (e.g., a metric that reflects aggregated results for 3 out of 4 facilities), the user should use the "subsets" screen.

- If specifications for population dimensions (i.e., gender or race) are selected that involve multiple values, additional metrics representing the additional potential combinations of dimensions will be output. For example, if the user selects "Males and Females, separately" using the radio button under the "Gender group" category on the assessment-specific selections tab, twice as many metrics will be generated (one set using results for males and one set for females).

A.6 Additional Information on Representative Ages Selected by TRIM.Expo$_{Inhalation}$

In the initial release of TRIM.Risk, for most risk metrics that are generated using exposure estimates calculated by TRIM.Expo$_{Inhalation}$, a single statistical value is selected to represent each age bin. This value is determined by ranking all of the values within a bin and then selecting the value that represents the user-specified percentile. In some cases, the number of modeled individuals within a home sector (e.g., census block) may be small or zero for certain demographic groups or dimensions.

If the number of modeled individuals is small for a specific demographic group in a home sector, the same risk value might be output for multiple percentiles. For example, if there are only 3 individuals for a specific group (e.g., Asian males), the 90th, 95th, and 99th percentiles would have the same risk value. Aggregating across characteristics (e.g., all males) may result in a larger distribution of risk values. However, the user should be aware that no warning is provided to the user if the number of individuals with selected demographic characteristics in a home sector is small.

If there are ***no*** modeled individuals for a particular combination of home sector, demographic group, and age bin, an algorithm is implemented to fill that data gap. This algorithm takes into account individuals in a given home sector and demographic group and assigns a surrogate risk value based on the following procedure.

- If the first (youngest) age bin is empty, a risk value is assigned to this age bin equal to that of the next highest (older) age bin that is not empty.
- If the last (oldest) age bin is empty, a risk value is assigned to this age bin equal to that of the next lowest (younger) age bin that is not empty.
- If an age bin that is neither the oldest or youngest is empty, a risk value is assigned equal to the average of the risk values associated with the next lower and next higher age bins that are not empty.

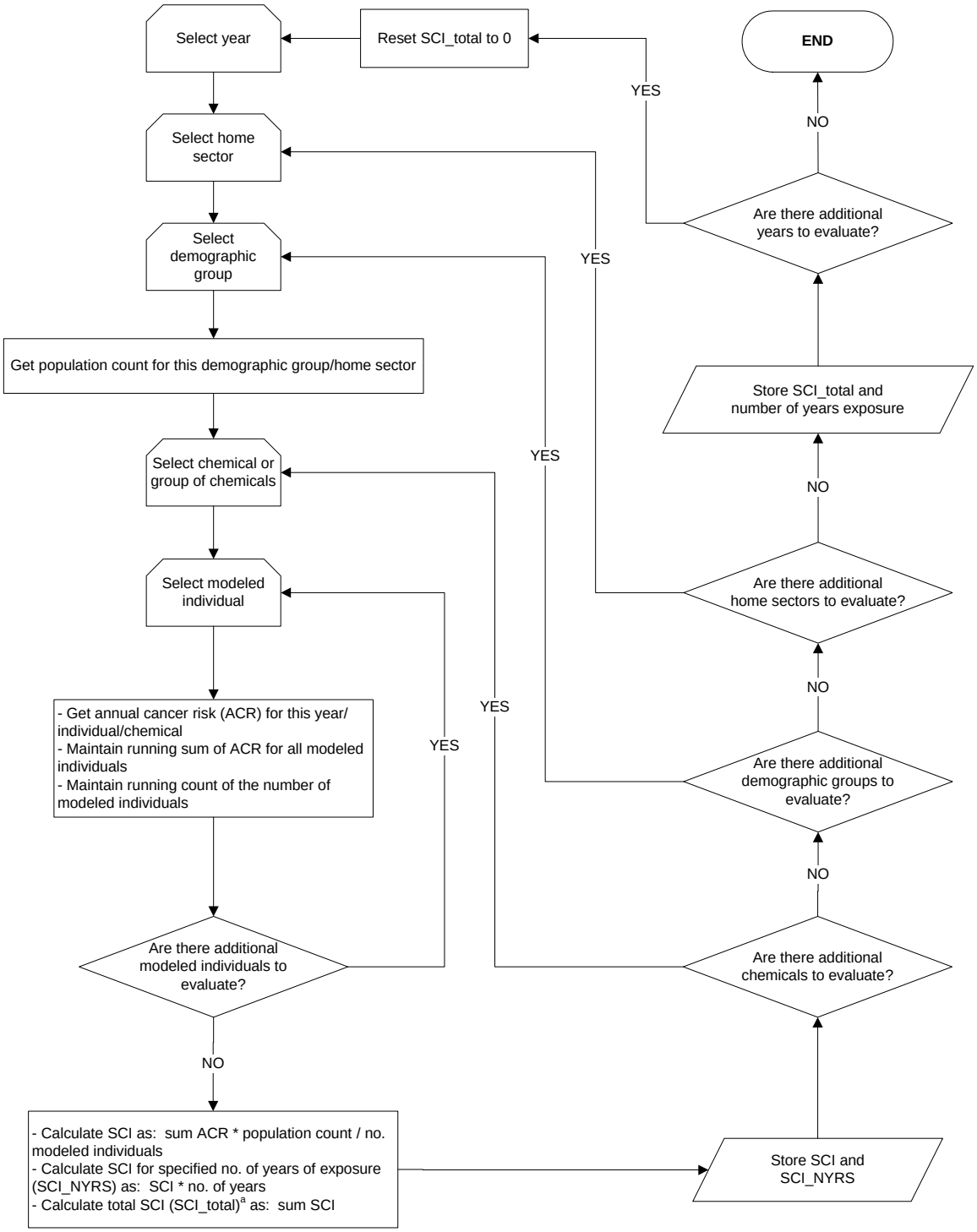
It is recommended that the user avoid this situation through careful consideration of the number of individuals to model with the exposure model and of the age group selection in the TRIM.Risk risk metrics generator.

A.7 Computational Steps for Risk Metrics

The flow charts in this section illustrate the computational steps involved in calculating each risk metric for human health inhalation risk assessments. Exhibits A-30 through A-36 present the steps involved in calculating cancer metrics. Exhibits A-37 through A-50 present the steps involved in calculating chronic hazard metrics.

Depending on the dimensions selected by the user for evaluation, each of these flow charts could have one or more additional computational “loops” that would occur before the selection of home sector to accommodate selections related to assessment dimensions (i.e., study area, facility, and source, if TRIM.Expo$_{Inhalation}$ is used).

Exhibit A-30. Statistical Cancer Incidence - SCI



[a] A total SCI may be calculated for a group of chemicals or across all chemicals within a demographic group/home sector. Total SCIs may also be calculated across demographic groups within a home sector or across home sectors.

Exhibit A-31. Lifetime Cancer Risk for Lifetime Residency Period - LCR

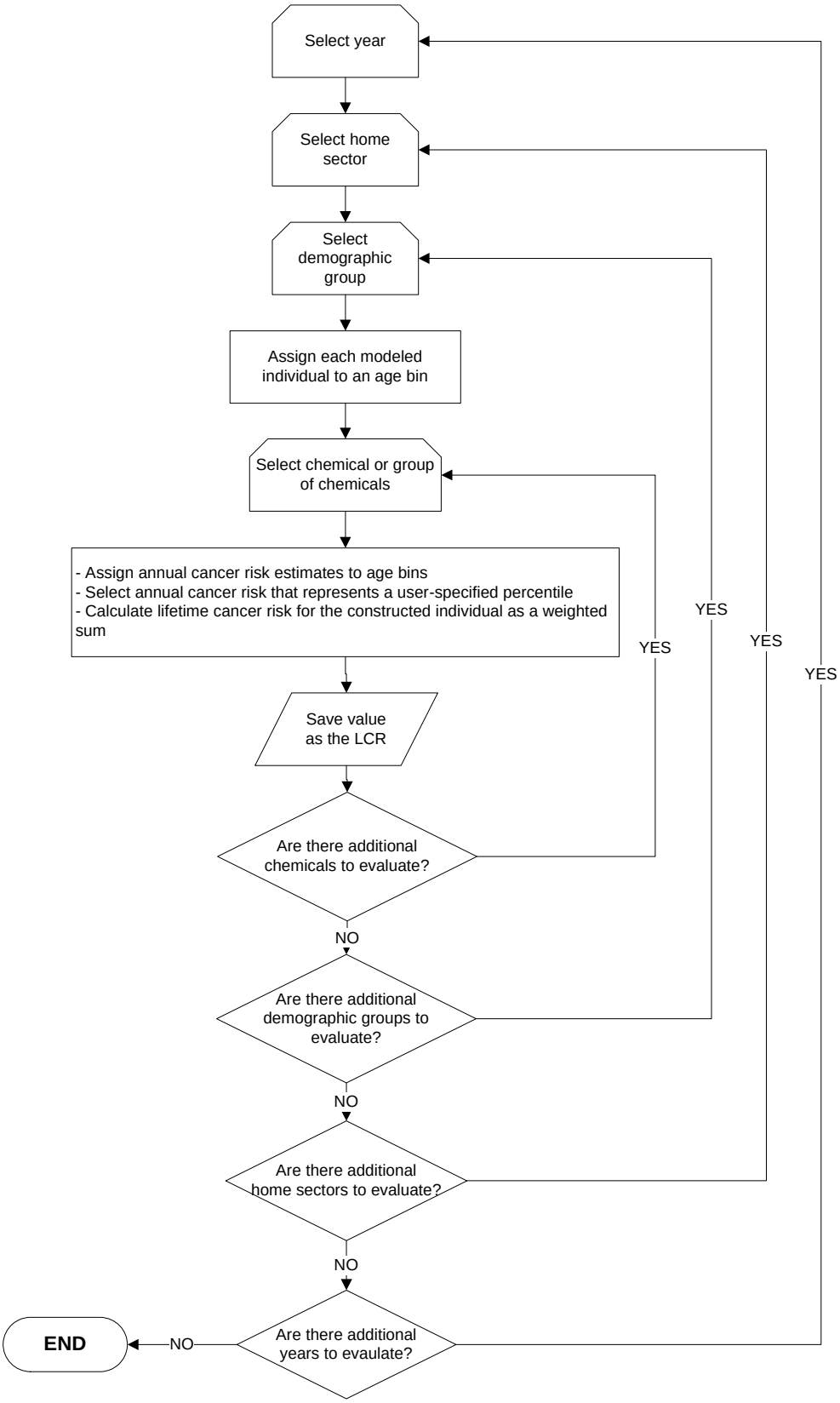


Exhibit A-32. Lifetime Cancer Risk for Less-Than-Lifetime Residency Period - LCR_LT

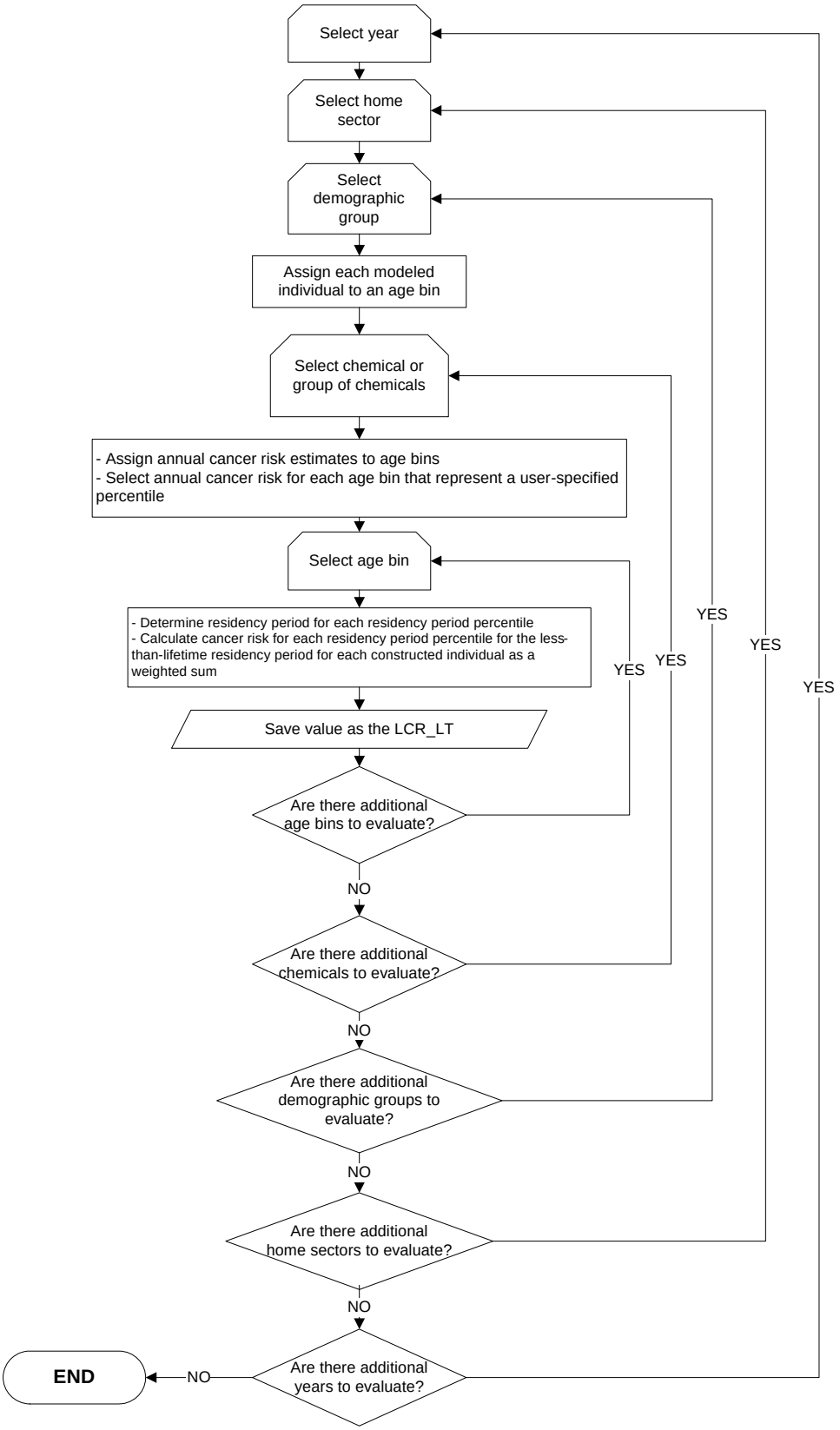


Exhibit A-33. Population-Weighted Risk Distribution - PRD

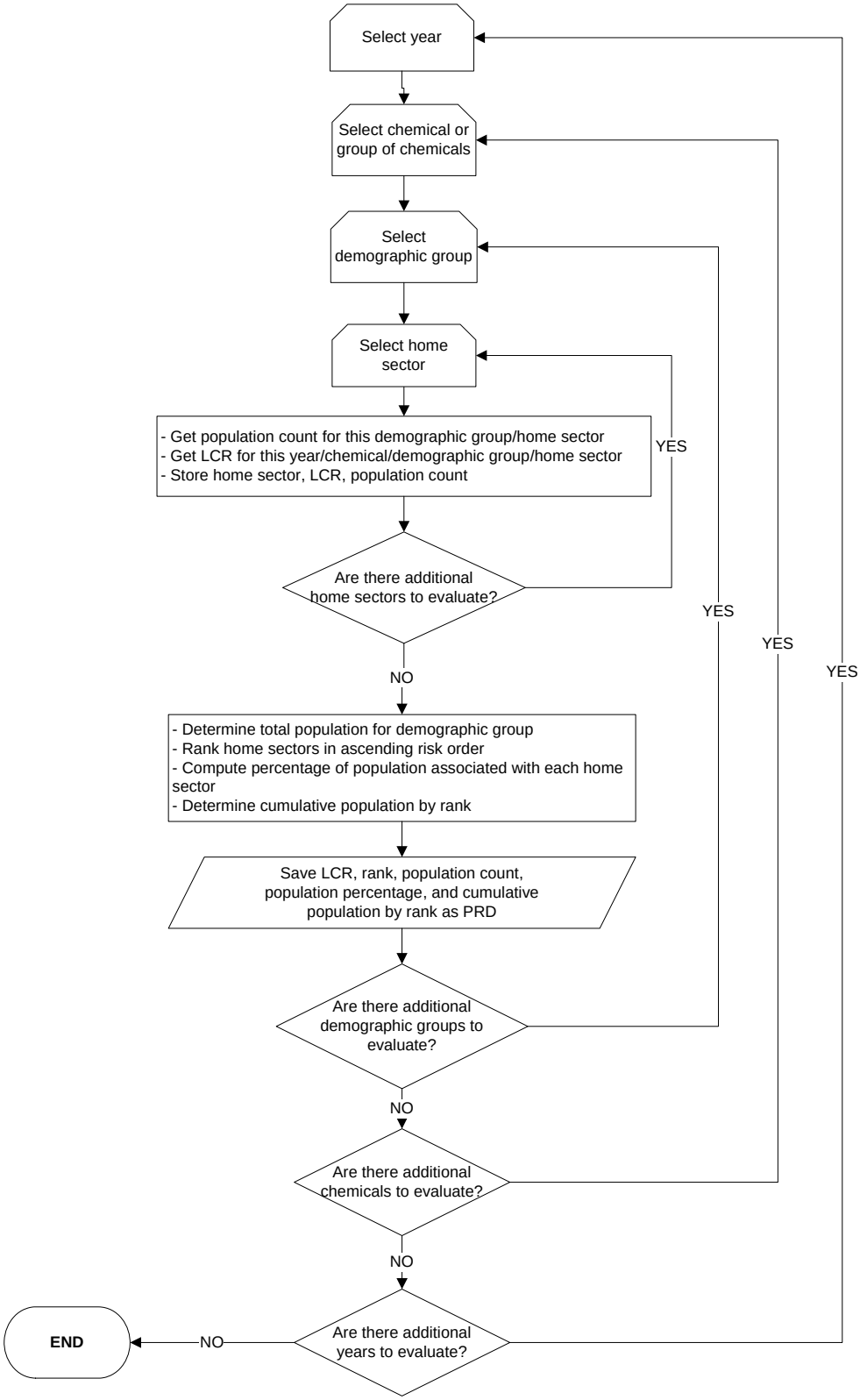


Exhibit A-34. Population-Weighted Risk Distribution for Less-Than-Lifetime Residency Period - PRD_LT

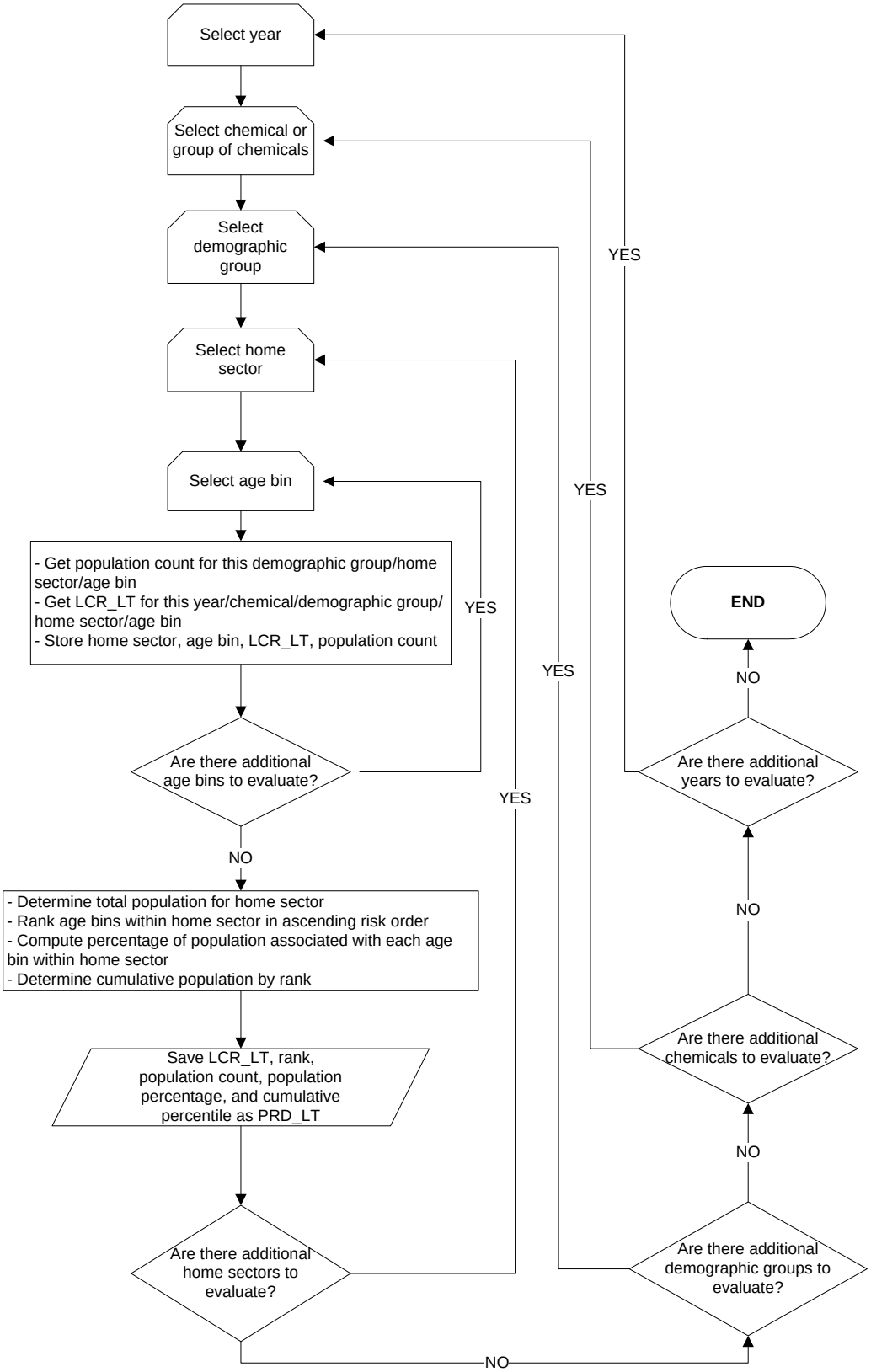


Exhibit A-35. Risk Bin Frequency Count - RBF

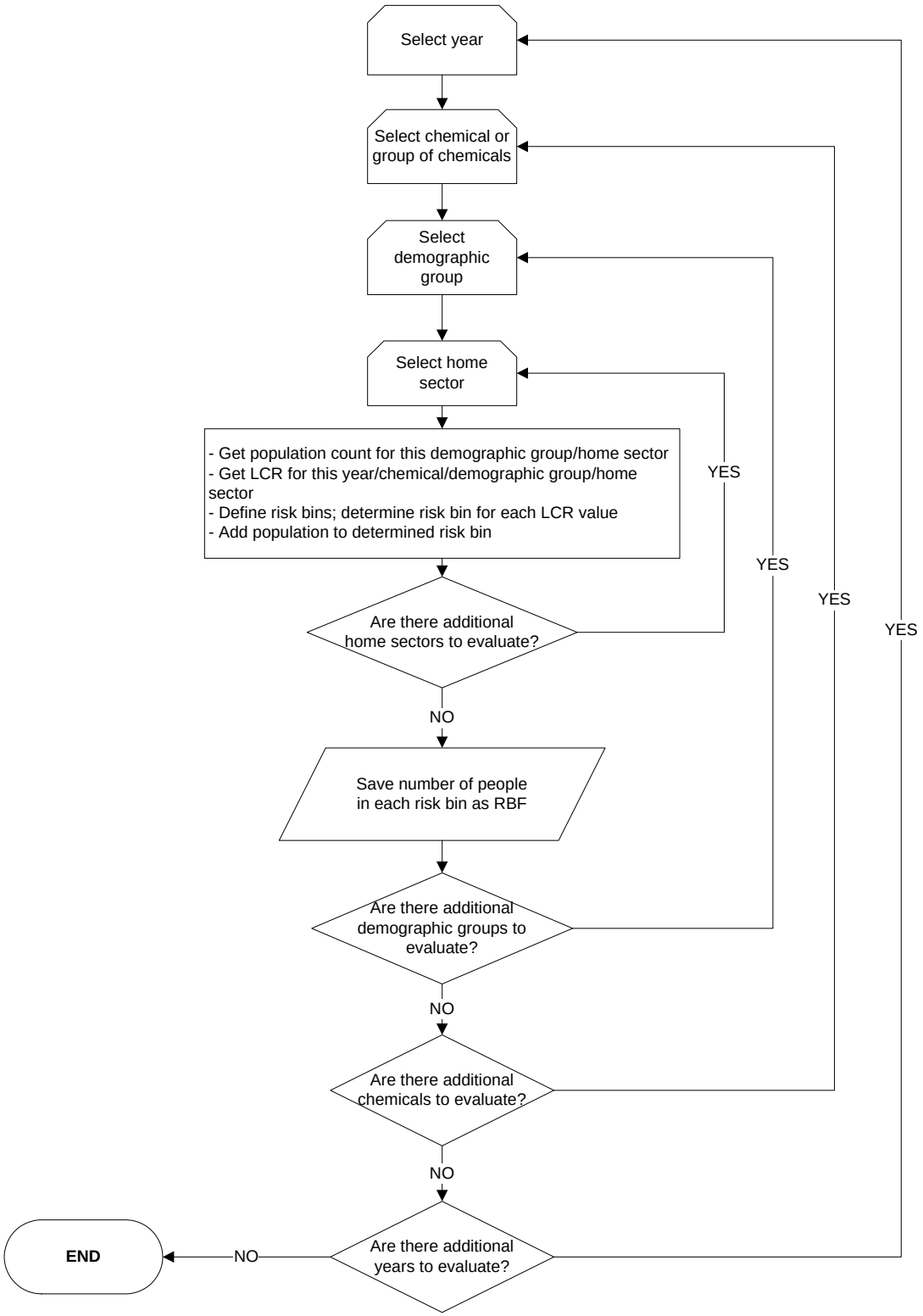


Exhibit A-36. Risk Bin Frequency Count for Less-Than-Lifetime Residency Period - RBF_LT

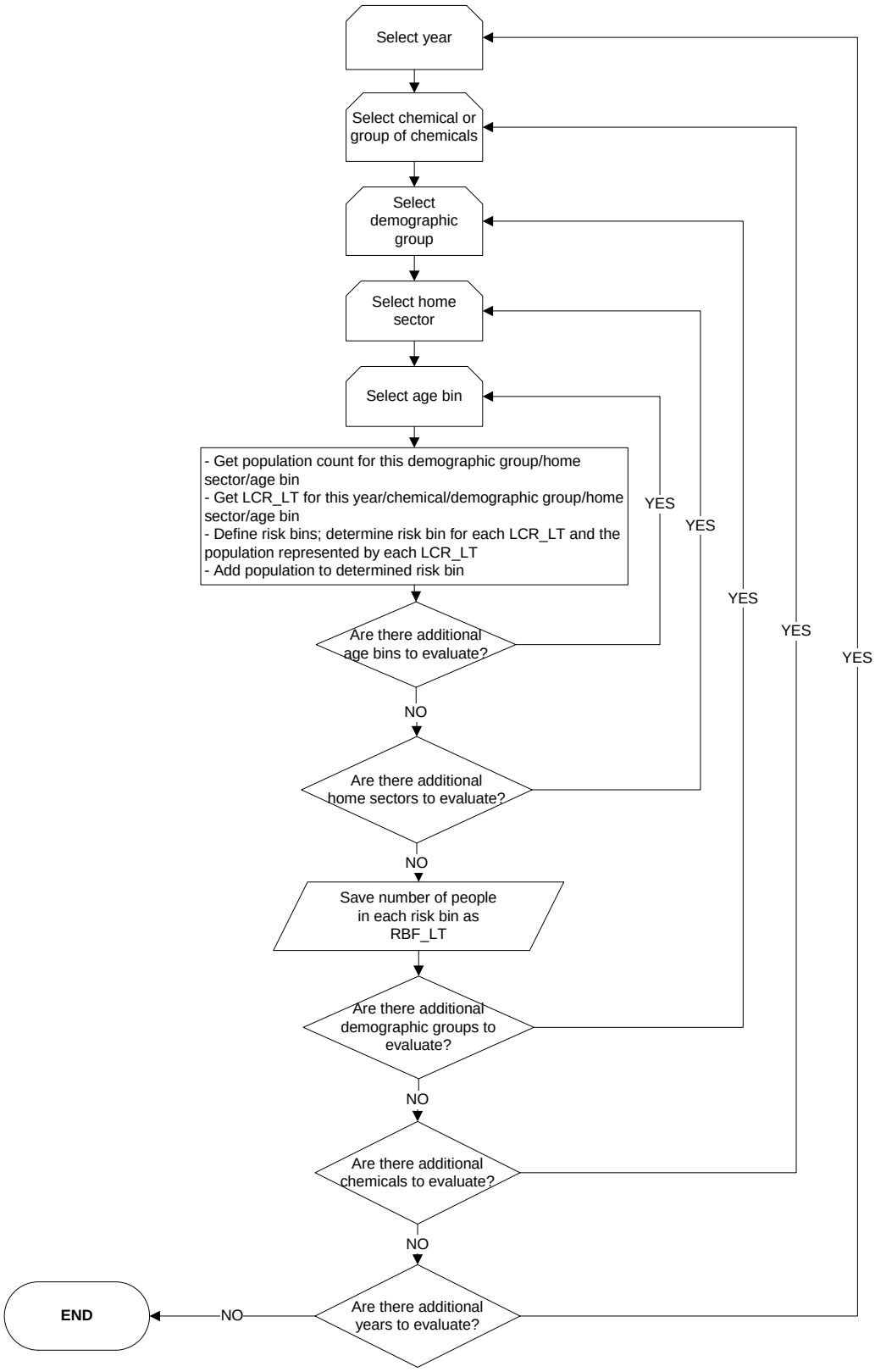


Exhibit A-37. Hazard Quotient for Lifetime Residency Period - HQ_L

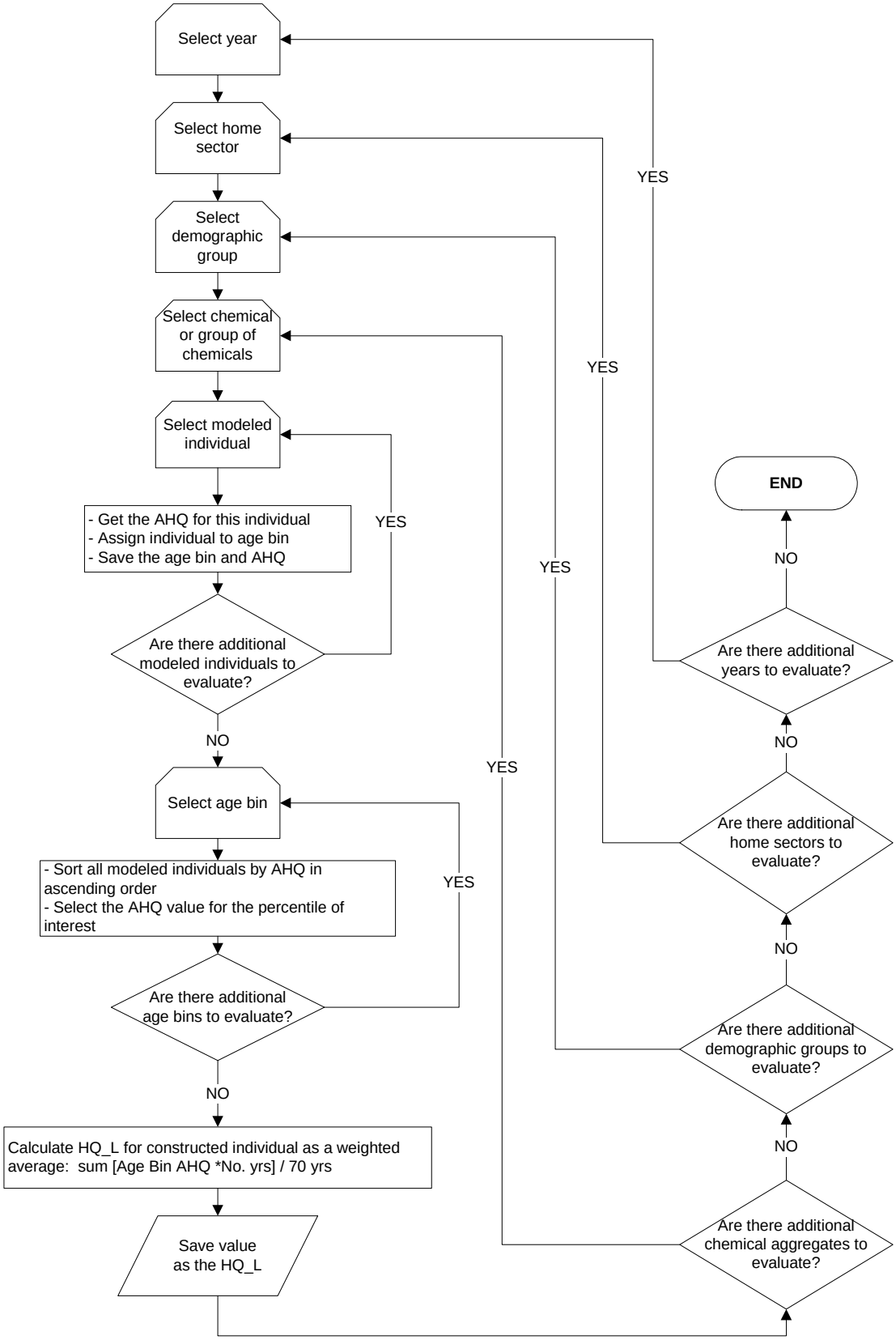
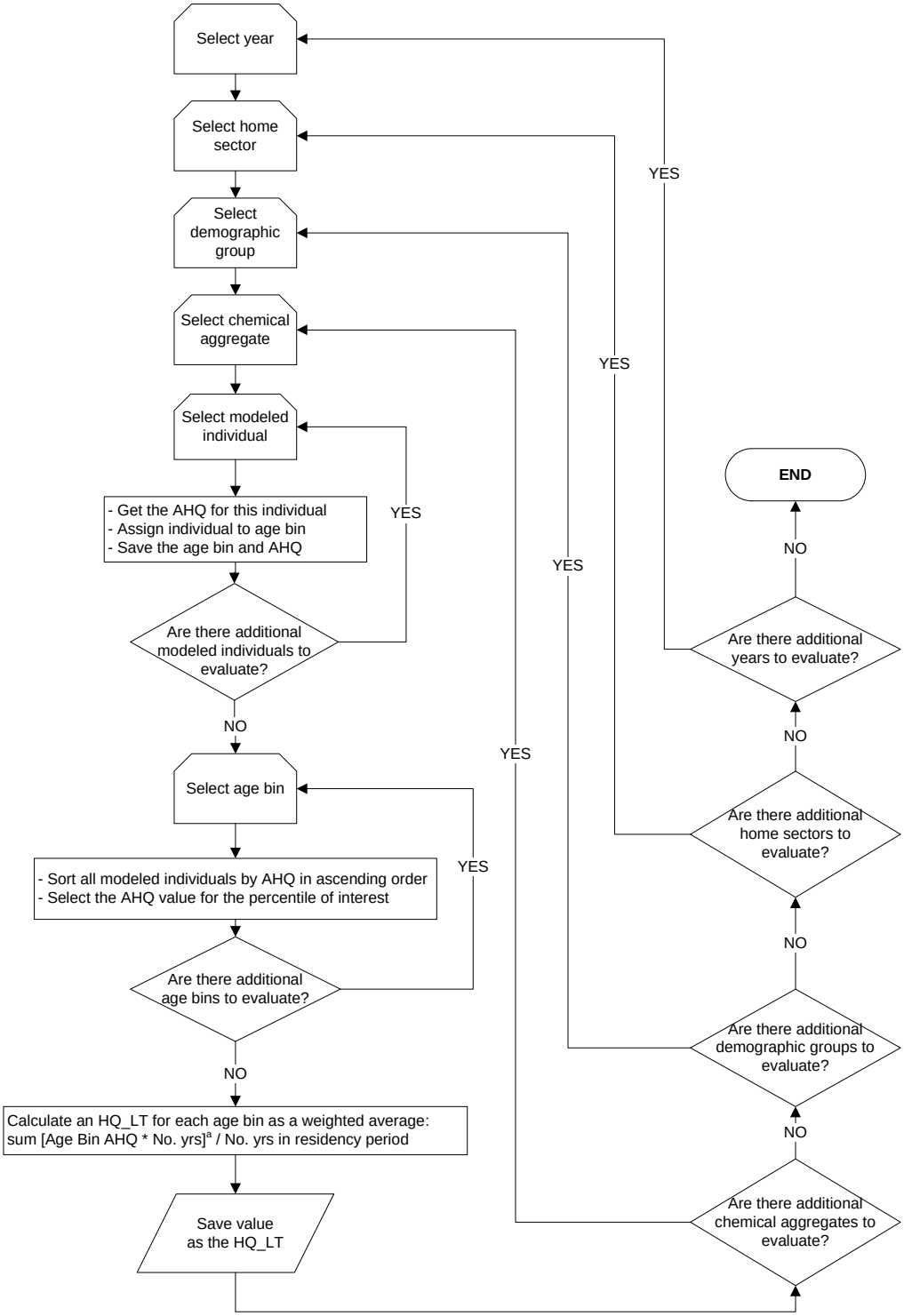


Exhibit A-38. Hazard Quotient for Less-Than-Lifetime Residency Period - HQ_LT



[a] This sum will reflect age bin duration and the number of years in the residency period for that age bin.

Exhibit A-39. Greatest 7-Year Hazard Quotient for Lifetime Residency Period - MAX7HQ_L

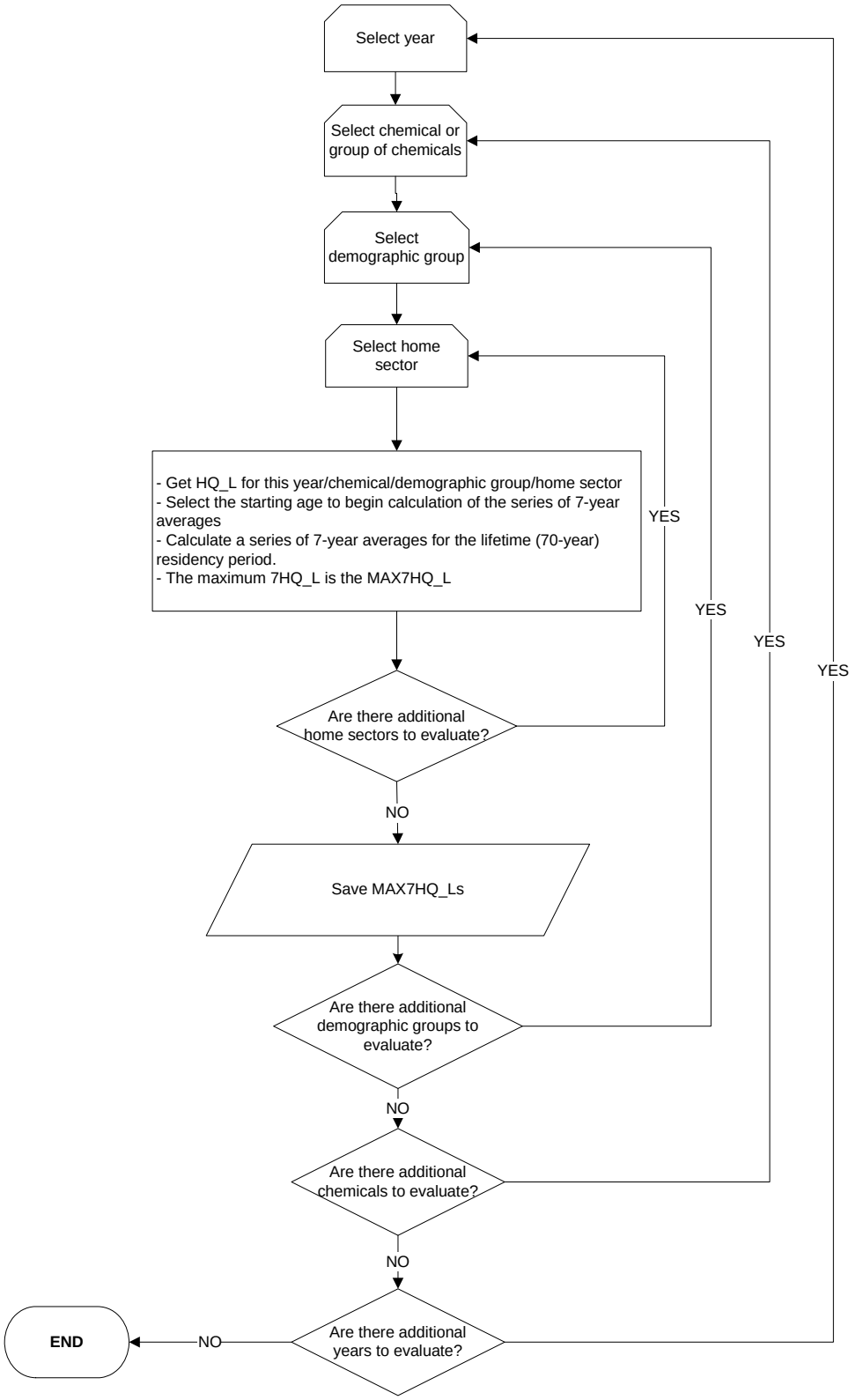


Exhibit A-40. Greatest 7-Year Hazard Quotient for Less-Than-Lifetime Residency Period - MAX7HQ_LT

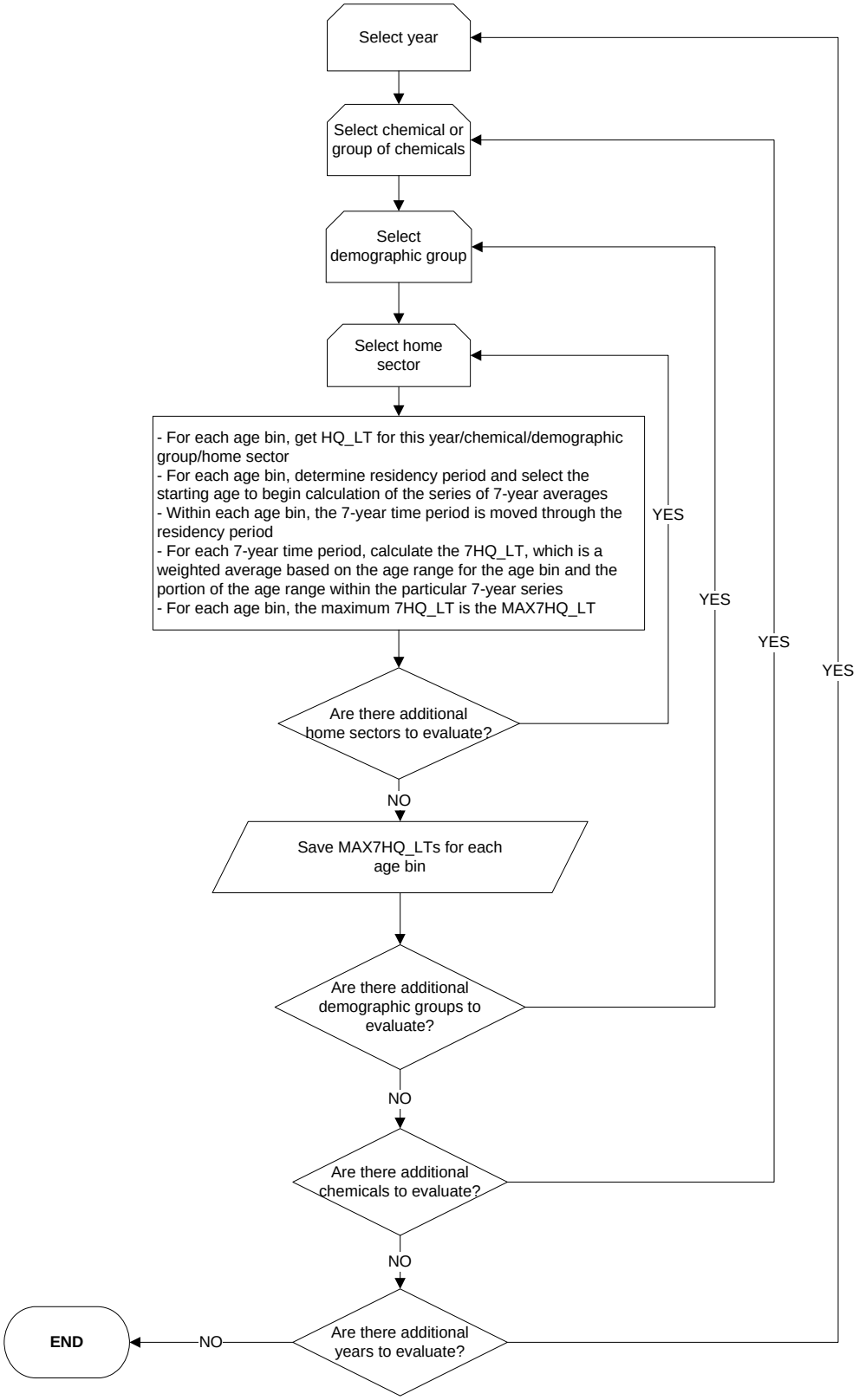


Exhibit A-41. Population-Weighted Hazard Distribution - PHD

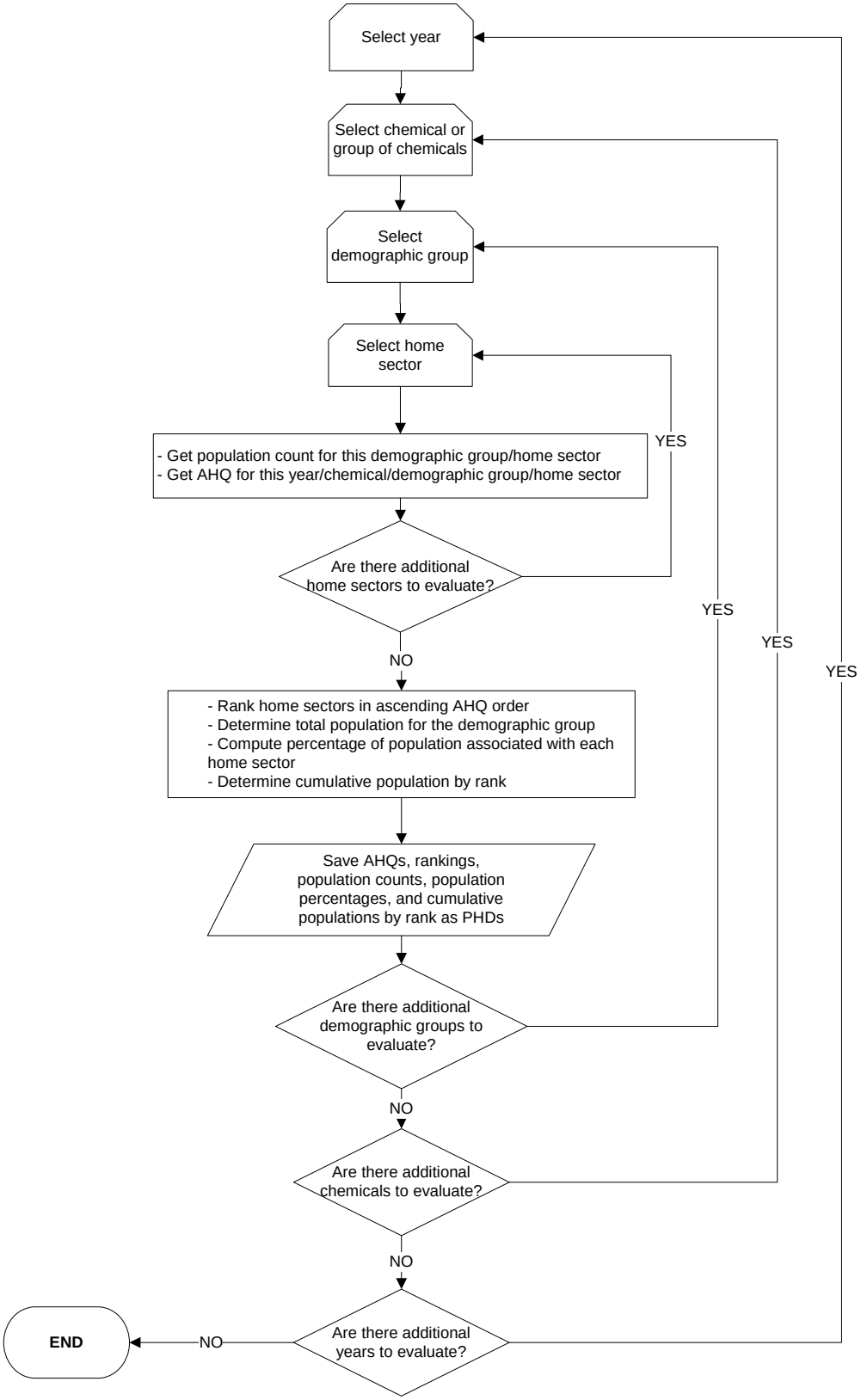


Exhibit A-42. Population-Weighted Hazard Distribution for Lifetime Residency Period - PHD_L

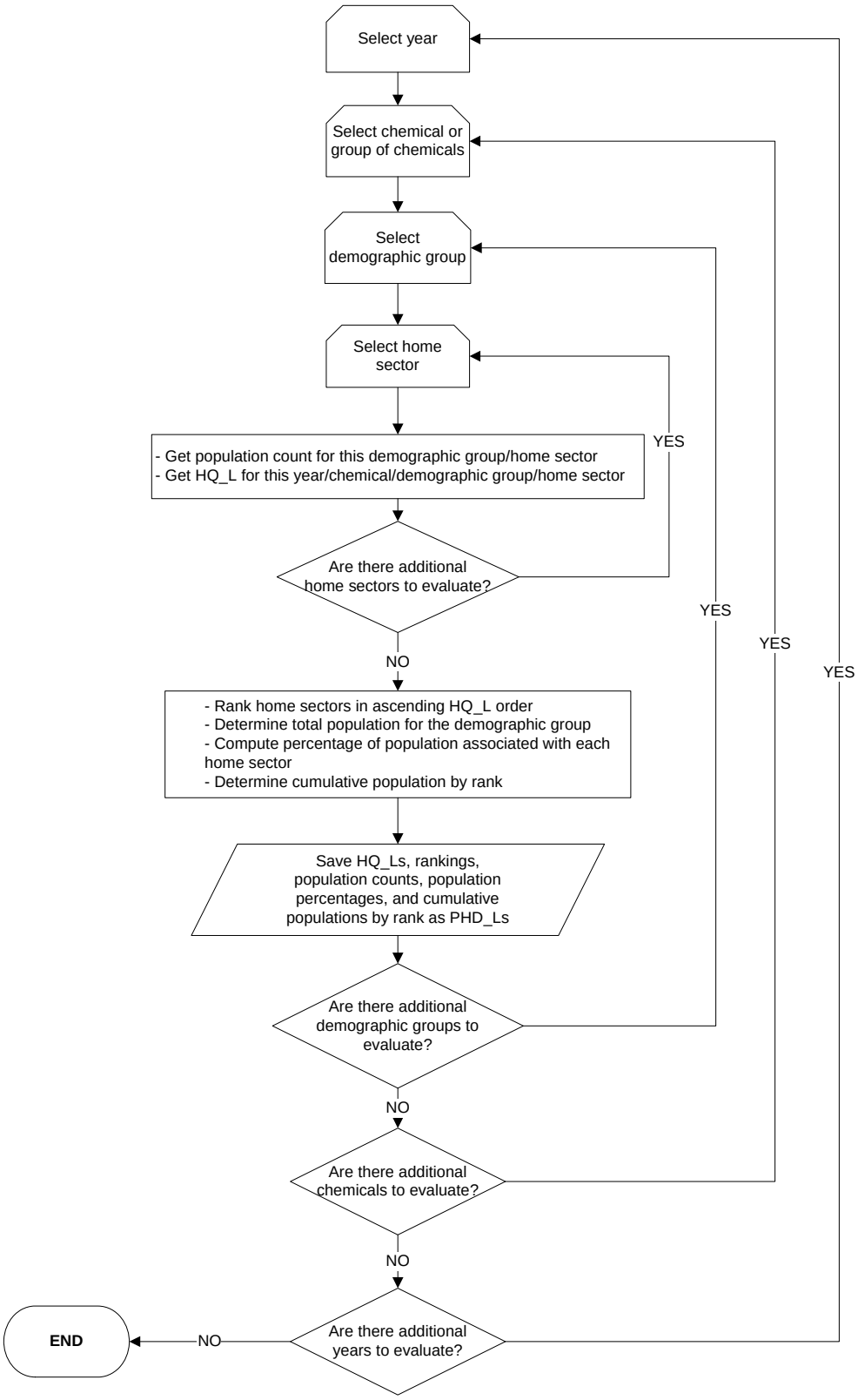


Exhibit A-43. Population-Weighted Hazard Distribution for Less-Than-Lifetime Residency Period - PHD_LT

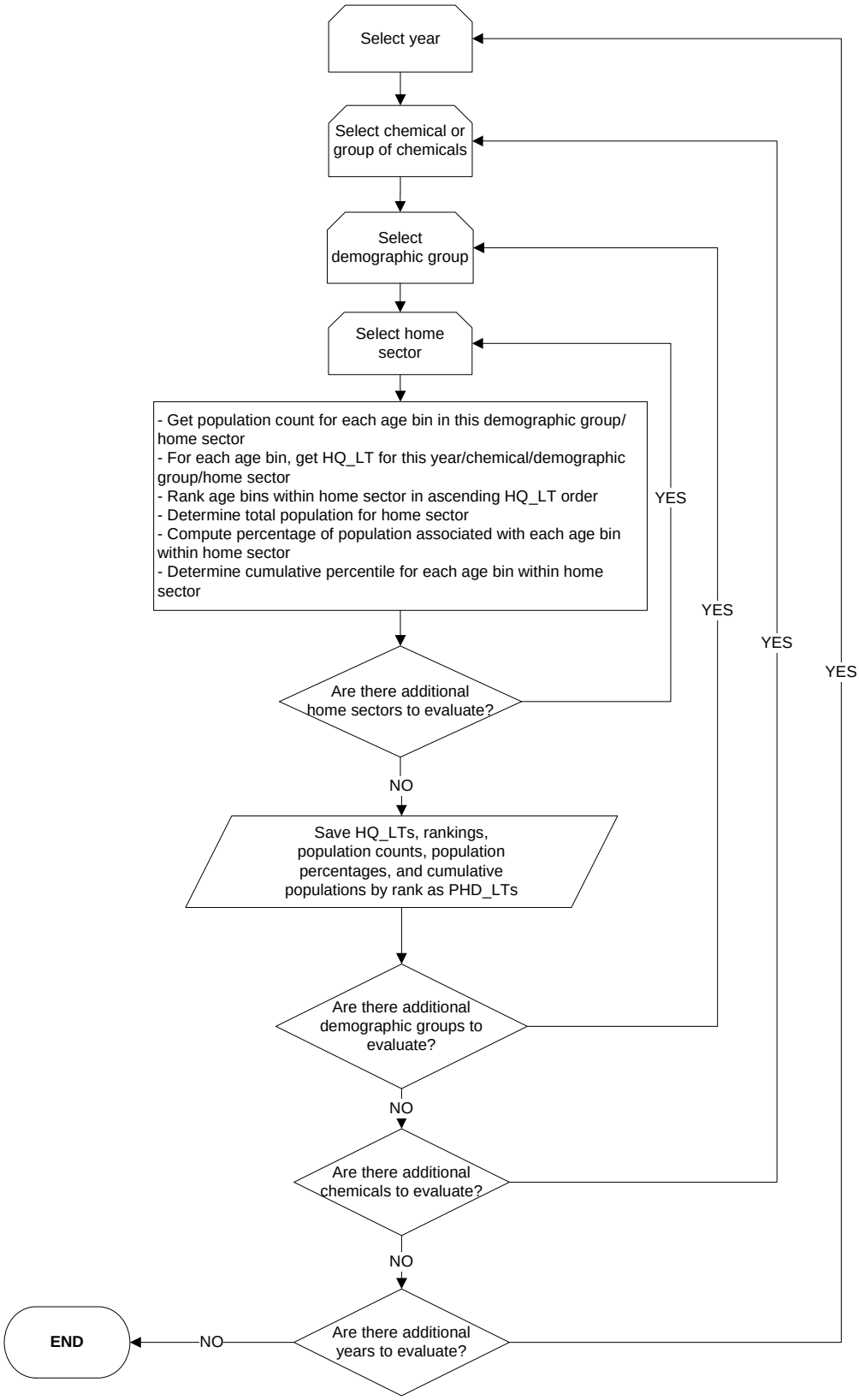


Exhibit A-44. Population Hazard Distribution for Greatest 7-Year Hazard Quotient for Lifetime Residency Period - PHD_7_L

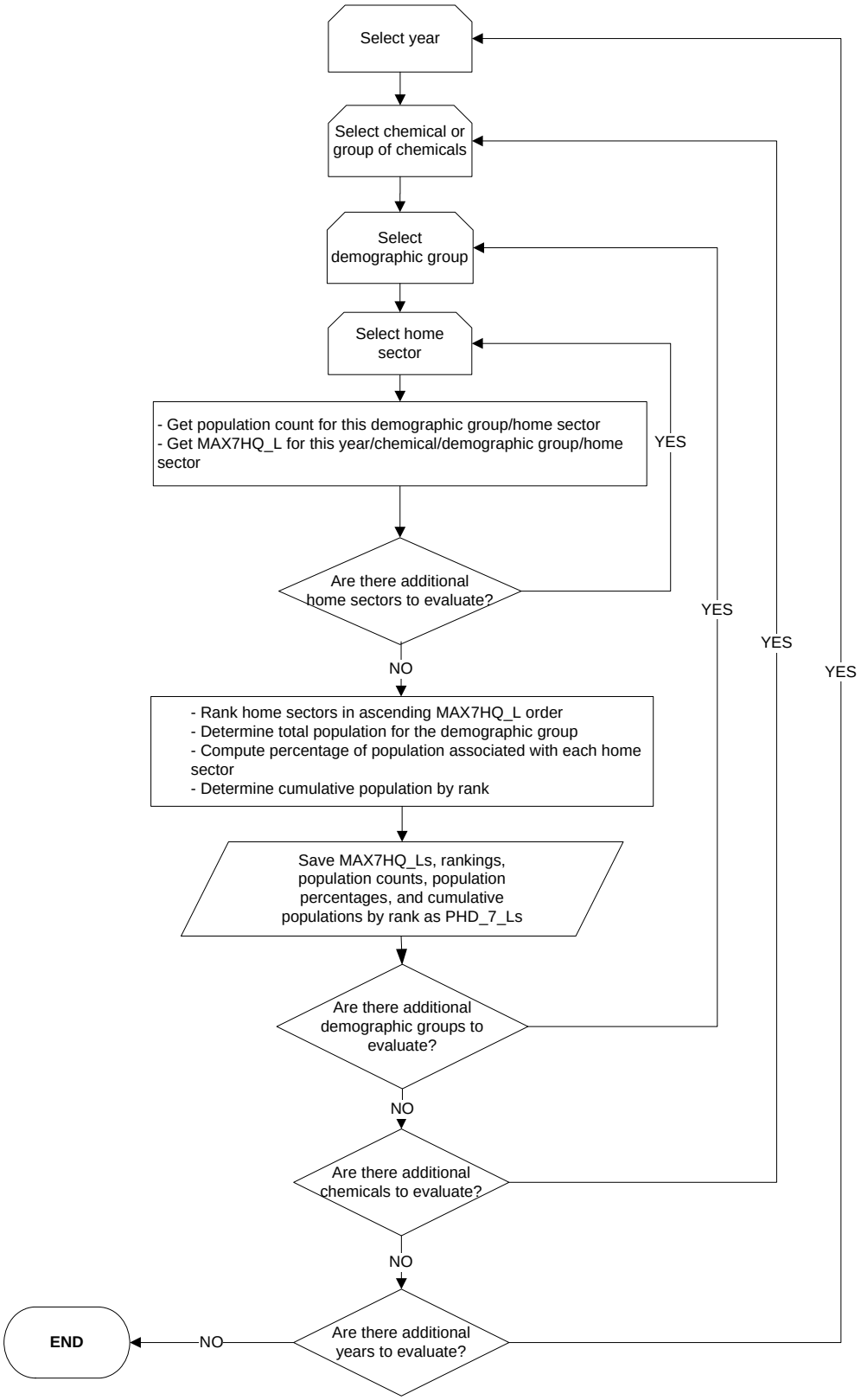


Exhibit A-45. Population Hazard Distribution for Greatest 7-Year Hazard Quotient for Less-Than-Lifetime Residency Period - PHD_7_LT

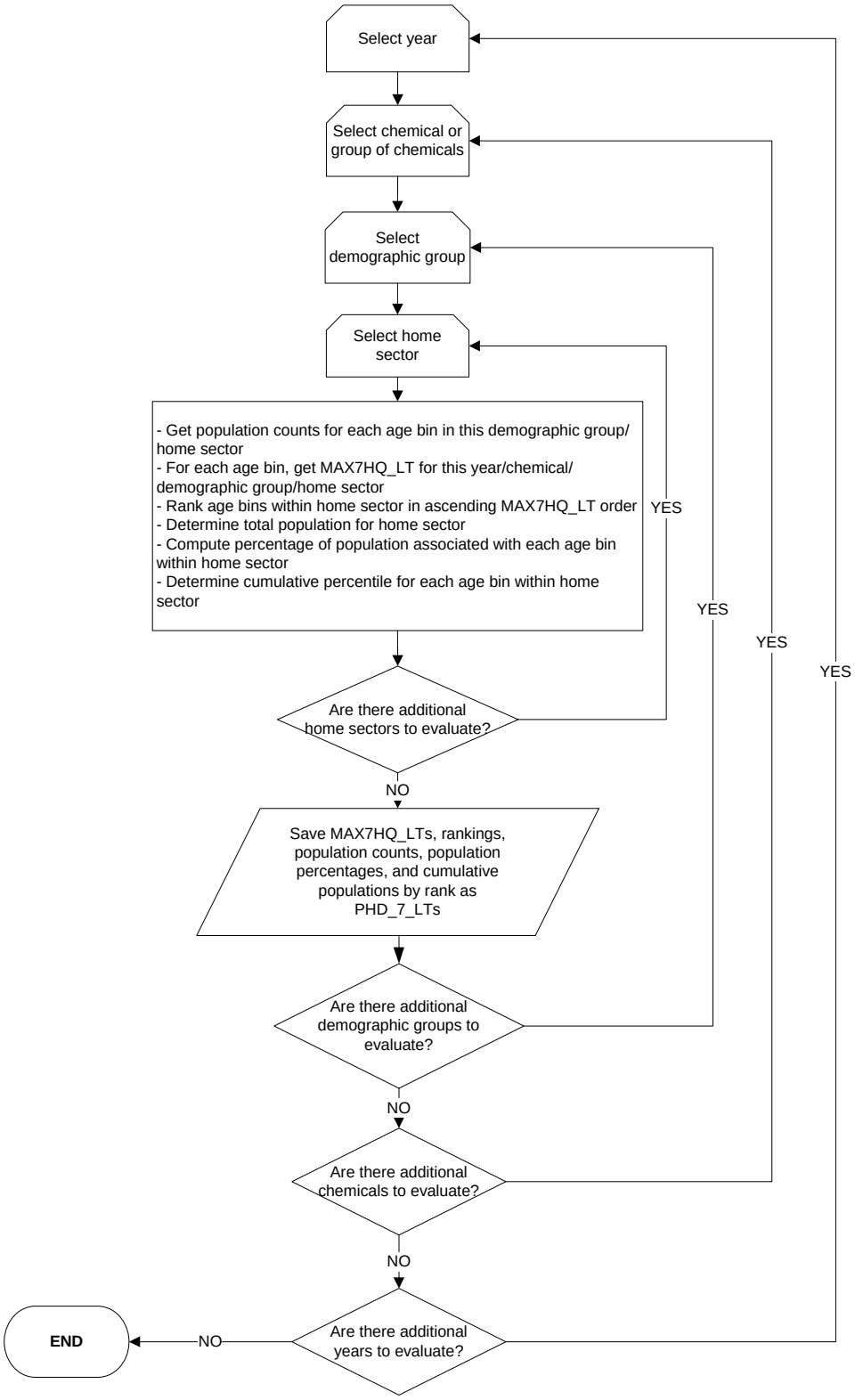


Exhibit A-46. Hazard Bin Frequency Count - HBF

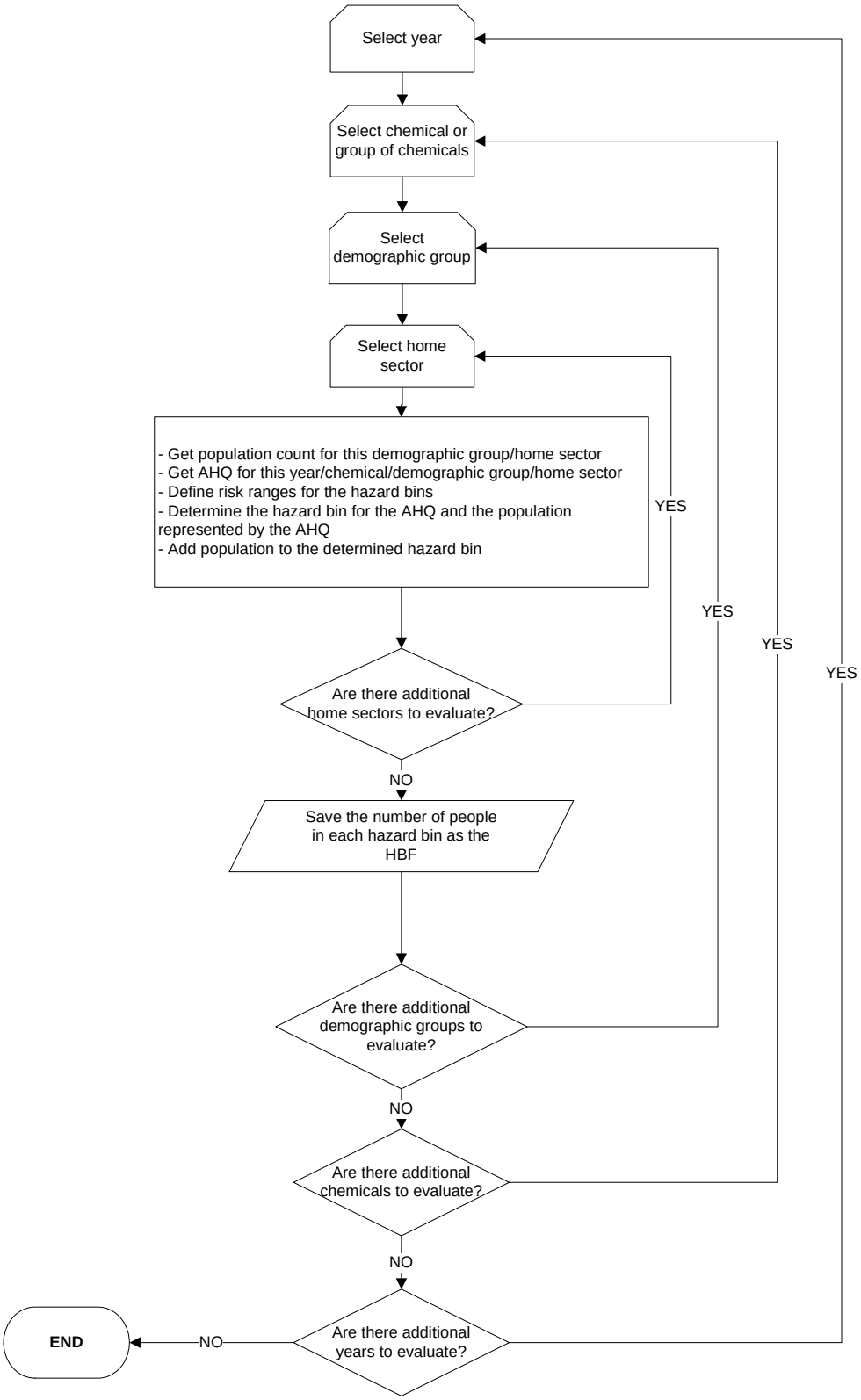


Exhibit A-47. Hazard Bin Frequency Count for Lifetime Residency Period - HBF_L

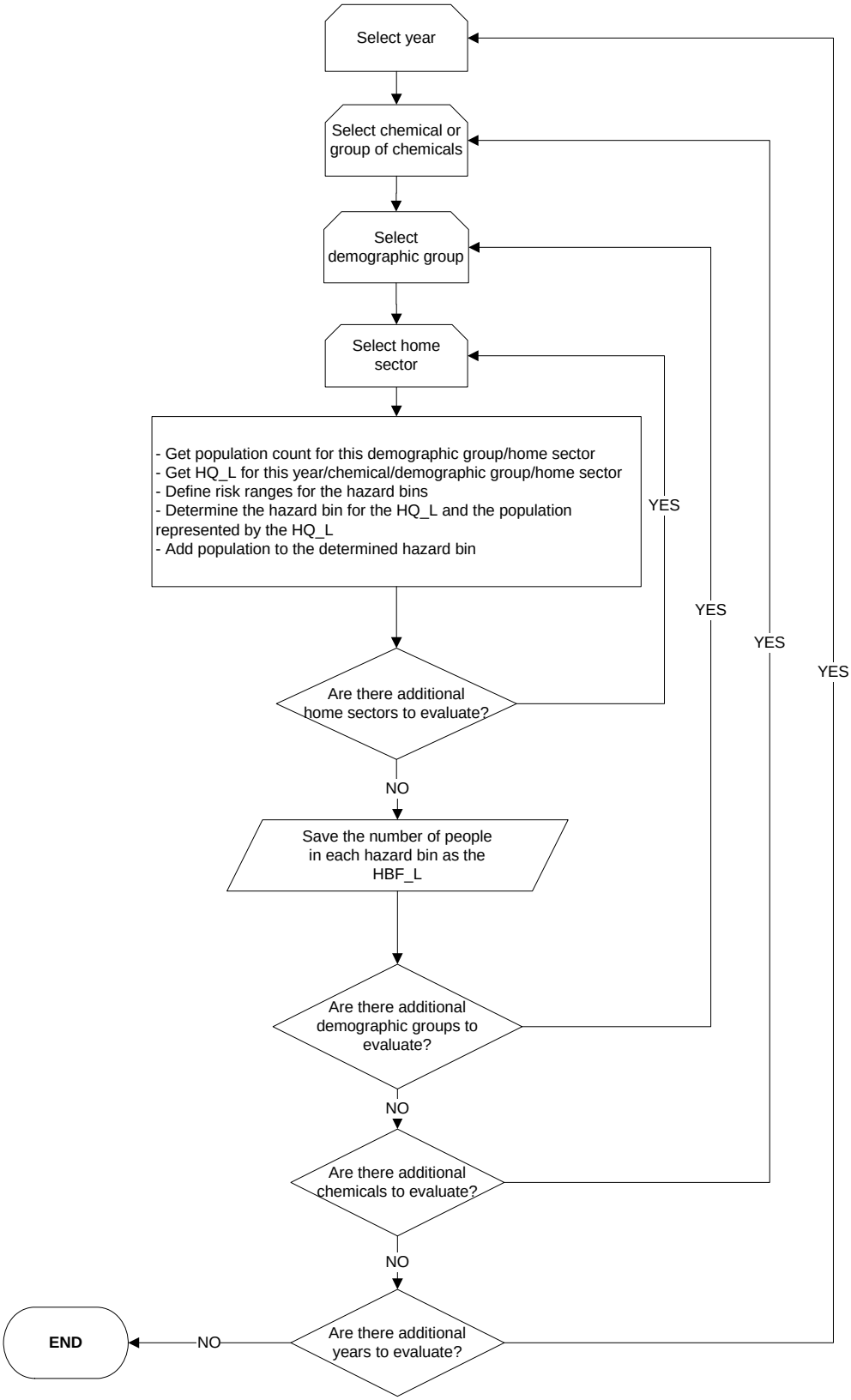


Exhibit A-48. Hazard Bin Frequency Count for Less-Than-Lifetime Residency Period - HBF_LT

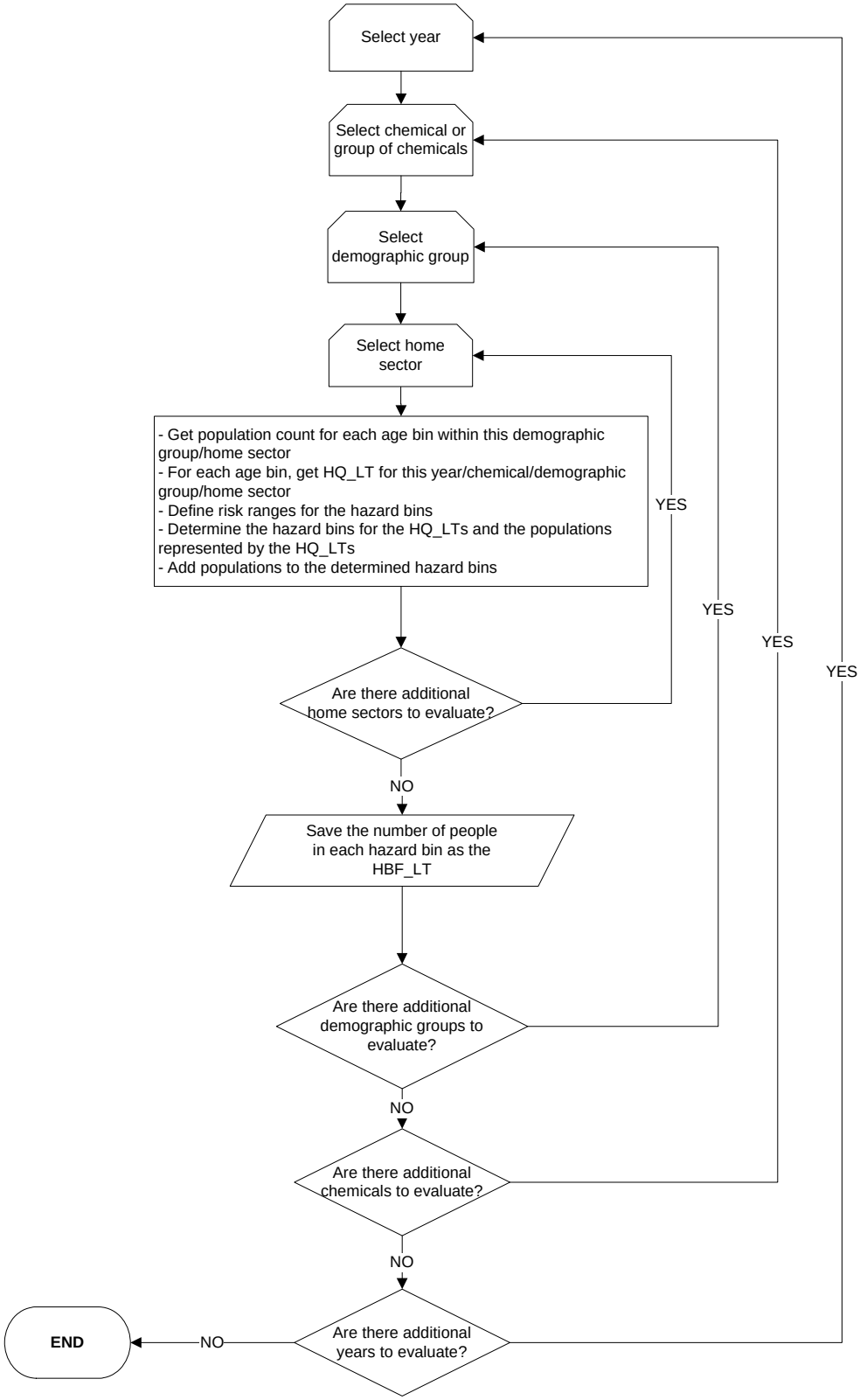


Exhibit A-49. Hazard Bin Frequency Count for Greatest 7-Year Hazard Quotient for Lifetime Residency Period - HBF_7_L

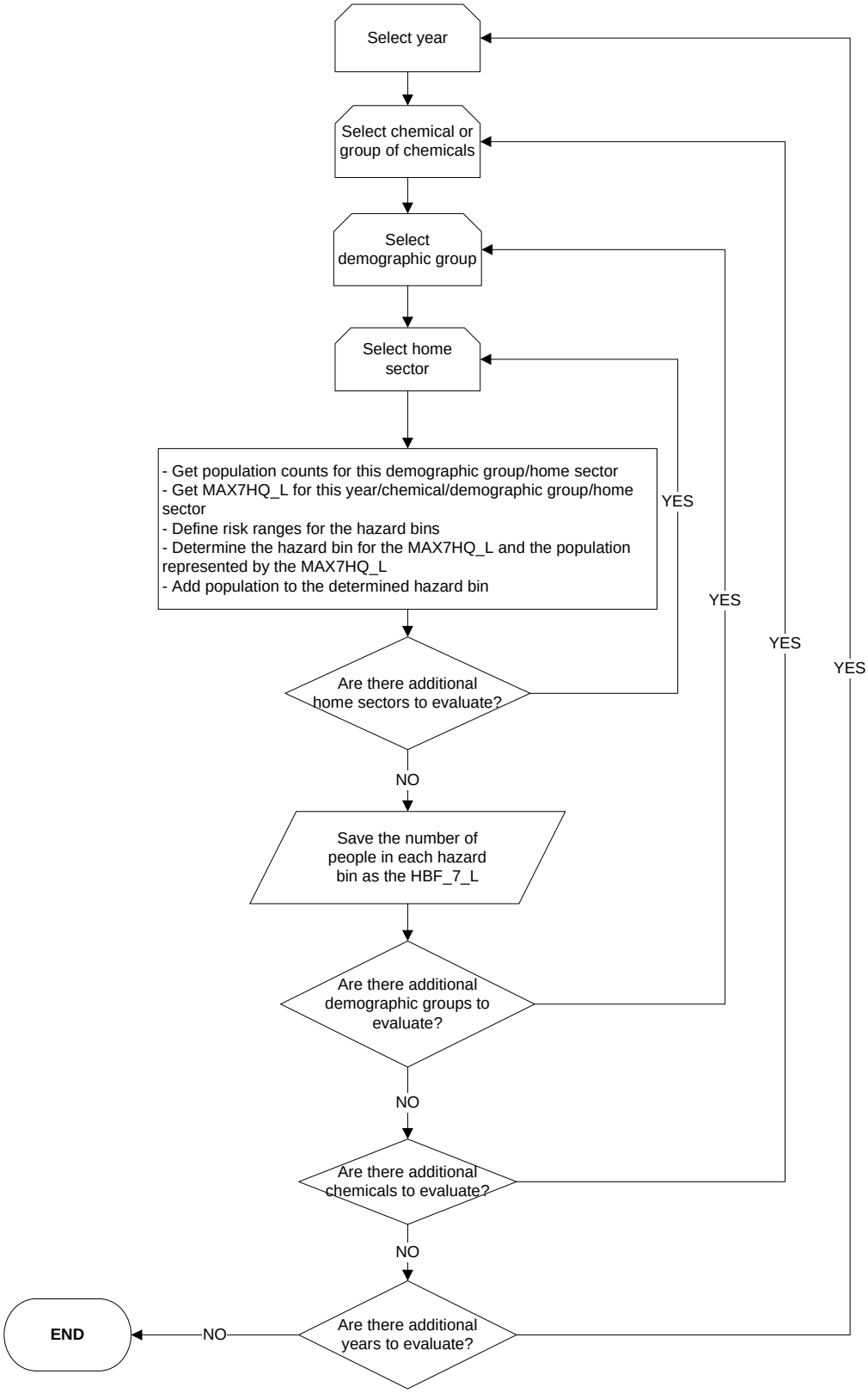
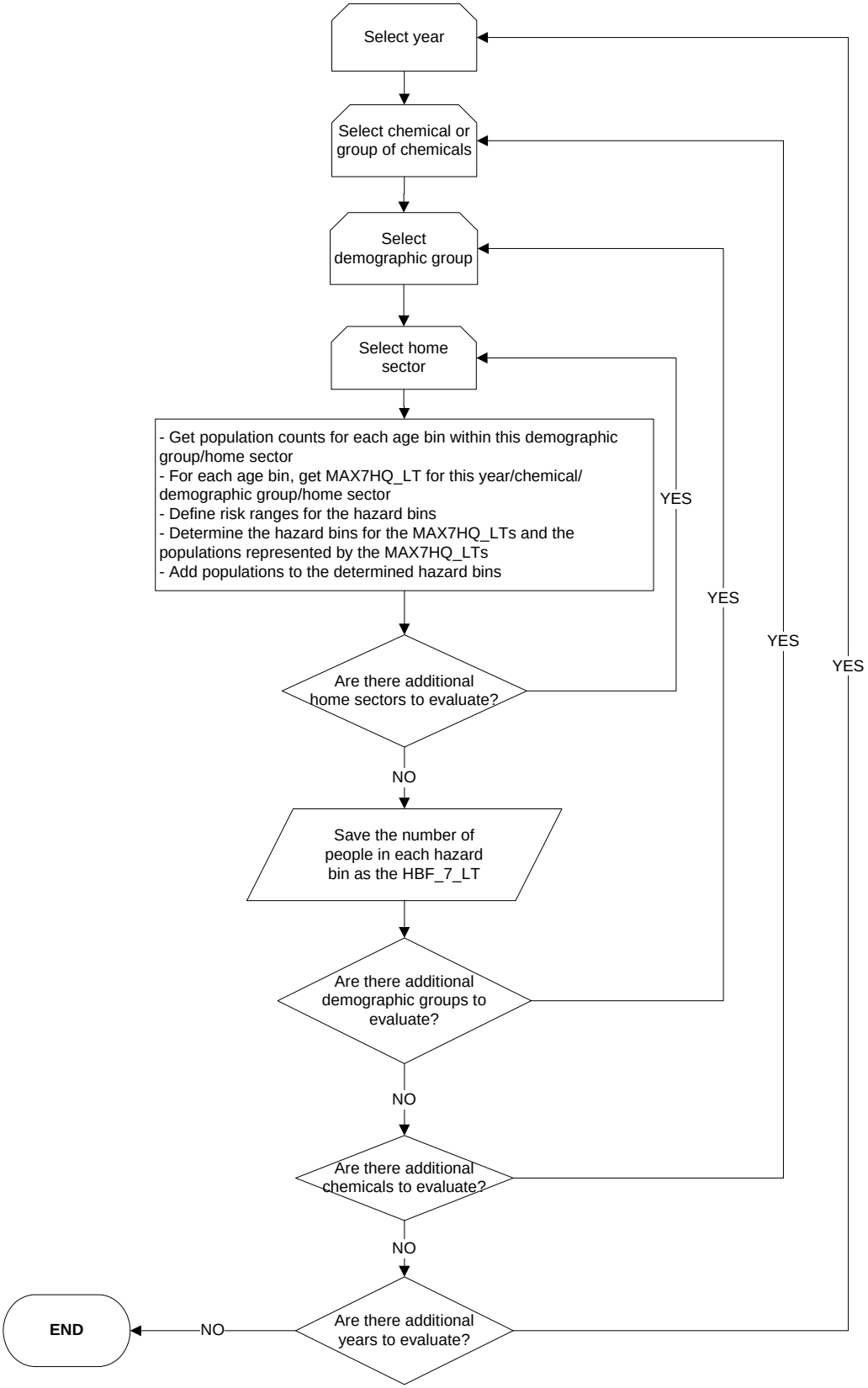


Exhibit A-50. Hazard Bin Frequency Count for Greatest 7-Year Hazard Quotient for Less-Than-Lifetime Residency Period - HBF_7_LT



Appendix B
Data Flow Diagrams

Included in this Appendix are data flow diagrams for the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" and "Inhalation risk assessment using RfCs and UREs, with HAPEM" projects. These diagrams articulate the sequence in which components included in the scenarios are run and indicate key databases used by each project.

Two sets of diagrams are presented for each project: a simplified figure that demonstrates the overall process and includes key TRIM components but omits more detailed aspects of the process, including interim databases created during a run and the presence of graphical user interfaces (GUIs) that allow for user input; and a more comprehensive diagram that provides additional detail on the process flow and the databases that are created and accessed by each component.

B.1 Inhalation Risk Assessment with TRIM.Expo

A simplified flow diagram for this project is presented in Exhibit B.1-1, with a brief description of each component included below.

The **TRIM.Expo$_{\text{Inhalation}}$ Population Processor** (in the TRIM Inhalation Population Processor scenario) converts the population data for the risk assessment study area from the format used by TRIM.Expo$_{\text{Inhalation}}$ to a MySQL database accessible to the TRIM.Expo$_{\text{Inhalation}}$ Postprocessor and TRIM.Risk metrics generator components.

The **TRIM.Expo$_{\text{Inhalation}}$** component estimates human exposure via inhalation for air pollutants of interest, taking into account ambient air concentrations and characteristics of the exposed population. For runs involving multiple chemicals, facilities, sources, or study populations, the iterator (a functionality within the TRIM.Expo$_{\text{Inhalation}}$ component) carries out the exposure calculations to loop over the desired assessment aspects.

The **TRIM.Expo$_{\text{Inhalation}}$ Postprocessor** accesses the population database generated by the TRIM.Expo$_{\text{Inhalation}}$ Population Processor and inhalation exposure estimates from TRIM.Expo$_{\text{Inhalation}}$ to create a MySQL database of exposure estimates used by TRIM.Risk.

The **TRIM.Risk** component uses the inhalation exposure estimates generated by TRIM.Expo$_{\text{Inhalation}}$, and a **human health toxicity database** to calculate individual annualized human health hazard and cancer risk associated with inhalation exposures.

The **TRIM.Risk metrics generator** component uses outputs generated by previous components, including the population database generated by the TRIM.Expo$_{\text{Inhalation}}$ Population Processor and annualized risk estimates from TRIM.Risk, and data elements in two user-specified databases (i.e., the human health toxicity database and a **residency period database**) to calculate risk metrics specified by the user. This component can be run multiple times using a single TRIM.Risk output database to generate a range of risk metrics (e.g., different combinations of

chemicals, different percentiles for age group representation, etc.) using the same annualized individual risk estimates.

DAVE then uses the risk metrics generated by the project and outputs from other components to create charts, tables, and other results summaries as specified by the user.

A more comprehensive data flow diagram for this project is presented in Exhibit B.1-2. This figure includes the TRIM components portrayed in Exhibit B.1-1, but demonstrates in more detail the interaction and feedback between these components. In addition, this figure indicates the GUIs that enable user interaction with the model and specifies the input files and databases used by components for this project (including interim files and databases generated by components during project execution). Note that Exhibits B.1-1 and B.1-2 present the process for a single iteration of an inhalation risk assessment using $\text{TRIM.Expo}_{\text{Inhalation}}$ (i.e., a single combination of chemical, source, and study area). Assessments involving multiple iterations of $\text{TRIM.Expo}_{\text{Inhalation}}$ would require that the steps for estimating exposures be completed for each iteration, a process facilitated by the iterator.

Exhibit B.1-1. Simplified Data Flow Diagram for the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" TRIM.Risk Project

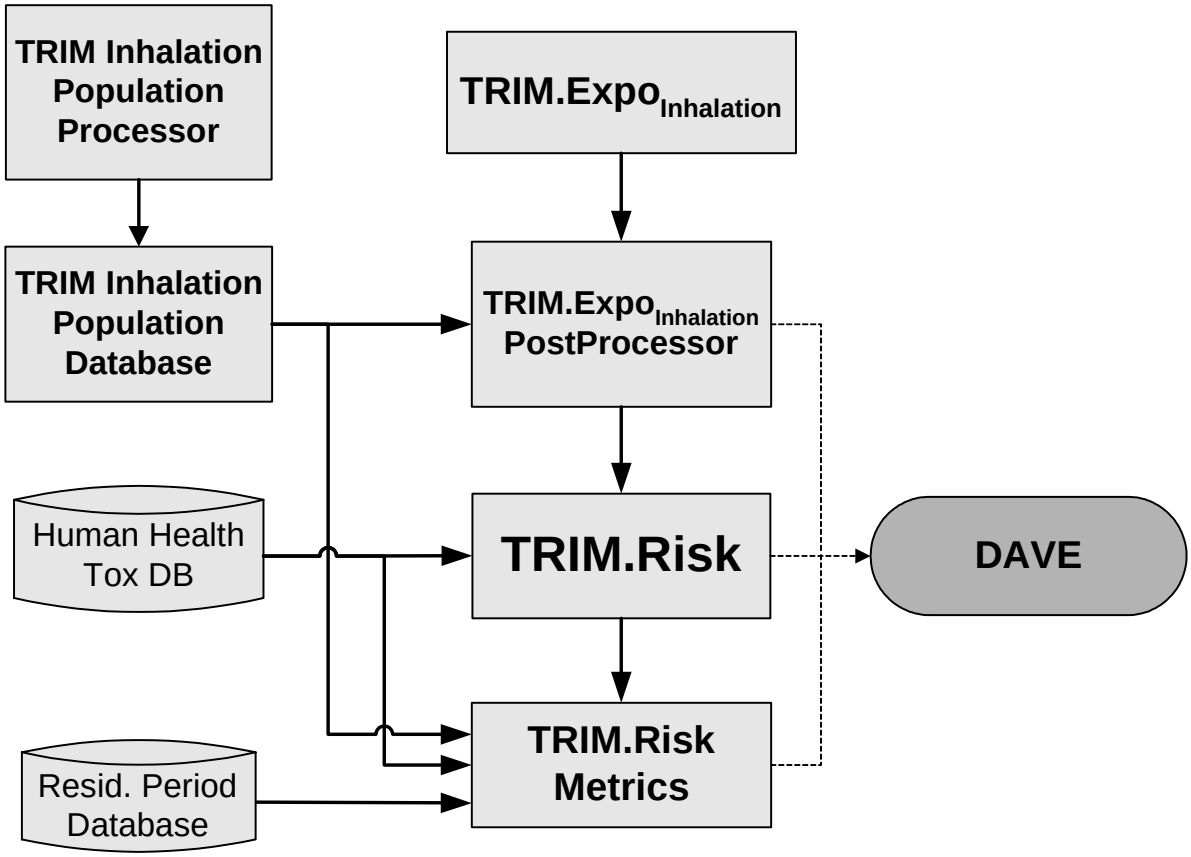
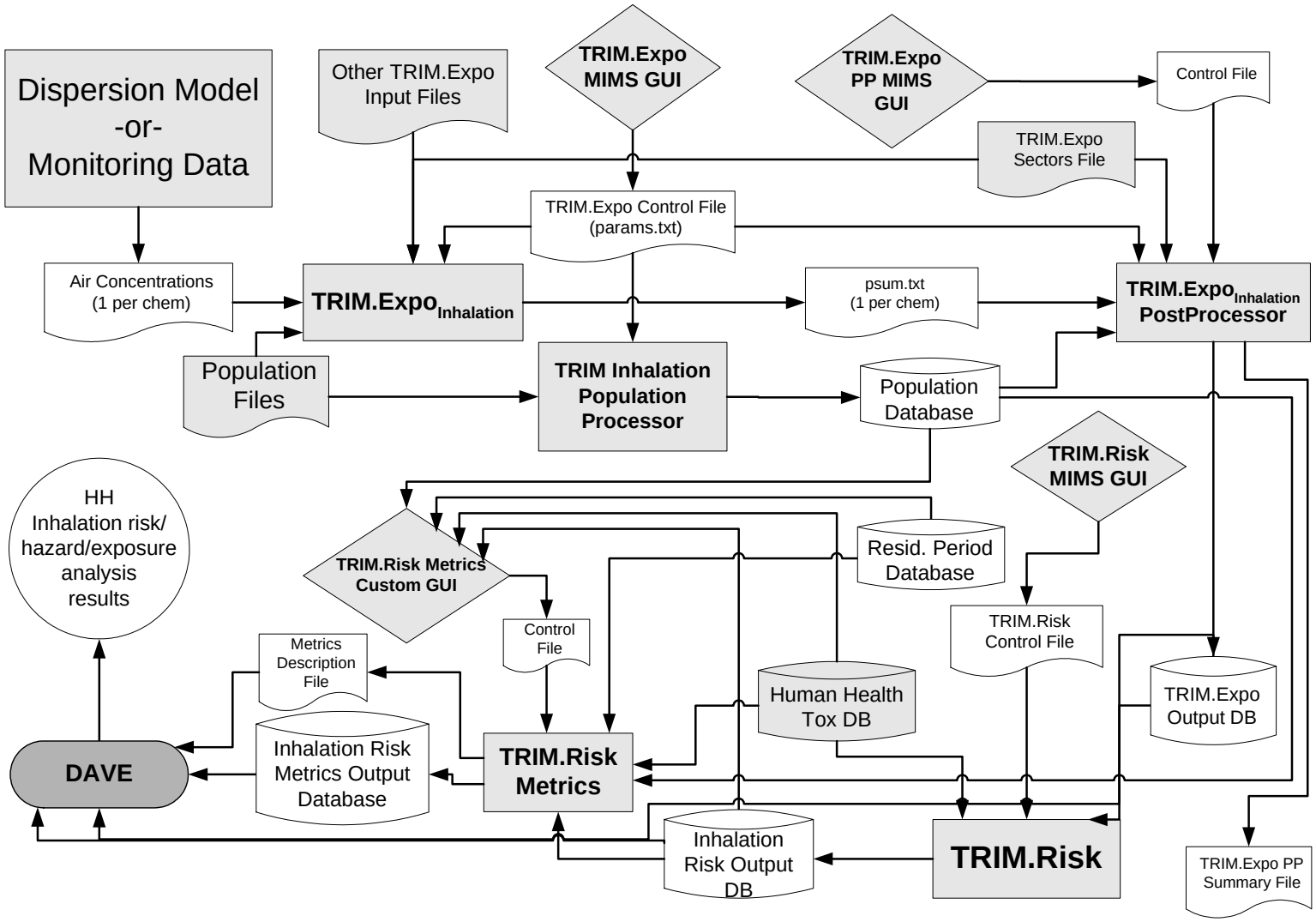


Exhibit B.1-2. Detailed Data Flow Diagram for the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" TRIM.Risk Project



B.2 Inhalation Risk Assessment with HAPEM

A simplified flow diagram for this project is presented in Exhibit B.2-1, with a brief description of each component included below.

HAPEM estimates human exposure via inhalation for air pollutants of interest, taking into account ambient air concentrations and characteristics of the exposed population. For runs involving multiple chemicals, the iterator (a functionality within HAPEM (Part 2)) carries out the exposure calculations to loop over the desired chemicals.

The **HAPEM Postprocessor** converts exposure estimates generated by HAPEM to a MySQL database accessible of exposure estimates used by TRIM.Risk.

The **TRIM.Risk** component uses the output from HAPEM and a **human health toxicity database** to calculate individual annualized human health hazard and cancer risk associated with inhalation exposures.

The **TRIM.Risk metrics generator** component uses outputs generated by previous components, including the HAPEM output database and annualized risk estimates from TRIM.Risk, and data elements in two user-specified databases (i.e., the human health toxicity database and a **residency period database**) to calculate risk metrics specified by the user. This component can be run multiple times using a single TRIM.Risk output database to generate a range of risk metrics (e.g., different combinations of chemicals, different percentiles for age group representation) using the same annualized individual risk estimates.

DAVE then uses the risk metrics generated by the project and outputs from other components to create charts, tables, and other results summaries as specified by the user.

A more comprehensive data flow diagram for this project is presented in Exhibit B.2-2. This figure includes the TRIM components portrayed in Exhibit B.2-1, but it demonstrates in more detail the interaction and feedback between these components. In addition, this figure indicates the GUIs that enable user interaction with the model and specifies the input files and databases used by components for this project (including interim files and databases generated by components during project execution). Note that Exhibits B.2-1 and B.2-2 present the process for a single iteration of an inhalation risk assessment using HAPEM (i.e., a single chemical). Assessments involving multiple iterations of HAPEM would require that the steps for estimating exposures be completed for each iteration, a process facilitated by the iterator.

Exhibit B.2-1. Simplified Data Flow Diagram for the "Inhalation risk assessment using RfCs and UREs, with HAPEM" TRIM.Risk Project

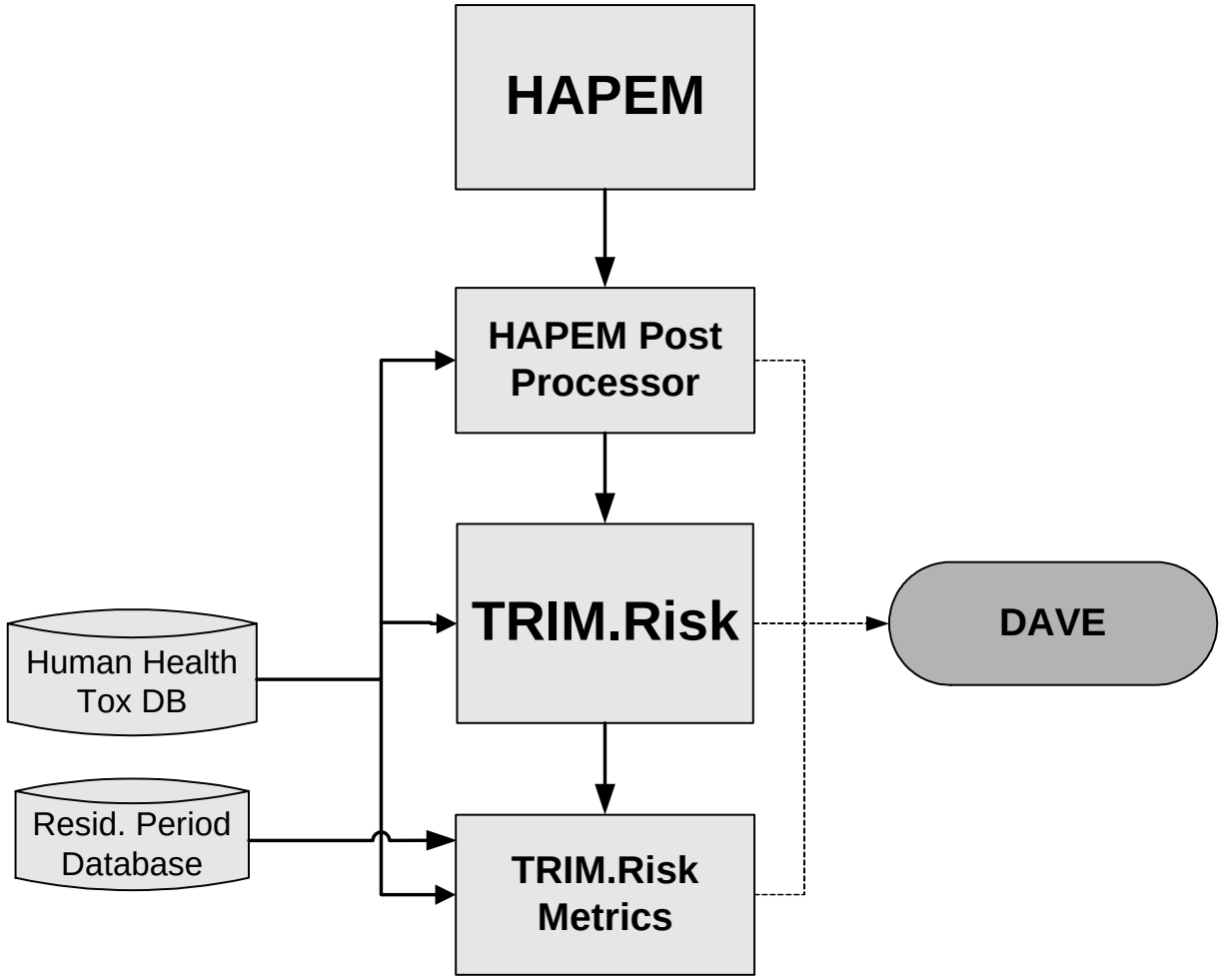
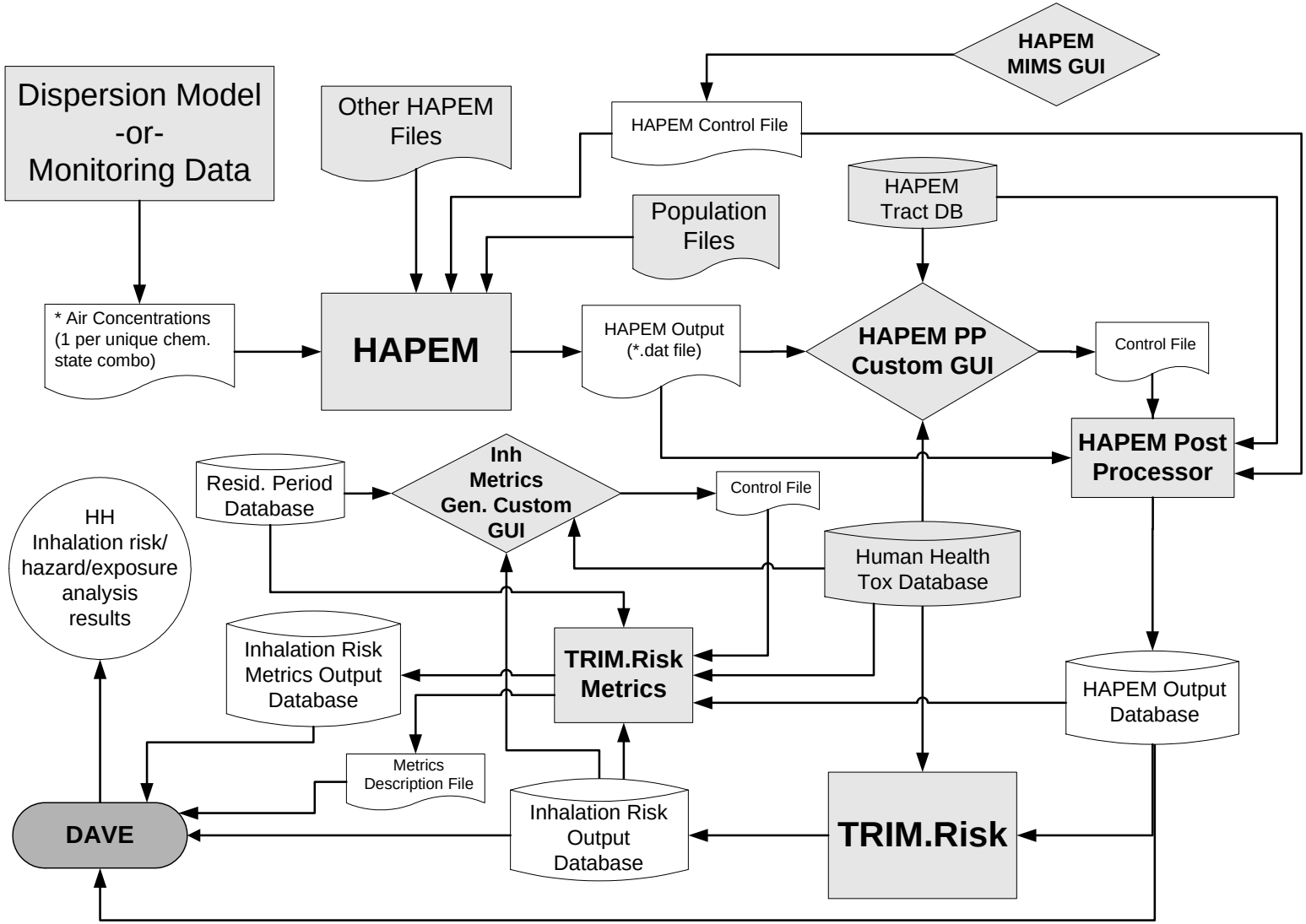


Exhibit B.2-2. Detailed Data Flow Diagram for the "Inhalation risk assessment using RfCs and UREs, with HAPEM" TRIM.Risk Project



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Appendix C
Scenario Components

This Appendix describes the components particular to each MIMS scenario in the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" and "Inhalation risk assessment using RfCs and UREs, with HAPEM" projects. These components, or building blocks, consist of *domain objects* and *modules*. The *domain object* insulates the module instances from other parts of a MIMS scenario so that module instances can be replaced (e.g., updated with a new version of a model) without impacting the input and output connections to other parts of the MIMS scenario. A module defines the link between MIMS and the models and programs (i.e., components) used in applications. It is a graphical user interface (GUI) within a MIMS scenario and allows the user to specify settings (e.g., location of input data) for executing the model or program. When these settings are specified, a *module instance* is created combining the module with these specified settings.

Components of the five $\text{TRIM.Expo}_{\text{Inhalation}}$ scenarios are described in Section C.1 and components of the three HAPEM scenarios are described in Section C.2. For each scenario, a screen shot of the "Graph View" pane is provided, which shows all of the domain objects and modules used within that scenario. A table with the names of the domain objects, modules, and associated processes performed accompanies each screen shot.

C.1 TRIM.Expo Scenario Components

Exhibit C.1-1. Components of "TRIM.Expo w. TRIM.Risk (1 run)" Scenario

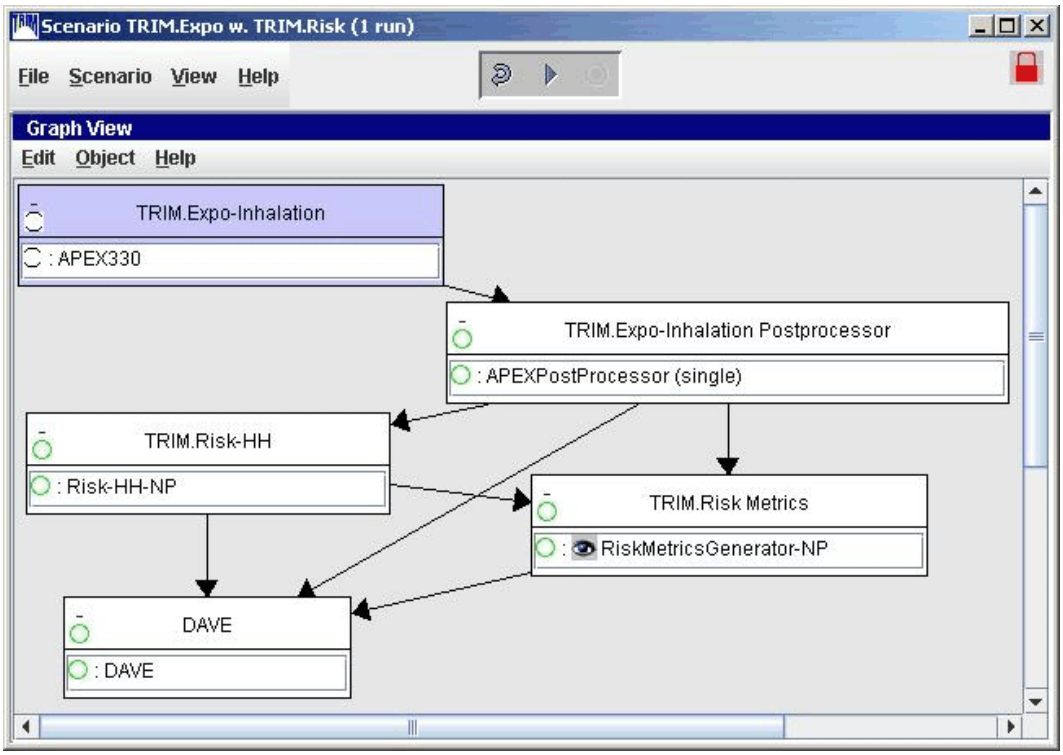

Exhibit C.1-2. Components of "TRIM.Expo w. TRIM.Risk (1 run)" Scenario

Domain Object	Module Instance	Process Description
TRIM.Expo$_{\text{Inhalation}}$	APEX330	Calculates inhalation exposure estimates.
TRIM.Expo$_{\text{Inhalation}}$ Postprocessor	APEXPostProcessor (single)	Writes inhalation exposure estimates to a MySQL database.
TRIM.Risk-HH	Risk-HH-NP	Generates annualized human health risk estimates.
TRIM.Risk Metrics	RiskMetricsGenerator-NP	Generates human health risk metrics.
DAVE	DAVE	Provides options for displaying exposure, risk, and risk metrics data.

Exhibit C.1-3. Components of "TRIM.Expo w. TRIM.Risk (>1 run)" Scenario

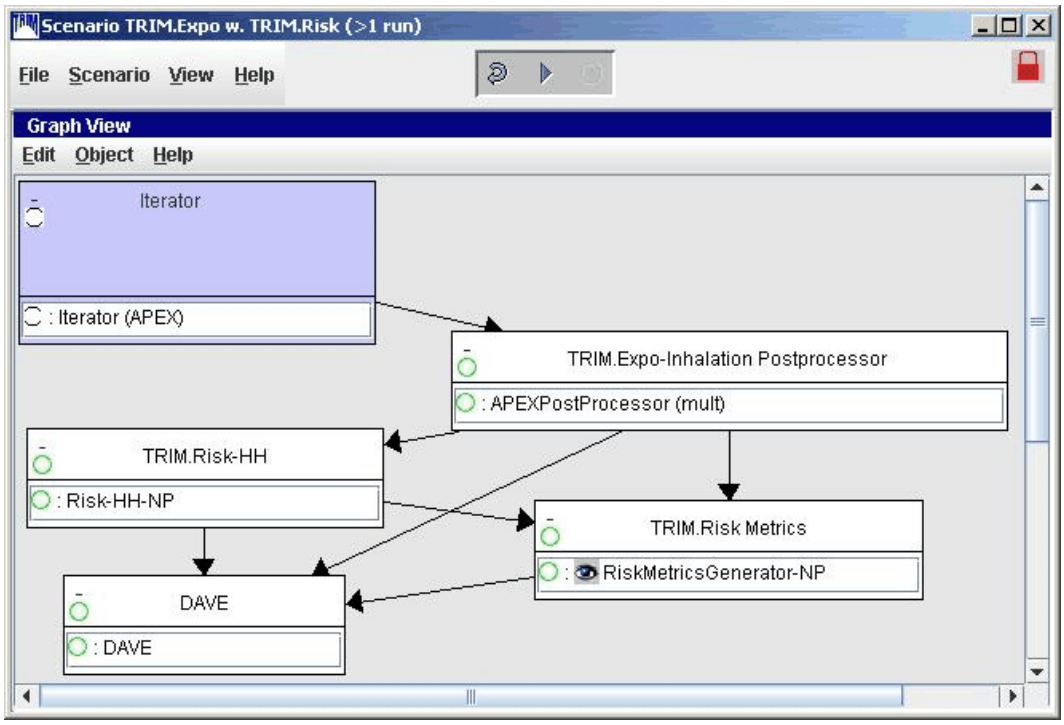

Exhibit C.1-4. Components of "TRIM.Expo w. TRIM.Risk (>1 run)" Scenario

Domain Object	Module Instance	Process Description
Iterator	Iterator (APEX)	Calculates inhalation exposure estimates over the items from one or more lists of parameters.
TRIM.Expo$_{\text{Inhalation}}$ Postprocessor	APEXPostProcessor (mult)	Writes inhalation exposure estimates to a MySQL database.
TRIM.Risk-HH	Risk-HH-NP	Generates annualized human health risk estimates.
TRIM.Risk Metrics	RiskMetricsGenerator-NP	Generates human health risk metrics.
DAVE	DAVE	Provides options for exporting and displaying exposure, risk, and risk metrics data.

Exhibit C.1-5. Components of "TRIM.Risk" Scenario

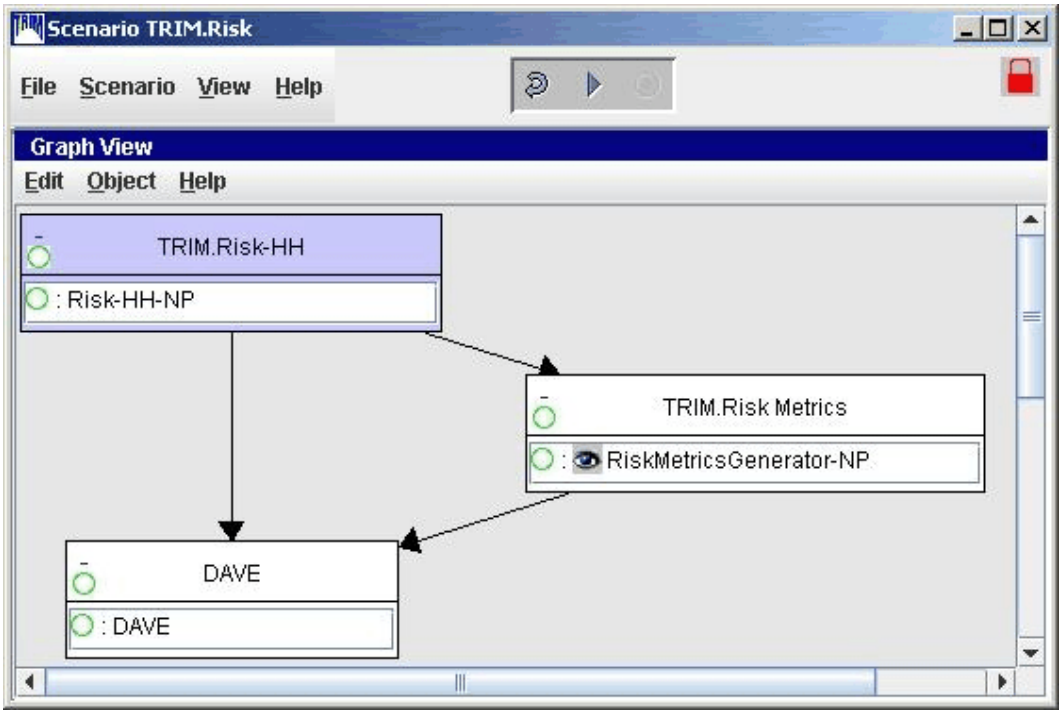

Exhibit C.1-6. Components of "TRIM.Risk" Scenario

Domain Object	Module Instance	Process Description
TRIM.Risk-HH	Risk-HH-NP	Generates annualized human health risk estimates.
TRIM.Risk Metrics	RiskMetricsGenerator-NP	Generates human health risk metrics.
DAVE	DAVE	Provides options for exporting and displaying exposure, risk, and risk metrics data.

Exhibit C.1-7. Components of "TRIM.Risk Metrics" Scenario

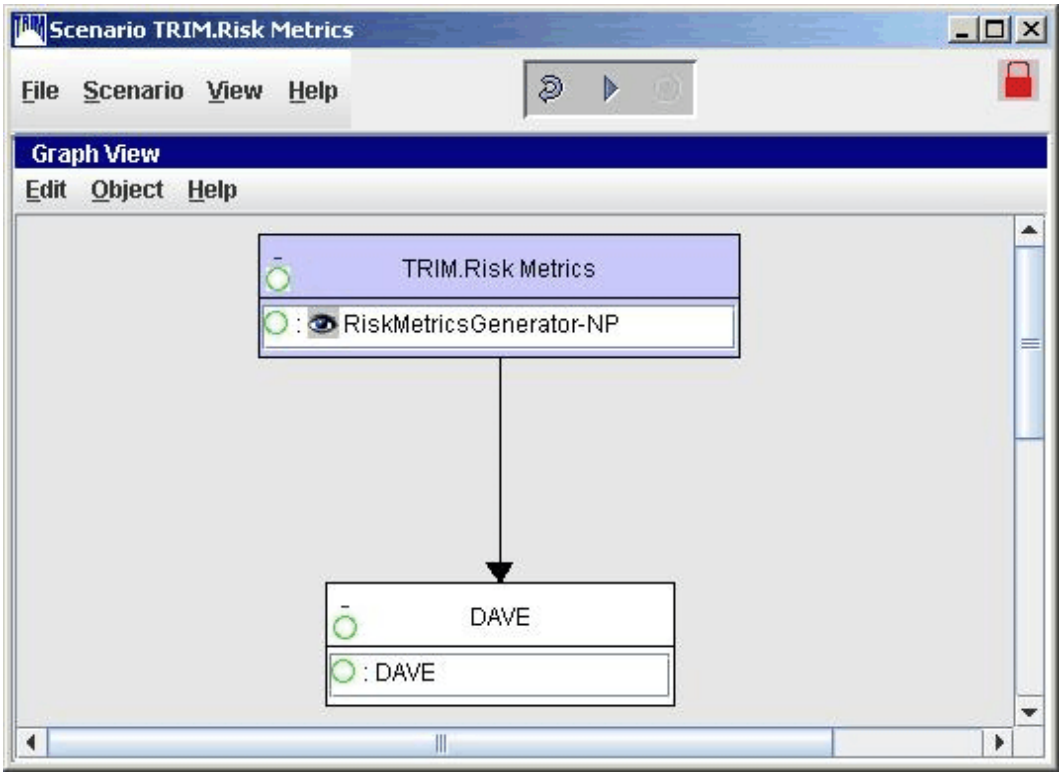

Exhibit C.1-8. Components of "TRIM.Risk Metrics" Scenario

Domain Object	Module Instance	Process Description
TRIM.Risk Metrics	RiskMetricsGenerator-NP	Generates human health risk metrics.
DAVE	DAVE	Provides options for exporting and displaying exposure, risk, and risk metrics data.

C.2 HAPEM Scenario Components

Exhibit C.2-1. Components of "HAPEM w. TRIM.Risk (1 chem)" Scenario

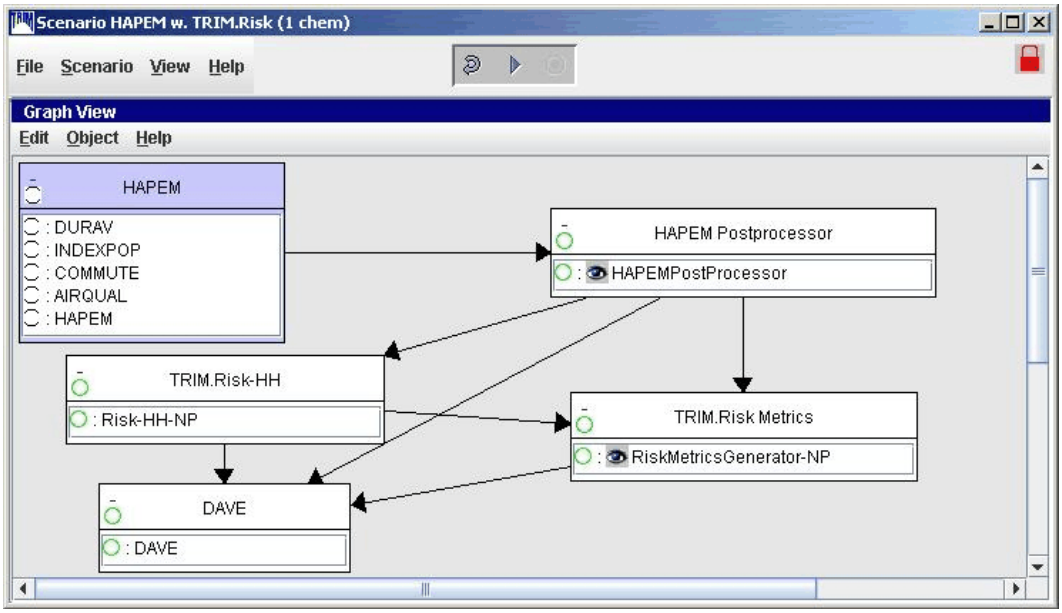

Exhibit C.2-2. Components of "HAPEM w. TRIM.Risk (1 chem)" Scenario

Domain Object	Module Instance	Process Description
HAPEM	DURAV	Categorizes activity data.
	INDEXPOP	Indexes population data.
	COMMUTE	Identifies commutes.
	AIRQUAL	Reads annual air quality estimates.
	HAPEM	Calculates annual average exposure estimates.
HAPEM Postprocessor	HAPEMPostProcessor	Writes inhalation exposure estimates to a MySQL database.
TRIM.Risk-HH	Risk-HH-NP	Generates annualized human health risk estimates.
TRIM.Risk Metrics	RiskMetricsGenerator-NP	Generates human health risk metrics.
DAVE	DAVE	Provides options for exporting and displaying exposure, risk, and risk metrics data.

Exhibit C.2-3. Components of "HAPEM w. TRIM.Risk (>1 chem)" Scenario

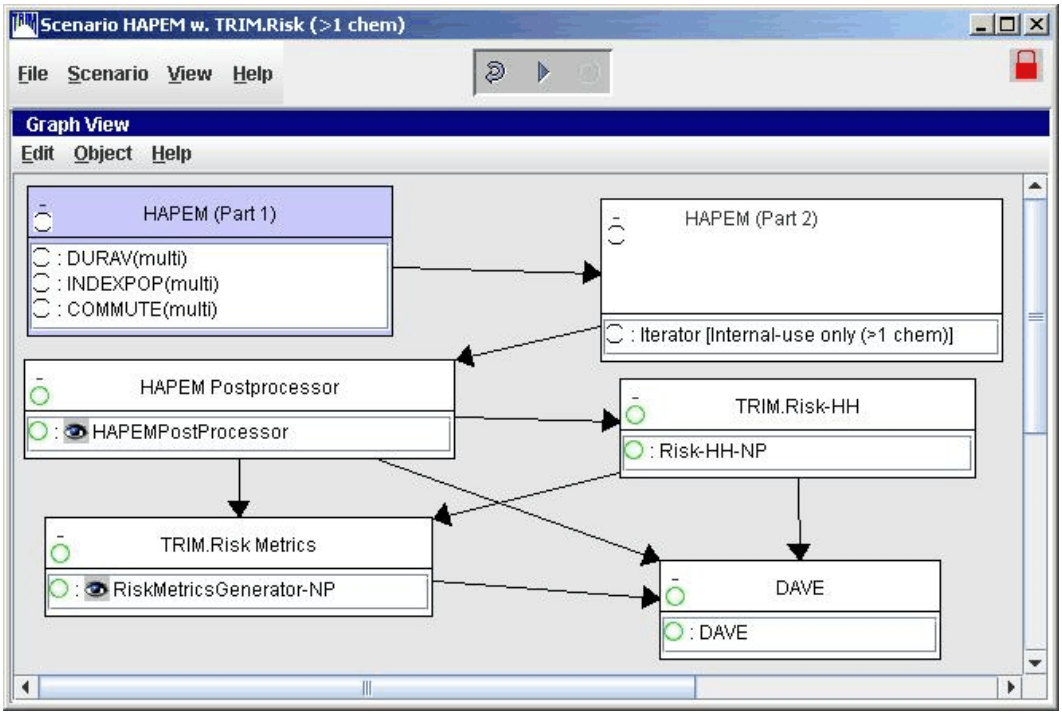

Exhibit C.2-4. Components of "HAPEM w. TRIM.Risk (>1 chem)" Scenario

Domain Object	Module Instance	Process Description
HAPEM (Part 1)	DURAV(multi)	Categorizes activity data.
	INDEXPOP(multi)	Indexes population data.
	COMMUTE(multi)	Identifies commutes.
HAPEM (Part 2)	Iterator [Internal-use only (>1 chem)]	Reads annual air quality estimates and calculates annual average exposure estimates over the items of a list of parameters.
HAPEM Postprocessor	HAPEMPostProcessor	Writes inhalation exposure estimates to a MySQL database.
TRIM.Risk-HH	Risk-HH-NP	Generates annualized human health risk estimates.
TRIM.Risk Metrics	RiskMetricsGenerator-NP	Generates human health risk metrics.
DAVE	DAVE	Provides options for exporting and displaying exposure, risk, and risk metrics data.

Exhibit C.2-5. Components of "TRIM.Risk Metrics" Scenario

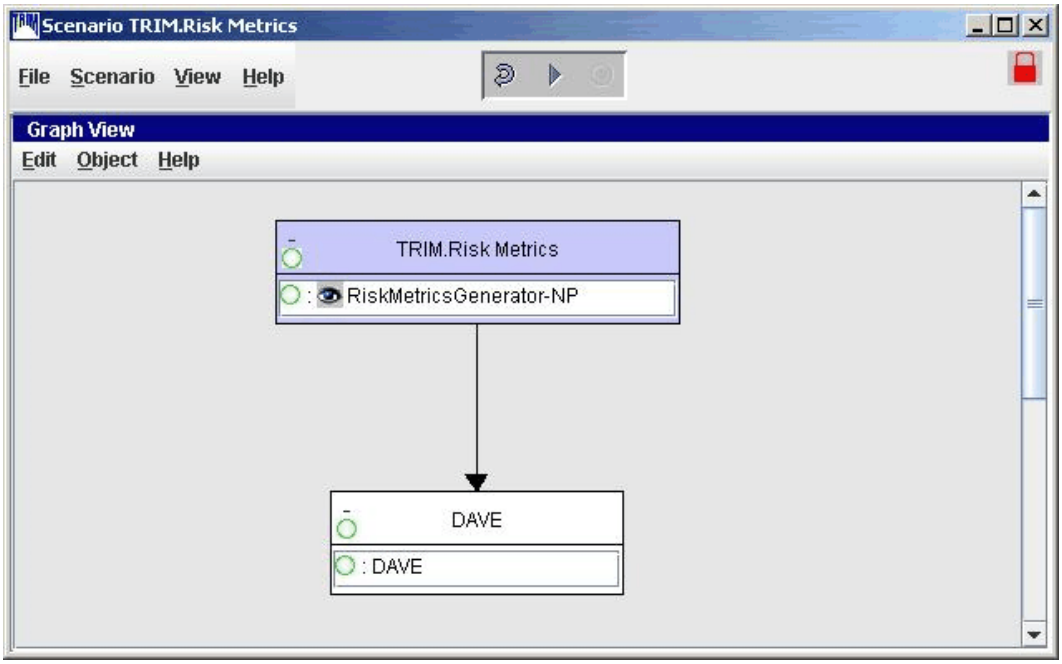

Exhibit C.2-6. Components of "TRIM.Risk Metrics" Scenario

Domain Object	Module Instance	Process Description
TRIM.Risk Metrics	RiskMetricsGenerator-NP	Generates human health risk metrics.
DAVE	DAVE	Provides options for exporting and displaying exposure, risk, and risk metrics data.

Appendix D
Scenario Parameters

For each MIMS scenario, there is a set of parameters that specifies the location of model components, executables, log files and databases; details about the scenario; and options for the user to modify how the run is performed. This Appendix provides a complete list of all scenario parameters for each pre-packaged scenario of both the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" and "Inhalation risk assessment using RfCs and UREs, with HAPEM" projects.

For each of the pre-packaged scenarios available with TRIM.Risk, the scenario (and module instance) parameters that are frequently changed by users are listed on tabs in the 'Input Panels" pane of the scenario window. Lists of these parameters and instructions for how to change them on the input panels are provided in Chapters 3 and 4. Some of the parameters on the input panels are included in the tables here because they are also found on the parameters tables within each scenario. Note that some parameters are included in both scenario and module instance parameter tables. Parameters that are in multiple tables are linked so that if the parameter is changed in one table, it will change in all tables where it appears.

Scenario Parameters specify the location of model components, executables, and log files as well as parameters that are used for other MIMS processes (note that not all parameters are needed in every application). The full set of parameters is accessed by either selecting "Edit Parameter Values" from the "Scenario" drop-down menu or by checking the box next to "Parameter Table" in the "View" drop-down menu and clicking on the "Expand" button ( ). If a required scenario parameter value is not set before the simulation is executed, there will be an error when the simulation is attempted. See Section 3.1.7 of Volume I of this User's Guide for further instructions on setting scenario parameters.

The exhibits in this Appendix include the data type, default value, description, and instructions on how to set each parameter. Note that the parameters are in alphabetical order in these Appendix tables, which may not be the same order as in the scenarios. To sort the parameters so they are listed in alphabetical order in a scenario, click on the "Parameters" header at the top of the "Parameters" column.

The scenario parameters found in the TRIM.Expo$_{Inhalation}$ and HAPEM projects are presented in the exhibits that follow:

Exhibit D-1. TRIM Inhalation Population Processor Scenario Parameters

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Exhibit D-3. TRIM.Expo w. TRIM.Risk (>1 run) Scenario Parameters

Exhibit D-4. TRIM.Risk Scenario Parameters

Exhibit D-5. TRIM.Risk Metrics Scenario Parameters (TRIM.Expo$_{Inhalation}$)

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Exhibit D-8. TRIM.Risk Metrics Scenario Parameters (HAPEM)

Exhibit D-9. File Management Parameters

Exhibit D-1. TRIM Inhalation Population Processor Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Directory	Directory name	Set by user during installation	Sets the directory location into which APEX (i.e., TRIM.Expo$_{Inhalation}$) is installed.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Input Directory	Directory name	–	Name and location of the directory containing the input files for APEX (i.e., TRIM.Expo$_{Inhalation}$).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Population Directory	Directory name	–	Location of directory containing population files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEXPopDB Name	Database name	–	Name of the MySQL database containing population data used by TRIM.Expo$_{Inhalation}$ (i.e., APEX), and also used to generate risk metrics.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Execution Path	Directory and file name	–	Name and location of the APEX (i.e., TRIM.Expo$_{Inhalation}$) executable.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Default Directory	Directory name	${str("TRIM Directory")}\logs\PopProc\${str("Run Name")}	Directory in which TRIM log files will be saved.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
File Management Parameters	Set of parameters	Set of 13	A group of all parameters relating to the file management of the scenario.	Click the "Edit" button in this row. A Parameter Value window containing 14 file management parameters will appear. See Exhibit D-9 for a listing of these parameters.

Exhibit D-1. TRIM Inhalation Population Processor Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input File - Employment	Directory and file name	–	Name and location of file containing employment probabilities for all age groups in population input files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Sector Locations	Directory and file name	–	Name and location of file providing the latitude and longitude of sector IDs.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	trim	Set by user during installation	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Population Input Files	Directory and file name	–	Name and location of gender and/or race specific population data files with defined age groups.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Run Name	Text string	–	Name of the unique TRIM.Risk scenario run. The purpose is solely to help users keep track of TRIM.Risk scenarios and results.	User-specified. Type a value directly into the "Value" column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Execution Path	Directory name	${str("TRIM Directory")}\bin	Sets the directory location of the TRIM executables.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
TRIM Lib Path	Directory name	${str("TRIM Directory")}\lib	Location of the TRIM\lib directory.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Directory	Directory name	Set by user during installation	Sets the directory location into which APEX (i.e., $TRIM.Expo_{Inhalation}$) is installed.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Input Directory	Directory name	–	Name and location of the directory containing the input files for APEX (i.e., $TRIM.Expo_{Inhalation}$).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Output Directory	Directory name	${str("APEX Directory")}\output_${str("Pollutant")}_${str("Location")}\${str("Run Name")}	Name and location of the directory containing the output files for APEX.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Population Database	Database name	–	Location of directory containing population files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Air Quality District Radius	Integer	–	Specifies the maximum distance in kilometers that a sector can be from the nearest air district to remain in the study.	User-specified. Type a value directly into the "Value" column.
CAS Number	Integer	–	The assigned CAS number for the chemical under analysis.	User-specified. Type a value directly into the "Value" column.
County FIPS Codes	Integer	–	FIPS codes for the counties to which the study area is restricted.	User-specified. Click the "Edit" button in this row.
Default Directory	Directory name	${str("TRIM Directory")}\logs\ExpoWRisksingle\${str("Run Name")}	Directory in which TRIM log files will be saved.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Dose	Directory and file name	${str("APEX Output Directory")}\dose.txt	Provides a time series of dose estimates for each modeled profile if doses are modeled.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
EVENTS	Directory and file name	${str("APEX Output Directory")}\events.txt	Provides a summary of the activity diary with accompanying exposure and dose, at the diary event level. Note that this file can become very large, and for this reason, the user is given the option of only writing the events for only a fraction of the simulated persons.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
End Date	Integer	–	End date of the simulation period.	User-specified. Type a value directly into the "Value" column.
Exposure	Directory and file name	${str("APEX Output Directory")}\exp.txt	Provides a time series of exposure estimates for each modeled profile.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Facility	Text string	–	The type of facility being modeled.	User-specified. Type a value directly into the "Value" column.
File Management Parameters	Set of parameters	Set of 13	A group of all parameters relating to the file management of the scenario.	Click the "Edit" button in this row. A Parameter Value window containing 13 file management parameters will appear. See Exhibit D-9 for a listing of these parameters.
Human Health Toxicity Database	Database name	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Include Commuting to Work?	True/false	False	If yes, commuting to work in a work sector or census tract is allowed.	User-specified. To select this option, click the check box in the "Value" column.
Inhalation Exposure DB Name	Database name	–	The name of the database with inhalation exposure estimates generated by $TRIM.Expo_{Inhalation}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk DB Name	Database name	–	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Air Quality Data	Directory and file name	–	Provides the hourly air quality data for the modeled pollutant for each monitoring/modeling location listed in the District Location File.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - District Locations	Directory and file name	–	Provides the site IDs and locations (decimal degrees latitude and longitude) of air quality monitoring or modeling locations.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Meteorological Zone Locations	Directory and file name	–	Provides the site Ids and locations (decimal degrees latitude and longitude) of the meteorological stations.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Temperature Data	Directory and file name	–	Contains the daily maximum and, optionally, average (or other) temperature data for the meteorological stations and dates indicated in the Meteorological Zones file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
LOG	Directory and file name	${str("APEX Output Directory")}\log.txt	Contains the record of the model simulation; if it completes successfully, the log file indicates the input files and parameter settings used for the simulation. If the simulation does not run successfully, the log file contains error messages describing the fatal errors.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Latitude	Number	–	Specifies the latitude in decimal degrees of the center of the study area.	User-specified. Type a value directly into the "Value" column.
Location	Text string	–	The location of the simulation.	User-specified. Type a value directly into the "Value" column.
Longitude	Number	–	Specifies the longitude in decimal degrees of the center of the study area.	User-specified. Type a value directly into the "Value" column.
MSUM	Directory and file name	${str("APEX Output Directory")}\msum.txt	Provides a summary of the time and exposure by microenvironment for each profile modeled in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Meteorological Zone Radius	Integer	–	Specifies maximum distance in kilometers from a weather station to which daily temperature data collected at that station should be applied.	User-specified. Type a value directly into the "Value" column.
MySQL Password	Text string	Set by user during installation	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
MySQL User Name	trim	Set by user during installation	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Number of Profiles	Integer	–	The number of persons modeled.	User-specified. Type a value directly into the "Value" column.
Overwrite Existing Database?	True/false	False	If true, a database previously generated by a module may be overwritten by a new database with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Overwrite Output Database	True/false	False	If true, an output database previously generated by $TRIM.Risk_{HH\text{-}NP}$ will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
PSUM	Directory and file name	${str("APEX Output Directory")}\psum.txt	Provides a summary of each profile modeled in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Params File	Directory and file name	–	The file that specifies input and output files, model parameters, and format of output files for this execution of APEX (i.e., $TRIM.Expo_{Inhalation}$).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Perform ingestion related calculations	True/false	False	Indicates whether ingestion risk should be calculated.	User-specified. To select this option, click the check box in the "Value" column.
Perform inhalation related calculations	True/false	True	Indicates whether inhalation risk should be calculated.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Pollutant	Text string	–	The chemical under analysis.	User-specified. Type a value directly into the "Value" column.
R Bin Directory	Directory name	Set by user during installation	Location of the bin directory for the R program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Random Seed	Integer	–	This value determines how modeled individuals are selected for a simulation. If the same random seed is used for two simulations with the same population and number of profiles, the same set of modeled individuals will be simulated. If different random seeds are used for these same two simulations, a different set of modeled individuals will be simulated.	User-specified. Type a value directly into the "Value" column.
Residency Period Database	Database name	–	The name of the database containing data on residency periods.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Run Name	Text string	–	Name of the unique TRIM.Risk scenario run. The purpose is solely to help users keep track of TRIM.Risk scenarios and results.	User-specified. Type a value directly into the "Value" column.
SITES	Directory and file name	${str("APEX Output Directory")}\sites.txt	Lists the sectors, districts, and zones in the study area, and identifies mapping between them.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Scenario	Text string	–	Name of TRIM.Risk scenario.	User-specified. Type a value directly into the "Value" column.
Source Type	Text string	–	The type of source being modeled.	User-specified. Type a value directly into the "Value" column.
Specific Input Directory	Directory name	–	Location of the input directory with files specific to this scenario and/or simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Start Date	Integer	–	Start date of the simulation period.	User-specified. Type a value directly into the "Value" column.
Study Area Radius	Number	–	The distance in kilometers from the center to the edge of the study area.	User-specified. Type a value directly into the "Value" column.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Summary File Name	Directory and file name	–	Indicates the location of the parameters file and logs a summary of the input parameter settings used by the TRIM.Expo$_{Inhalation}$ Postprocessor to generate the MySQL database of exposure estimates.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TABLESB	Directory and file name	${str("APEX Output Directory")}\tables.txt	Contains tables summarizing the results of the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Data Directory	Directory name	${str("TRIM Directory")}\data	Directory in which the TRIM results are stored.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Database Type	Text string	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Select from the drop-down menu in the "Value"column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Execution Path	Directory and file name	${str("TRIM Directory")}\bin	Sets the directory location of the TRIM executables.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-2. TRIM.Expo w. TRIM.Risk (1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
TRIM Lib Path	Directory and file name	${str("TRIM Directory")}\lib	Sets the directory location of the TRIM jar files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Use County List?	True/false	False	Specifies whether to use a list of counties to define the study area.	User-specified. To select this option, click the check box in the "Value" column.
Use Daylight Savings Time?	True/false	False	If yes, the Air Quality Data file will be adjusted for Daylight Savings Time in the summer.	User-specified. To select this option, click the check box in the "Value" column.
Write Hourly Output?	True/false	False	If yes, the hourly exposure and dose (if applicable) out put files are created.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit D-3. TRIM.Expo w. TRIM.Risk (>1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Directory	Directory name	Set by user during installation	Sets the directory location into which $TRIM.Expo_{Inhalation}$ is installed.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Input Directory	Directory name	–	Name and location of the directory containing the input files for APEX.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Population Database	Database name	–	Location of directory containing population files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX Execution Path	Directory and file name	–	Name and location of the APEX executable.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Default Directory	Directory name	${str("TRIM Directory")}\logs\ExpoWRiskmult\${str("Run Name")}	Directory in which TRIM log files will be saved.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
End Date	Integer	–	End date of the simulation period.	User-specified. Type a value directly into the "Value" column.
File Management Parameters	Set of parameters	Set of 14	A group of all parameters relating to the file management of the scenario.	Click the "Edit" button in this row. A Parameter Value window containing 14 file management parameters will appear. See Exhibit D-9 for a listing of these parameters.

Exhibit D-3. TRIM.Expo w. TRIM.Risk (>1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Human Health Toxicity Database	Text string	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Include Commuting to Work?	True/false	False	If this box is checked, commuting to work is allowed.	User-specified. To select this option, click the check box in the "Value" column.
Inhalation Exposure DB Name	Text string	–	The name of the database with inhalation exposure estimates generated by $TRIM.Expo_{Inhalation}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk DB Name	Text string	–	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH\text{-}NP}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Overwrite Existing Database?	True/false	False	If true, an output database previously generated by the $TRIM.Expo_{Inhalation}$ Postprocessor will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Overwrite Output Database	True/false	False	If true, an output database previously generated by $TRIM.Risk_{HH\text{-}NP}$ will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit D-3. TRIM.Expo w. TRIM.Risk (>1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Perform ingestion related calculations	True/false	False	Indicates whether ingestion risk should be calculated.	User-specified. To select this option, click the check box in the "Value" column.
Perform inhalation related calculations	True/false	True	Indicates whether inhalation risk should be calculated.	User-specified. To select this option, click the check box in the "Value" column.
R Bin Directory	Directory name	Set by user during installation	Location of the bin directory for the R program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Random Seed	Integer	–	This value determines how modeled individuals are selected for a simulation. If the same random seed is used for two simulations with the same population and number of profiles, the same set of modeled individuals will be simulated. If different random seeds are used for these same two simulations, a different set of modeled individuals will be simulated.	User-specified. Type a value directly into the "Value" column.
Residency Period Database	Database name	–	The name of the database containing residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-3. TRIM.Expo w. TRIM.Risk (>1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Run Name	Text string	–	Name of the unique TRIM.Risk scenario run. The purpose is solely to help users keep track of TRIM.Risk scenarios and results.	User-specified. Type a value directly into the "Value" column.
Scenario	Text string	–	Name of TRIM.Risk scenario.	User-specified. Type a value directly into the "Value" column.
Start Date	Integer (YYYYMMDD)	–	Start date of the simulation period.	User-specified. Type a value directly into the "Value" column.
Summary File Name	Directory and file name	–	Indicates the location of the parameters file and logs a summary of the input parameter settings used by the $\text{TRIM.Expo}_{\text{Inhalation}}$ Postprocessor to generate the MySQL database of exposure estimates.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Data Directory	Directory name	${str("TRIM Directory")}\data	Directory in which the TRIM results are stored.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-3. TRIM.Expo w. TRIM.Risk (>1 run) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
TRIM Database Type	Text string	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Select from the drop-down menu in the "Value"column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Execution Path	Directory name	${str("TRIM Directory")}\bin	Sets the directory location of the TRIM executables.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Lib Path	Directory name	${str("TRIM Directory")}\lib	Sets the directory location of the TRIM jar files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Use Daylight Savings Time?	True/false	False	If yes, the Air Quality Data file will be adjusted for Daylight Savings Time in the summer.	User-specified. To select this option, click the check box in the "Value" column.
Write Hourly Output?	True/false	False	If yes, the hourly exposure and dose (if applicable) out put files are created.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit D-4. TRIM.Risk Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Population Database	Database name	–	Location of directory containing population files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Default Directory	Directory name	${str("TRIM Directory")}\logs\ExpoInhRisk\${str("Run Name")}	Directory in which TRIM log files will be saved.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
File Management Parameters	Set of parameters	Set of 13	A group of all parameters relating to the file management of the scenario.	Click the "Edit" button in this row. A Parameter Value window containing 13 file management parameters will appear. See Exhibit D-9 for a listing of these parameters.
Human Health Toxicity Database	Database name	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Exposure DB Name	Database name	–	The name of the database with inhalation exposure estimates generated by $TRIM.Expo_{Inhalation}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk DB Name	Database name	–	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.

Exhibit D-4. TRIM.Risk Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
MySQL User Name	trim	Set by user during installation	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Overwrite Existing Database?	True/false	False	If yes, an output database previously generated by the TRIM.Expo$_{Inhalation}$ Postprocessor will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Overwrite Output Database	True/false	False	If true, an output database previously generated by TRIM.Risk$_{HH-NP}$ will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Params File	Directory and file name	${str("APEX Input Directory")}\Params_${str("Pollutant")}_${str("Location")}_${str("Run Name")}.txt	The file that specifies input and output files, model parameters, and format of output files for this execution of APEX (i.e., TRIM.Expo$_{Inhalation}$).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Perform ingestion related calculations	True/false	False	Indicates whether ingestion exposure/risk assessment calculations are performed.	User-specified. To select this option, click the check box in the "Value" column.
Perform inhalation related calculations	True/false	True	Indicates whether ingestion exposure/risk assessment calculations are performed.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit D-4. TRIM.Risk Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
R Bin Directory	Directory name	Set by user during installation	Location of the bin directory for the R program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Residency Period Database	Database name	–	The name of the database containing residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Run Name	Text string	–	Name of the unique TRIM.Risk scenario run. The purpose is solely to help users keep track of TRIM.Risk scenarios and results.	User-specified. Type a value directly into the "Value" column.
Summary File Name	Directory and file name	–	Indicates the location of the parameters file and logs a summary of the input parameter settings used by the $\text{TRIM.Expo}_{\text{Inhalation}}$ Postprocessor to generate the MySQL database of exposure estimates.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-4. TRIM.Risk Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
TRIM Data Directory	Directory name	${str("TRIM Directory")}\data	Directory in which the TRIM results are stored.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Database Type	Text string	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Select from the drop-down menu in the "Value"column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Execution Path	Directory and file name	${str("TRIM Directory")}\bin	Sets the directory location of the TRIM executables.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Lib Path	Directory and file name	${str("TRIM Directory")}\lib	Sets the directory location of the TRIM jar files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-5. TRIM.Risk Metrics Scenario Parameters (TRIM.Expo$_{Inhalation}$)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Population Database	Directory name	–	Location of directory containing population files.	
Default Directory	Directory name	${str("TRIM Directory")}\logs\ExpoInhRiskMetrics\${str("Run Name")}	Directory in which TRIM log files will be saved.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
File Management Parameters	Set of parameters	Set of 13	A group of all parameters relating to the file management of the scenario.	Click the "Edit" button in this row. A Parameter Value window containing 13 file management parameters will appear. See Exhibit D-9 for a listing of these parameters.
Human Health Toxicity Database	Database name	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Exposure Database	Database name	–	The database created by the APEXPostProcessor containing inhalation exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk Database	Database name	–	The database created by TRIM.Risk$_{HH-NP}$ containing inhalation risk data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	trim	Set by user during installation	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.

Exhibit D-5. TRIM.Risk Metrics Scenario Parameters (TRIM.Expo$_{Inhalation}$)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
R Bin Directory	Directory name	Set by user during installation	Location of the bin directory for the R program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Residency Period Database	Database name	–	The name of the database containing residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Run Name	Text string	–	Name of the unique TRIM.Risk scenario run. The purpose is solely to help users keep track of TRIM.Risk scenarios and results.	User-specified. Type a value directly into the "Value" column.
Summary File Name	Directory and file name	–	Indicates the location of the parameters file and logs a summary of the input parameter settings used by the TRIM.Expo$_{Inhalation}$ Postprocessor to generate the MySQL database of exposure estimates.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-5. TRIM.Risk Metrics Scenario Parameters (TRIM.Expo$_{Inhalation}$)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
TRIM Data Directory	Directory name	${str("TRIM Directory")}\data	Directory in which the TRIM results are stored.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Database Type	Text string	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Select from the drop-down menu in the "Value"column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Execution Path	Directory and file name	${str("TRIM Directory")}\bin	Sets the directory location of the TRIM executables.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Lib Path	Directory and file name	${str("TRIM Directory")}\lib	Sets the directory location of the TRIM jar files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Activity Pattern Directory	Directory name	${str("Input Data Directory")}\Activity Pattern	Directory containing Activity files	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Additional Input Directory	Directory name	${str("Input Data Directory")}\Add	Directory containing additional input files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Air Quality Directory	Directory name	${str("Input Data Directory")}\airqual	Directory containing Air Quality files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Background Concentration	Integer	–	Specifies the uniform background concentration throughout the study area.	User-specified. Type a value directly into the "Value" column.
Commuting Directory	Directory name	${str("Input Data Directory")}\commute	Directory containing Commuting files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Default Directory	Directory name	${str("TRIM Directory")}\logs\HAPEMWRiskSingle\${str("Run Name")}	Directory in which TRIM log files will be saved.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
EPA Region	Integer	–	The EPA region number of indoor emission source data.	User-specified. Type a value directly into the "Value" column.
Factors Directory	Directory name	${str("Input Data Directory")}\factor	Directory containing Factors files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
File Management Parameters	Set of parameters	Set of 14	A group of all parameters relating to the file management of the scenario.	Click the "Edit" button in this row. A Parameter Value window containing 14 file management parameters will appear. See Exhibit D-9 for a listing of these parameters.
HAPEM County Database	Database name	–	Database containing the HAPEM County/State data.	Database containing the HAPEM County/State data.
HAPEM Directory	Directory name	Set by user during installation	Directory in which HAPEM is installed.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Human Health Toxicity Database	Database name	–	The database containing chemical-specific information on human health effects.	The name of the database containing chemical-specific information on human health effects.
Include Commuting in Analysis?	Yes/No/Not Set	Yes	Specifies whether commuting will be included in the analysis (input in parameter files of DURAV and HAPEM).	User-specified. To select this option, click the check box in the "Value" column.
Inhalation Exposure DB Name	Database name	–	The name of the database with inhalation exposure estimates generated by HAPEM.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk DB Name	Database name	–	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH\text{-}NP}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input - Activity File	Directory and file name	–	Describes the amount of time spent in various microenvironments by individuals; the total number of minutes spent in each microenvironment during each time block throughout the day.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Air Quality File	Directory and file name	–	Contains the ambient air concentrations as recorded concentration contributions from multiple emission source categories for multiple time blocks for a census tract; also includes location-specific background concentration data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - AutoPduct File	Directory and file name	–	The full path name of any existing file (except other HAPEM input or output files) must be specified as the *AutoPduct* file. In the future this file will comprise part of the input for evaluating indoor source algorithms. Currently, the file is not utilized by the HAPEM program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Cluster File	Directory and file name	–	Specifies the cluster category for each CHAD record, identified by the CHAD identification code.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Cluster Transition File	Directory and file name	–	Specifies the number of activity patterns in each group of two to three clusters and cluster-to-cluster transition probabilities for each demographic group/day type combination.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input - Commuting File	Directory and file name	–	Identifies the tract of work and tract of residence for individuals.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Factors File	Directory and file name	–	Includes values for the penetration, proximity, additive, and slow diffusion factor (PEN, PROX, ADD, and LAG, respectively) for each microenvironment/emission source category combination. The number of microenvironments in the Factors file must match the number in the Activity file (i.e., *nmicro).*	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - State FIPS File	Directory and file name	–	Supplies the state FIPS, county FIPS, and tract code for the Population file data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input Data Directory	Directory Name	–	Directory containing input data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from the drop-down menu in the "Value"column.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Models Directory	Directory name	C:\models	Directory containing TRIM models.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation	Password used for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation	User name used for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Number of Day Types	Integer	–	Internal parameter that specifies the number of day types (input in the parameter files of DURAV and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Demographic Groups	Integer	–	Internal parameter that specifies the number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Emission Sources	Integer	–	Internal parameter that specifies the number of outdoor emission source categories, which must match the number in the Factors file (input in the parameter files of AIRQUAL and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Microenvironments	Integer	–	Internal parameter that specifies the number of microenvironments in both the Activity file and Factors file (input in the parameter file of DURAV).	User-specified. Type a value directly into the "Value" column.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Number of Replicates	Integer	–	The number of replicates for each demographic group/tract.	User-specified. Type a value directly into the "Value" column.
Number of Time Blocks for Analysis	Integer	–	Internal parameter that specifies the number of time blocks for the analysis; may be less than or equal to *nblock*, but must be an integral factor of *nblock* (input in the paramter files of DURAV, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Time Blocks in the Activity File	Integer	–	Internal parameter that specifies the number of time blocks in the Activity file (input in the parameter file of DURAV).	User-specified. Type a value directly into the "Value" column.
Output - Path of Final Exposure File	Directory and file name	–	Indicates the file name and location of the HAPEM exposure output file.	Set automatically by MIMS if HAPEM is run as part of the scenario. Otherwise, user-specified. Can be edited in the "Value" column or by clicking on "Edit."
Output Data Directory	Directory name	–	Directory containing output dat a files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Overwrite Output Database	True/false	False	If true, an output database previously generated by TRIM.Risk$_{HH-NP}$ will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Pollutant	Directory and file name	–	The chemical under analysis.	User-specified. Type a value directly into the "Value" column.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Population Directory	Directory name	${str("Input Data Directory")}\population	Directory containing Population files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
R Bin Directory	Directory name	Set by user during installation	Location of the bin directory for the R program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Random Seed for Selecting Activity Pattern Data	Integer	–	Allows for the random selection of activity pattern data for analysis. Using the same random seed for two simulations for the same scenario will select the same activity patterns.	User-specified. Type a value directly into the "Value" column.
Random Seed for Selecting Air Quality Dataset	Integer	–	Allows for the random selection of air quality data for analysis. Using the same random seed for two simulations for the same scenario will select the same air quality data.	User-specified. Type a value directly into the "Value" column.
Random Seed for Selecting Micro Factors	Integer	–	Allows for the random selection of microenvironment factors for analysis. Using the same random seed for two simulations for the same scenario will select the same microenvironment factors.	User-specified. Type a value directly into the "Value" column.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Region 1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Region 2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Residency Period Database	Database name	–	Indicates the name for the database containing study area residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Run Name	Text string	–	Name of the unique TRIM.Risk scenario run. The purpose is solely to help users keep track of TRIM.Risk scenarios and results.	User-specified. Can be edited in the "Value" column.
SAROAD Pollutant Code	Integer	–	Specifies the SAROAD code corresponding to the chemical under analysis.	User-specified. Can be edited in the "Value" column.

Exhibit D-6. HAPEM w. TRIM.Risk (1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Simulation Year	Integer	–	Specifies the year to be simulated by the model run.	User-specified. Can be edited in the "Value" column.
TRIM Data Directory	Directory name	${str("TRIM Directory")}\data	Directory in which the TRIM results are stored.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Database Type	Text string	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Can be edited in the "Value" column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Execution Path	Directory and file name	${str("TRIM Directory")}\bin	Sets the directory location of the TRIM executables.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Units	Text string	–	Specifies the units for exposure concentration data.	User-specified. Can be edited in the "Value" column.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Activity Pattern Directory	Directory name	${str("Input Data Directory")}\Activity Pattern	Directory containing Activity files	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Additional Input Directory	Directory name	${str("Input Data Directory")}\Add	Directory containing additional input files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Air Quality Directory	Directory name	${str("Input Data Directory")}\airqual	Directory containing Air Quality files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Commuting Directory	Directory name	${str("Input Data Directory")}\commute	Directory containing Commuting files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Counter File Name	Directory and file name	${str("Output Data Directory")}\counter.dat	Records the number of records in various data input and output files, which is useful for keeping track of which files were used in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Default Directory	Directory name	${str("TRIM Directory")}\logs\HAPEMWRiskmult	Directory in which TRIM log files will be saved.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
EPA Region	Integer	–	The EPA region number of indoor emission source data.	User-specified. Type a value directly into the "Value" column.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Factors Directory	Directory name	${str("Input Data Directory")}\factor	Directory containing Factors files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
File Management Parameters	Set of parameters	Set of 14	A group of all parameters relating to the file management of the scenario.	Click the "Edit" button in this row. A Parameter Value window containing 14 file management parameters will appear. See Exhibit D-9 for a listing of these parameters.
HAPEM County Database	Database name	–	Database containing the HAPEM County/State data.	Database containing the HAPEM County/State data.
HAPEM Directory	Directory name	Set by user during installation	Directory in which HAPEM is installed.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Human Health Toxicity Database	Database name	–	The database containing chemical-specific information on human health effects.	The name of the database containing chemical-specific information on human health effects.
Include Commuting in Analysis?	Yes/No/Not Set	Yes	Specifies whether commuting will be included in the analysis (input in parameter files of DURAV and HAPEM).	User-specified. To select this option, click the check box in the "Value" column.
Inhalation Exposure DB Name	Database name	–	The name of the database with inhalation exposure estimates generated by HAPEM.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk DB Name	Database name	–	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input - Activity File	Directory and file name	–	Describes the amount of time spent in various microenvironments by individuals; the total number of minutes spent in each microenvironment during each time block throughout the day.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Air Quality File	Directory and file name	${str("Air Quality Directory")}\con${str(" SAROAD Pollutant Code")}.txt	Contains the ambient air concentrations as recorded concentration contributions from multiple emission source categories for multiple time blocks for a census tract; also includes location-specific background concentration data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - AutoPduct File	Directory and file name	–	The full path name of any existing file (except other HAPEM input or output files) must be specified as the *AutoPduct* file. In the future this file will comprise part of the input for evaluating indoor source algorithms. Currently, the file is not utilized by the HAPEM program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Cluster File	Directory and file name	–	Specifies the cluster category for each CHAD record, identified by the CHAD identification code.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Cluster Transition File	Directory and file name	–	Specifies the number of activity patterns in each group of two to three clusters and cluster-to-cluster transition probabilities for each demographic group/day type combination.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input - Commuting File	Directory and file name	–	Identifies the tract of work and tract of residence for individuals.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Factors File	Directory and file name	${str("Factors Directory")}\con${str(" SAROAD Pollutant Code")}.fact.txt	Includes values for the penetration, proximity, additive, and slow diffusion factor (PEN, PROX, ADD, and LAG, respectively) for each microenvironment/emission source category combination. The number of microenvironments in the Factors file must match the number in the Activity file (i.e., *nmicro).*	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - State FIPS File	Directory and file name	–	Supplies the state FIPS, county FIPS, and tract code for the Population file data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input Data Directory	Directory name	–	Directory containing input data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from the drop-down menu in the "Value"column.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Log File Name	Directory and file name	${str("Output Data Directory")}\log_file.txt	Name of the HAPEM log file.	
MySQL Password	Text string	Set by user during installation	Password used for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	trim	Set by user during installation	User name used for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Number of Day Types	Integer	–	Internal parameter that specifies the number of day types (input in the parameter files of DURAV and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Demographic Groups	Integer	–	Internal parameter that specifies the number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Emission Sources	Integer	–	Internal parameter that specifies the number of outdoor emission source categories, which must match the number in the Factors file (input in the parameter files of AIRQUAL and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Microenvironments	Integer	–	Internal parameter that specifies the number of microenvironments in both the Activity file and Factors file (input in the parameter file of DURAV).	User-specified. Type a value directly into the "Value" column.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Number of Replicates	Integer	–	The number of replicates for each demographic group/tract.	User-specified. Type a value directly into the "Value" column.
Number of Time Blocks for Analysis	Integer	–	Internal parameter that specifies the number of time blocks for the analysis; may be less than or equal to *nblock*, but must be an integral factor of *nblock* (input in the paramter files of DURAV, AIRQUAL, and HAPEM).	User-specified. Can be edited in the "Value" column.
Number of Time Blocks in the Activity File	Integer	–	Internal parameter that specifies the number of time blocks in the Activity file (input in the parameter file of DURAV).	User-specified. Type a value directly into the "Value" column.
Output - Path of Final Exposure File	Directory and file name	–	Indicates the file name and location of the HAPEM exposure output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Output Data Directory	Directory name	–	Directory containing output dat a files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Overwrite Output Database	True/False	True	If true, an output database previously generated by TRIM.Risk$_{HH-NP}$ will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Population Directory	Directory name	${str("Input Data Directory")}\population	Directory containing Population files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
R Bin Directory	Directory name	Set by user during installation	Location of the bin directory for the R program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Random Seed for Selecting Activity Pattern Data	Integer	–	Allows for the random selection of activity pattern data for analysis. Using the same random seed for two simulations for the same scenario will select the same activity patterns.	User-specified. Type a value directly into the "Value" column.
Random Seed for Selecting Air Quality Dataset	Integer	–	Allows for the random selection of air quality data for analysis. Using the same random seed for two simulations for the same scenario will select the same air quality data.	User-specified. Type a value directly into the "Value" column.
Random Seed for Selecting Micro Factors	Integer	–	Allows for the random selection of microenvironment factors for analysis. Using the same random seed for two simulations for the same scenario will select the same microenvironment factors.	User-specified. Type a value directly into the "Value" column.
Region 1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Region 2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Residency Period Database	Database name	–	Indicates the name for the database containing study area residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Run Name	Text string	–	Name of the unique TRIM.Risk scenario run. The purpose is solely to help users keep track of TRIM.Risk scenarios and results.	User-specified. Type a value directly into the "Value" column.
Simulation Year	Integer	–	Specifies the year to be simulated by the model run.	User-specified. Type a value directly into the "Value" column.
TRIM Data Directory	Directory name	${str("TRIM Directory")}\data	Directory in which the TRIM results are stored.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
TRIM Database Type	Database name	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Type a value directly into the "Value" column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Execution Path	Directory and file name	${str("TRIM Directory")}\bin	Sets the directory location of the TRIM executables.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Units	Text string	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the "Value" column.
allcomm.da	File name	${str("Commuting Directory")}\comm2000.da	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
allcomm.ind	File name	${str("Commuting Directory")}\comm2000.st_comm1_fip_range	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
allcomm.st_comm1_fip_range	File name	${str("Commuting Directory")}\comm2000.st_comm1_fip_range	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
benzout.air_da	File name	${str("Air Quality Directory")}\con${str(" SAROAD Pollutant Code")}.air_da	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.da	File name	${str("Air Quality Directory")}\con${str(" SAROAD Pollutant Code")}.da	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.pop_air_da	File name	${str("Air Quality Directory")}\con${str(" SAROAD Pollutant Code")}.pop_air_da	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air1_fip_range	File name	${str("Air Quality Directory")}\con${str(" SAROAD Pollutant Code")}.state_air1_fip_range	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air2_fip_range	File name	${str("Air Quality Directory")}\con${str(" SAROAD Pollutant Code")}.state_air2_fip_range	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air_fip_range	File name	${str("Air Quality Directory")}\con${str(" SAROAD Pollutant Code")}.state_air_fip_range	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
census.county_tract_pop_range	File name	${str("Population Directory")}\census2000.county_tract_pop_range	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-7. HAPEM w. TRIM.Risk (>1 chem) Scenario Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
census.da	File name	${str("Population Directory")}\census2000.da	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
census.state_county_pop_range	File name	${str("Population Directory")}\census2000.state_county_pop_range	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
census_direct.ind	File name	${str("Population Directory")}\census2000_direct.ind	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
durhw.da	File name	${str("Activity Pattern Directory")}\durhw.da	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
durhw.nonzero	File name	${str("Activity Pattern Directory")}\durhw.nonzero	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
durhw.wrong_chad	File name	${str("Activity Pattern Directory")}\durhw.wrong_chad	HAPEM-defined input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-8. TRIM.Risk Metrics Scenario Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Default Directory	Directory name	${str("TRIM Directory")}\logs\HAPEMWRiskSingle\${str("Run Name")}	Directory in which TRIM log files will be saved.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
File Management Parameters	Set of parameters	Set of 14	A group of all parameters relating to the file management of the scenario.	Click the "Edit" button in this row. A Parameter Value window containing 14 file management parameters will appear. See Exhibit D-9 for a listing of these parameters.
Human Health Toxicity Database	Database name	–	Indicates the name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Exposure Database	Database name	–	The database created by the HAPEM PostProcessor containing inhalation exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk Database	Database name	–	The database created by TRIM.Risk containing inhalation risk data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation	Password used for access to hte MySQL databases created or used for the TRIM.Risk projects.	User-specified. Can be edited in the "Value" column.
MySQL User Name	trim	Set by user during installation	User name used for access to hte MySQL databases created or used for the TRIM.Risk projects.	User-specified. Can be edited in the "Value" column.

Exhibit D-8. TRIM.Risk Metrics Scenario Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
R Bin Directory	Directory name	Set by user during installation	Location of the bin directory for the R program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Residency Period Database	Database name	–	Indicates the name for the database containing study area residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Run Name	Text string	–	Name of the unique TRIM.Risk scenario run. The purpose is solely to help users keep track of TRIM.Risk scenarios and results.	User-specified. Can be edited in the "Value" column.
TRIM Data Directory	Directory name	${str("TRIM Directory")}\data	Directory in which the TRIM results are stored.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit D-8. TRIM.Risk Metrics Scenario Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
TRIM Database Type	Text string	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will “execute” and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Can be edited in the “Value” column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
TRIM Execution Path	Directory and file name	${str("TRIM Directory")}\bin	Sets the directory location of the TRIM executables.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit D-9. File Management Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Create Output Directories	True/False	True	No user interaction is required for these parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Delete Generated Batch Files	True/False	False		
Delete Generated Input Files	True/False	False		
Delete Intermediate Files When Done	True/False	False		
Delete Old Output Files	True/False	False		
Delete Unused Final Files	True/False	False		
Execution Method	Text string	Local Execution		
Execution Path	Directory name			
Keep Module Logs	Pick list	Yes		
Log Module Start and Finish	True/False	True		
Overwrite Log Files	True/False	False		
Overwrite Script Files	True/False	False		
Random Number Seed	Integer			
Saving Frequency	Integer	0		

Appendix E
Module Instance Parameters

For each MIMS module instance within a scenario, there is a set of parameters that specifies the location of module components, executables, log files and databases; details about the module instance; and options for the user to modify how the module run is performed. This Appendix provides a complete list of all module instance parameters for both the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" and "Inhalation risk assessment using RfCs and UREs, with HAPEM" projects.

For each of the pre-packaged scenarios available with TRIM.Risk, the module instance (and scenario) parameters that are frequently changed by users are listed on tabs in the "Input Panels" pane of the scenario window. Lists and instructions for how to change these parameters on the input panels are provided in Chapters 3 and 4. Some of the parameters on the input panels are included in the tables here because they are also found on the parameters tables within each module instance. Note that some parameters are in both scenario and module instance parameters tables. Parameters that are in multiple tables are linked so that if the parameter is changed in one table, it will change in all tables where it appears.

Module Instance Parameters contain information required to run a module through MIMS. The module instance parameters are accessed by double-clicking on the module instance name in the graph view pane of the scenario window (e.g., click on ":Iterator(APEX)" in the "TRIM.Expo w. TRIM.Risk (>1 run)" scenario to open the "Iterator(APEX)" module instance parameters). The parameter values required to run the module instance within MIMS are specified via the parameters table, which is accessed by clicking on the "Parameters" tab. The full set of parameters is accessed by either selecting "Expand View" from the "Parameters" drop-down menu or clicking the "Expand" button (). The "Iterator(APEX)" and "Iterator[Internal use only (>1 chem)]" module instances also have "Iterating Lists" tabs with parameters that must be set to run these modules in their respective MIMS projects. Access the "Iterating Lists" tab by opening the module instance (described above) and click on the "Iterating Lists" tab instead of the "Parameters" tab (Note: Do not make edits directly on the "Iterating Lists" tab; all edits to parameters that are iterated over should be made via the "Synchronized Input Lists Editor," accessed by clicking on "Edit Synchronized Lists."). There are no user inputs or interaction required in the Module view, which is accessed by clicking on the "Module" tab.

The tables in this Appendix include the data type, default value, description, and instructions on how to set each parameter. Note that the parameters are in alphabetical order in these Appendix tables, which may not be the same order as in the module instances. To sort the parameters so they are listed in alphabetical order in a module instance, click on the "Parameters" header at the top of the "Parameters" column.

The module instance parameters tables found in the TRIM.Expo$_{Inhalation}$ and HAPEM projects are presented in the exhibits that follow:

Exhibit E-1. TRIM.Expo$_{Inhalation}$ Population Processor Module Instance Parameters

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Exhibit E-3. Iterator Module Instance Parameters

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Exhibit E-5. TRIM.Expo$_{Inhalation}$ PostProcessor [single run] Module Instance Parameters

Exhibit E-6. TRIM.Expo$_{Inhalation}$ PostProcessor [multiple run] Module Instance Parameters

Exhibit E-7. TRIM.Risk Module Instance Parameters (TRIM.Expo$_{Inhalation}$)

Exhibit E-8. TRIM.Risk Metrics Module Instance Parameters (TRIM.Expo$_{Inhalation}$)

Exhibit E-9. DAVE Module Instance Parameters (TRIM.Expo$_{Inhalation}$)

Exhibit E-10. HAPEM Module Instance Parameters

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Exhibit E-13. HAPEM (Part 2) Iterating Lists Parameters

Exhibit E-14. HAPEM PostProcessor Module Instance Parameters

Exhibit E-15. TRIM.Risk Module Instance Parameters (HAPEM)

Exhibit E-16. TRIM.Risk Metrics Module Instance Parameters (HAPEM)

Exhibit E-17. DAVE Module Instance Parameters (HAPEM)

Exhibit E-1. TRIM.Expo$_{Inhalation}$ Population Processor Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Population Database	Text string	–	The database created by the TRIM.Expo$_{Inhalation}$ Population Processor.	User-specified. Click "Set Name" under the "Additional Type Info" column.
APEX Population Directory	Directory and file name	–	Location of directory containing population files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEXPopDB Name	Directory and file name	–	The name of the database created by the TRIM.Expo$_{Inhalation}$ Population Processor.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX PopProcessor Executable	Directory and file name[1]	${str("TRIM Lib Path")}\ApexPopProc.jar	Name and location of the executable file that executes the Population Processor for the population data in the MySQL database containing population data used by TRIM.Expo$_{Inhalation}$ (i.e., APEX).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Class Path	Directory and file name	${str("Apex PopProcessor Executable")};${str("TRIM Lib Path")}\connectorJ.jar	Specifies the classpath required to run this module.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

[1]Values for parameters that specify file or directory names and locations can include "environmental variables" that allow the parameter to use the values of other parameters in its value. For example, the "APEX PopProcessor Executable" parameter may have a value of "${str("TRIM Lib Path")}\apexpopproc.jar." In this case, the "APEX PopProcessor Executable" parameter is set equal to the "TRIM Lib Path," which is set in the Scenario parameters as "${str("TRIM Directory")}\lib." The TRIM directory is set to C:\Models\TRIM. Thus, the "TRIM Lib Path" points to the "lib" subdirectory of the TRIM directory and the "APEX PopProcessor Executable" parameter is found in this "lib" subdirectory as well. For more information on setting environmental variables in MIMS, refer to the MIMS User Guide.

Exhibit E-1. TRIM.Expo$_{Inhalation}$ Population Processor Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input File - Employment	Directory and file name	–	Name and location of file containing employment probabilities for all age groups in population input files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Sector Location	Directory and file name	–	Name and location of file providing the latitude and longitude of sector IDs.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation	Password used for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation	User name used for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Population Control File	Directory and file name	${str("APEX Input Directory")}\apexpostproc_control.txt	File name of the control file associated with the generation of the *Population* file(s).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Population Input Files	List	–	Name and location of gender and/or race specific population data files with defined age groups.	User-specified. Click the "Edit" button in this row.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Executable	Directory and file name	–	Name and location of the APEX (i.e., TRIM.Expo$_{Inhalation}$) executable.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Additive factor for average concentration	Number	–	Additive term applied when working outside study area (only used if people who work outside the study area are included in the simulation; see "Include people who work outside study area?" input parameter.)	User-specified. Type a value directly into the "Value" column.
Air Quality District Radius	Number	–	The maximum distance in kilometers that a sector can be from the nearest air district to remain in the study.	User-specified. Type a value directly into the "Value" column.
Altitude	Number	–	Altitude of the study area in feet; is assumed to be constant for the study area.	User-specified. Type a value directly into the "Value" column.
CAS Number	Number	–	The assigned CAS number for the chemical under analysis.	User-specified. Type a value directly into the "Value" column.
COHb Convergence Factor	Number	–	Convergence parameter for carboxyhemoglobin (COHb) algorithm. This is a safety factor that limits the permitted error in determining the solution to the Cobrun-Forester-Kane (CFK) equation for determining blood COHb concentration. Larger factors mean greater accuracy but slower evaluation.	User-specified. Type a value directly into the "Value" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Comments	Text string	–	User comments regarding the scenario.	User-specified. Type a value directly into the "Value" column.
County FIPS Codes	List	–	FIPS codes for the counties to which the study area is restricted.	User-specified. Click the "Edit" button in this row.
Create the Events Output File?	True/false	False	Indicates whether the EVENTS output file will be generated.	User-specified. To select this option, click the check box in the "Value" column.
Do COHb Dose Calculations?	True/false	False	Y = perform dose calculations, N = do not perform calculations. Setting this parameter to No saves some job execution time if the user does not need dose calculation. Note that the *Physiological Parameters* file must still be provided.	User-specified. To select this option, click the check box in the "Value" column.
Do Rollback Adjustments?	True/false	False	Y = use air quality rollback adjustments, N = do not use adjustments. Rollback adjusts the ambient air quality data before the exposure calculations occur. The purpose is to determine exposure in hypothetical scenarios where the ambient concentrations have been reduced by various controls.	User-specified. To select this option, click the check box in the "Value" column.
Dose	Directory and file name	${str("APEX Output Directory")}\dose.txt	Provides a time series of dose estimates for each modeled profile (if doses are modeled).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Dose Calculation Parameters	List	Set of 3	Three parameters (included in this table) necessary for performing the carboxyhemoglobin (COHb) dose calculation.	User-specified. Click the "Edit" button in this row.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
EVENTS	Directory and file name	${str("APEX Output Directory")}\events.txt	Provides a summary of the activity diary with accompanying exposure and dose, at the diary event level. Note that this file can become very large, and for this reason, the user is given the option of only writing the events for only a fraction of the simulated persons.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
End Date	Integer	–	The end date of the simulation.	User-specified. Type a value directly into the "Value" column.
Exposure	Directory and file name	${str("APEX Output Directory")}\exp.txt	Provides a time series of exposure estimates for each modeled profile.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Facility	Text string	–	The type of facility being modeled.	User-specified. Type a value directly into the "Value" column.
Include Commuting to Work?	True/false	False	If true, commuting to work is allowed/simulated.	User-specified. To select this option, click the check box in the "Value" column.
Include people who work outside study area?	True/false	False	Yes = keep persons who live in study area but work outside. No = do not keep these persons in the simulation.	User-specified. To select this option, click the check box in the "Value" column.
Include these profiles in Events File	Integers	–	Provides the option of writing out events for user-specified profiles. List the desired profile numbers here, separated by commas (e.g., 1, 8, 23).	User-specified. Type a value directly into the "Value" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input Concentration Units	Text string	–	Pollutant concentration units used for the input data, in ppm or ug/m^3.	User-specified. Type a value directly into the "Value" column.
Input Data Directory	Directory name and location	–	Directory containing input data files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input Database Files	List	Set of 7	Files containing input databases.	User-specified. Click the "Edit" button in this row.
Input File - Activity Specific METS	Directory and file name	${str("APEX Input Directory")}\CHAD\CHADMets.txt	Provides distribution types and parameters for calculating the metabolic (MET) value for each activity code in the diary events file, and is used for calculating dose, not exposure concentrations. Note that this file is required even if the dose calculation is turned off.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Air Quality Data	Directory and file name	–	Provides the hourly air quality data for the modeled pollutant for each monitoring/modeling location listed in the district location file(s).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Census Commuting Flow	Directory and file name	–	Contains the probabilities of a worker commuting to different destination sectors from any given home sector. This file is only required when worker commuting is modeled.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Diary Events	Directory and file name	${str("APEX Input Directory")}\CHAD\CHADEvents.txt	Contains the event descriptions (i.e., start time, duration, activity, and location) for all of the diary days in the activity database (e.g., CHAD).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input File - District Locations	Directory and file name	–	Provides the site IDs and locations (decimal degrees latitude and longitude) of air quality monitoring or modeling locations.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Employment	Directory and file name	–	Name and location of file containing employment probabilities for all age groups in population input files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Meteorological Zone Locations	Directory and file name	–	Provides the site IDs and locations (decimal degrees latitude and longitude) of the meteorological stations.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Microenvironment Descriptions	Directory and file name	–	Contains the definitions of the microenvironments and the microenvironment factors used to determine the exposure concentrations in user-defined microenvironments.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Microenvironment Mapping	Directory and file name	–	Links the diary events location codes to the APEX microenvironment in the microenvironment descriptions file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Personal Info	Directory and file name	${str("APEX Input Directory")}\CHAD\CHADQuest.txt	Contains information related to each 24-hour activity diary from the diary events file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Physiological Parameters	Directory and file name	${str("APEX Input Directory")}\Other\physiology.txt	Provides tables of physiological parameters used in calculating dose.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input File - Profile Functions	Directory and file name	–	Provides the definitions of the following user-definable functions: MaxTempCat, AvgTempCat, DiaryPools, IDGRP, HasGasStove, HasPilot, AC_Home, AC_Car, WindowPos, and SpeedCat.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Sector Locations	Directory and file name	–	Name and location of file providing the latitude and longitude of sector IDs.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Temperature Data	Directory and file name	–	Contains the daily maximum and, optionally, average (or other) temperature data for the meteorological stations and dates indicated in the meteorological zones file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Ventilation Regression	Directory and file name	${str("APEX Input Directory")}\Other\ventilation.txt	This file contains regression parameters used to estimate total ventilation VE from the basal rate of oxygen consumption.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
LOG	Directory and file name	${str("APEX Output Directory")}\log.txt	Contains the record of the model simulation; if it completes successfully, the log file indicates the input files and parameter settings used for the simulation. If the simulation does not run successfully, the log file contains error messages describing the fatal errors.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Latitude	Number	–	The latitude in decimal degrees of the center of the study area.	User-specified. Type a value directly into the "Value" column.
Location	Text string	–	The location of the simulation.	User-specified. Type a value directly into the "Value" column.
Location and Time Specific Files	List	Set of 2	*Air Quality* and *Temperature Data* files.	User-specified. Click the "Edit" button in this row.
Log Home Sectors	True/false	–	Yes =All home sectors will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Log Population Summary Data?	True/false	–	Yes =Population summary data will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Log Profile Summary?	True/false	–	Yes =A summary line for each profile generated will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Log Tables Information?	True/false	–	Yes =All tables will be listed in the log file as well as the Tables file.	User-specified. To select this option, click the check box in the "Value" column.
Log Temperature Zones	True/false	–	Yes =All temperature zones will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Log all Air Districts?	True/false	–	Yes =All air districts will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Longitude	Number	–	The longitude in decimal degrees of the center of the study area.	User-specified. Type a value directly into the "Value" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
MSUM	Directory and file name	${str("APEX Output Directory")}\msum.txt	Provides a summary of the time and exposure by microenvironment for each profile modeled in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Maximum Age	Integer	–	Maximum age for simulated profiles (persons).	User-specified. Type a value directly into the "Value" column.
Maximum Microenvironment Number	Integer	–	The number of microenvironments defined in the Micro Mapping and Micro Descriptions files.	User-specified. Type a value directly into the "Value" column.
Meteorological Zone Radius	Number	–	The maximum application radius in kilometers of daily temperature data collected at a weather station.	User-specified. Type a value directly into the "Value" column.
Minimum Age	Integer	–	Minimum age for simulated profiles (persons).	User-specified. Type a value directly into the "Value" column.
Missing Age Diary Probability Factor	Number	–	Diary probability factor for missing age. Some of the supplied CHAD diaries are for persons of unknown age. This factor operates to lower the selection probability for such diaries. If set to zero, such diaries will never be selected; if set to one, such diaries are equally likely to be selected as diaries of known age.	User-specified. Type a value directly into the "Value" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Missing Employment Diary Probability Factor	Number	–	Diary probability factor for missing employment. Some of the supplied CHAD diaries are for persons of unknown employment status. This factor operates to lower the selection probability for such diaries. If set to zero, such diaries will never be selected; if set to one, such diaries are equally likely to be selected as diaries of known employment status.	User-specified. Type a value directly into the "Value" column.
Missing Gender Diary Probability Factor	Number	–	Diary probability factor for missing gender. Some of the supplied CHAD diaries are for persons of unknown gender. All profiles are assigned a gender, however, and the CHAD diaries are selected from those of the same gender or from the unknowns. If set to zero, such diaries will never be selected; if set to one, such diaries are equally likely to be selected as diaries of the correct, known gender.	User-specified. Type a value directly into the "Value" column.
Multiplicative factor for average concentration	Number	–	Multiplicative factor for city-wide average concentration, applied when working outside study area (only used if people who work outside the study area are included in the simulation; see "Include people who work outside study area?" input parameter.)	User-specified. Type a value directly into the "Value" column.
Number of Profiles	Integer	–	The number of profiles to simulate.	User-specified. Type a value directly into the "Value" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Number of Sources	Integer	–	The largest number of sources in any microenvironment.	User-specified. Type a value directly into the "Value" column.
Output Concentration Units	Text string	–	Pollutant concentration units used for the input data, in ppm or ug/m^3.	User-specified. Type a value directly into the "Value" column.
Output Data Directory	Directory name/location	${str("APEX Output Directory")}	Name and location of the directory containing the output files of the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Output File - Events File	Directory and file name	${str("APEX Output Directory")}\events.txt	Provides a summary of the activity diary with accompanying exposure and dose, at the diary event level. Note that this file can become very large, and for this reason, the user is given the option of only writing the events for only a fraction of the simulated persons.	User-specified. Click "Set Name" under "Additional Type Info" column.
Output File - Hourly COHb Dose Estimates	Directory and file name	${str("APEX Output Directory")}\dose.txt	Provides an hourly time series of doses for each profile. Each record provides 24-hour dose values for a simulation day. Note that this file can become very large if a large number of profiles are simulated.	User-specified. Click "Set Name" under "Additional Type Info" column.
Output File - Hourly Exposure Estimates	Directory and file name	${str("APEX Output Directory")}\exp.txt	Provides an hourly time series of exposure concentrations for each profile. Each record provides 24-hour dose values for a simulation day. Note that this file can become very large if a large number of profiles are simulated.	User-specified. Click "Set Name" under "Additional Type Info" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Output File - Log	Directory and file name	${str("APEX Output Directory")}\log.txt	Records the input files used, model parameters used, number of available diaries, model execution time, sectors, air districts, and temperature zones in the study area, mappings of sectors to air districts and temperature zones, statistical summaries of each simulated person, and output summary tables. Should a model run stop abnormally, an error message will be written to this file.	User-specified. Click “Set Name” under “Additional Type Info” column.
Output File - Microenvironment Summary	Directory and file name	${str("APEX Output Directory")}\msum.txt	Provides information on the amount of time spent, mean exposure concentration and maximum exposure concentration in each micorenvironment for during the simulation period, for each simulated person.	User-specified. Click “Set Name” under “Additional Type Info” column.
Output File - Person Summary	Directory and file name	${str("APEX Output Directory")}\psum.txt	Provides a summary of profile characteristics and exposure dose for each simulated person.	User-specified. Click “Set Name” under “Additional Type Info” column.
Output File - Site Mapping	Directory and file name	${str("APEX Output Directory")}\sites.txt	Lists the sectors, districts, and zones in the study area, and identifies mapping between them.	User-specified. Click “Set Name” under “Additional Type Info” column.
Output File - Tables	Directory and file name	${str("APEX Output Directory")}\tables.txt	Provides 14 summary tables; the first six are exposure summary tables, and the remaining eight are dose summary tables.	User-specified. Click “Set Name” under “Additional Type Info” column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Output Settings	List	Set of 14	Parameters (14) specifying output settings, (i.e., what should be written to the output log file, should people who work outside the study area be included in the simulation, etc.).	User-specified. Click the "Edit" button in this row.
Output Table Levels	List	Set of 13	Parameters (13) specifying output table dose and exposure cutpoints and percentiles.	User-specified. Click the "Edit" button in this row.
PPM to ug/m3 Factor	Number	–	Units conversion factor (1 ppm = ppmfact µg/m^3). For CO, ppmfact = 1,145. It is used when source strengths are expressed in micrograms per hour but concentrations are in parts per million (ppm) and when the input and output concentration units are different.	User-specified. Type a value directly into the "Value" column.
PSUM	Directory and file name	${str("APEX Output Directory")}\psum.txt	Provides a summary of each profile modeled in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Params File	Directory and file name	–	Names input and output files, sets model parameters, and controls the format of output files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Persons to include in EVENTS file	Integer	–	The EVENTS file can become very large, averaging about 1.4 MB per person-year. For this reason, the user is given the option of only writing the events for only a fraction of the simulated persons.	User-specified. Type a value directly into the "Value" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Pollutant	Text string	–	The chemical under analysis.	User-specified. Type a value directly into the "Value" column.
Pollutant Notification Threshold		–	The pollutant concentration threshold for user notification. If a simulated individual experiences a concentration above the value specified here, then a message is printed to the log file.	User-specified. Type a value directly into the "Value" column.
Population Files	List	Set of 4	Name and location of gender and/or race specific population data files with defined age groups.	User-specified. Click the "Edit" button in this row.
Population Input Files	List	–	Name and location of gender and/or race specific population data files with defined age groups.	User-specified. Click the "Edit" button in this row.
Primary Age Window Width	Integer	–	Specifies the width of the main age window (%). Each simulated profile is assigned a specific year of age. A window is created around this target age, of size equal to the Primary Age Window Width percent of the target age.	User-specified. Type a value directly into the "Value" column.
Profile Parameters	List	Set of 8	Eight parameters necessary for generating profiles/simulated persons.	User-specified. Click the "Edit" button in this row.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Random Seed	Number	–	This value determines how modeled individuals are selected for a simulation. If the same random seed is used for two simulations with the same population and number of profiles, the same set of modeled individuals will be simulated. If different random seeds are used for these same two simulations, a different set of modeled individuals will be simulated.	User-specified. Type a value directly into the "Value" column.
Rollback Adjustments	Number	Set of 3	Rollback adjusts the ambient air quality data before the exposure calculations occur. The purpose is to determine exposure in hypothetical scenarios where the ambient concentrations have been reduced by various controls.	User-specified. Click the "Edit" button in this row.
Rollback Background Concentration	Number	–	Rollback background concentrations; use the same units as the input units.	User-specified. Type a value directly into the "Value" column.
Rollback Maximum Concentration	Directory and file name	–	Rollback maximum concentration; use the same units as the input units.	User-specified. Type a value directly into the "Value" column.
Rollback Target Concentration	Directory and file name	–	Rollback target concentration; use the same units as the input units.	User-specified. Type a value directly into the "Value" column.
SITES	Directory and file name	${str("APEX Output Directory")}\sites.txt	Lists the sectors, districts, and zones in the study area, and identifies mapping between them.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Scenario	Text string	–	Name of the TRIM.Expo scenario.	User-specified. Type a value directly into the "Value" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Shoulder Age Window Width	Number	–	Diary probability factor for "shoulder" ages. This parameter allows an optional shoulder window of ages outside the primary age window. The shoulders have the same width in years as the main age window.	User-specified. Type a value directly into the "Value" column.
Source Type	Text string	–	The type of source being modeled.	User-specified. Type a value directly into the "Value" column.
Specific Input Directory	Directory and file name	–	Location of the input directory with files specific to this scenario and/or simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Start Date	Integer	–	The start date of the simulation.	User-specified. Type a value directly into the "Value" column.
Study Area Parameters	List	Set of 9	Nine parameters necessary for defining the study area.	User-specified. Click the "Edit" button in this row.
Study Area Radius	Directory and file name	–	The distance in kilometers from the center to the edge of the study area.	User-specified. Type a value directly into the "Value" column.
TABLESB	Directory and file name	${str("APEX Output Directory")}\tables.txt	Contains tables summarizing the results of the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Table - COHb Dose Cutpoints	List	List of 13	Specifies cut points in %COHb for summing time spent at various blood dose levels. Apart from this statistic, the tables resemble the Exposure Cutpoints table.	User-specified. Click the "Edit" button in this row.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Table - Daily Average COHb Dose Cutpoints	List	List of 13	Specifies the cutpoints in %COHb for the Daily Average Blood Dose. The cut points are used to bin all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table - Daily Average Exposure Cutpoints	List	List of 14	Specifies the average exposure cutpoints (ppm) for binning all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table - Daily Max 1-Hour COHb Dose Cutpoints	List	List of 13	Specifies the cutpoints in %COHb for Daily Maximum 1-Hour Blood Dose. The cut points were used to bin all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table Daily Max 1-Hour Exposure Cutpoints	List	List of 7	Specifies the daily maximum 1-hour exposure cut points (ppm) for binning all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table- Daily Max 8-Hour COHb Dose Cutpoints	List	List of 13	Specifies cut points in %COHb for Daily Maximum 8-Hour Blood Dose. The cut points were used to bin all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table - Daily Max 8-Hour Exposure Cutpoints	List	List of 14	Specifies the daily maximum 8-hour average exposure cut points (ppm) for binning all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table -Daily Max End-of-Hour COHb Dose Cutpoints	List	List of 13	Specifies cut points in %COHb for Daily Maximum End-of-Hour Blood Dose. The cut points are used to bin all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Table - Exposure Cutpoints	List	List of 14	Specifies the exposure cut points (ppm) for summing time spent at various exposure levels. The time is expressed in minutes and is summed across all profiles.	User-specified. Click the "Edit" button in this row.
Table - Number of Hours End-of-Hour Dose Cutpoints	List	List of 13	Similar to the Daily Max End-of-Hour COHb Dose Cutpoints, except that this parameter collects results for all 24 end-of-hour doses on each day.	User-specified. Click the "Edit" button in this row.
Table - Percentiles	List	List of 7	Specifies the levels of percentile of the exposed population for exposure or dose in APEX output files. Values can include up to one digit beyond the decimal point. Percentiles can only be distinguished from nearby ones if there are enough profiles in the simulation (i.e., at least 100 profiles are needed to properly determine a 99th percentile).	User-specified. Click the "Edit" button in this row.
Table - Simulation Average COHb Dose Cutpoints	List	List of 13	Specifies the cut points in %COHb for the Average Blood Dose over the entire simulation. The cut points are used to bin all the profiles created in the APEX run.	User-specified. Click the "Edit" button in this row.
Table - Simulation Average Exposure Cutpoints	List	List of 13	Specifies the cut points (ppm) for average exposure over the simulation period. The cut points are used to bin all simulated persons created in the run.	User-specified. Click the "Edit" button in this row.
Use County List?	True/false	–	Specifies whether to use a list of counties to define the study area.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit E-2. TRIM.Expo$_{Inhalation}$ Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Use Daylight Savings Time?	True/false	False	If true, the Air Quality Data file will be adjusted for Daylight Savings Time in the summer.	User-specified. To select this option, click the check box in the "Value" column.
Write Hourly Output?	True/false	False	If true, the hourly exposure and dose (if applicable) output files are created.	User-specified. To select this option, click the check box in the "Value" column.
Write Microenvironment Summary File?	True/false	–	Indicates whether the microenvironment summary file is generated.	User-specified. To select this option, click the check box in the "Value" column.
Write Ventilation Rates to Events File	True/false	–	Indicates whether ventilation rate information will be included in the EVENTS output file will be generated.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Executable	Directory and file name	–	Name and location of the APEX (i.e., $TRIM.Expo_{Inhalation}$) executable.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Additive factor for average concentration	Number	–	Additive term applied when working outside study area (only used if people who work outside the study area are included in the simulation; see "Include people who work outside study area?" input parameter.)	User-specified. Type a value directly into the "Value" column.
Altitude	Number	–	The maximum distance in kilometers that a sector can be from the nearest air district to remain in the study.	User-specified. Type a value directly into the "Value" column.
COHb Convergence Factor	Number	–	Convergence parameter for carboxyhemoglobin (COHb) algorithm. This is a safety factor that limits the permitted error in determining the solution to the Cobrun-Forester-Kane (CFK) equation for determining blood COHb concentration. Larger factors mean greater accuracy but slower evaluation.	User-specified. Type a value directly into the "Value" column.
Comments	Text string	–	User comments regarding the scenario.	User-specified. Type a value directly into the "Value" column.
Create the Events Output File?	True/false	–	Indicates whether the EVENTS output file will be generated.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Do COHb Dose Calculations?	True/false	False	Y = perform dose calculations, N = do not perform calculations. Setting this parameter to No saves some job execution time if the user does not need dose calculation. Note that the *Physiological Parameters* file must still be provided.	User-specified. To select this option, click the check box in the "Value" column.
Do Rollback Adjustments?	True false	False	Y = use air quality rollback adjustments, N = do not use adjustments. Rollback adjusts the ambient air quality data before the exposure calculations occur. The purpose is to determine exposure in hypothetical scenarios where the ambient concentrations have been reduced by various controls.	User-specified. To select this option, click the check box in the "Value" column.
Dose	Directory and file name	${str("Output Data Directory")}\dose.txt	Provides a time series of dose estimates for each modeled profile (if doses are modeled).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
EVENTS	Directory and file name	${str("Output Data Directory")}\events.txt	Provides a summary of the activity diary with accompanying exposure and dose, at the diary event level. Note that this file can become very large, and for this reason, the user is given the option of only writing the events for only a fraction of the simulated persons.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
End Date	Integer	–	The end date of the simulation.	User-specified. Type a value directly into the "Value" column.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Exposure	Directory and file name	${str("Output Data Directory")}\exp.txt	Provides a time series of exposure estimates for each modeled profile.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Include Commuting to Work?	True/false	False	If true, commuting to work is allowed/simulated.	User-specified. To select this option, click the check box in the "Value" column.
Include people who work outside study area?	True/false	–	Yes = keep persons who live in study area but work outside. No = do not keep these persons in the simulation.	User-specified. To select this option, click the check box in the "Value" column.
Include these profiles in Events File	Integer(s)	–	Provides the option of writing out events for user-specified profiles. List the desired profile numbers here, separated by commas (e.g., 1, 8, 23).	User-specified. Type a value directly into the "Value" column.
Input Data Directory	Directory and file name	–	Directory containing input data files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Activity Specific METS	Directory and file name	${str("Input Data Directory")}\CHAD\CHADMets.txt	Provides distribution types and parameters for calculating the metabolic (MET) value for each activity code in the *Diary Events* file, and is used for calculating dose, not exposure concentrations. Note that this file is required even if the dose calculation is turned off.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Air Quality Data	Directory and file name	–	Provides the hourly air quality data for the modeled pollutant for each monitoring/modeling location listed in the District Location File.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input File - Census Commuting Flow	Directory and file name	–	Contains the probabilities of a worker commuting to different destination sectors from any given home sector. This file is only required when worker commuting is modeled.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Diary Events	Directory and file name	${str("Input Data Directory")}\CHAD\CHADEvents.txt	Contains the event descriptions (i.e., start time, duration, activity, and location) for all of the diary days in the activity database (e.g., CHAD).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - District Locations	Directory and file name	–	Provides the site IDs and locations (decimal degrees latitude and longitude) of air quality monitoring or modeling locations.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Employment	Directory and file name	–	Name and location of file containing employment probabilities for all age groups in *Population Input* files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Meteorological Zone Locations	Directory and file name	–	Provides the site IDs and locations (decimal degrees latitude and longitude) of the meteorological stations.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Microenvironment Descriptions	Directory and file name	–	Contains the definitions of the microenvironments and the microenvironment factors used to determine the exposure concentrations in user-defined microenvironments.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input File - Microenvironment Mapping	Directory and file name	–	Links the diary events location codes to the APEX microenvironment in the *Microenvironment Descriptions* file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Personal Info	Directory and file name	${str("Input Data Directory")}\CHAD\CHADQuest.txt	Contains information related to each 24-hour activity diary from the *Diary Events* file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Physiological Parameters	Directory and file name	${str("Input Data Directory")}\other\Physiology.txt	Provides tables of physiological parameters used in calculating dose.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Profile Functions	Directory and file name	–	Provides the definitions of the following user-definable functions: MaxTempCat, AvgTempCat, DiaryPools, IDGRP, HasGasStove, HasPilot, AC_Home, AC_Car, WindowPos, and SpeedCat.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Sector Locations	Directory and file name	–	Name and location of file providing the latitude and longitude of sector IDs.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input File - Temperature Data	Directory and file name	–	Contains the daily maximum and, optionally, average (or other) temperature data for the meteorological stations and dates indicated in the Meteorological Zones file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input File - Ventilation Regression	Directory and file name	${str("Input Data Directory")}\other\ventilation.txt	This file contains regression parameters used to estimate total ventilation VE from the basal rate of oxygen consumption.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
LOG	Directory and file name	${str("Output Data Directory")}\log.txt	Contains the record of the model simulation; if it completes successfully, the log file indicates the input files and parameter settings used for the simulation. If the simulation does not run successfully, the log file contains error messages describing the fatal errors.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Log Home Sectors?	True/false	–	Yes =All home sectors will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Log Population Summary Data?	True/false	–	Yes =Population summary data will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Log Profile Summary?	True/false	–	Yes =A summary line for each profile generated will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Log Tables Information?	True/false	–	Yes =All tables will be listed in the log file as well as the Tables file.	User-specified. To select this option, click the check box in the "Value" column.
Log Temperature Zones?	True/false	–	Yes =All temperature zones will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.
Log all Air Districts?	True/false	–	Yes =All air districts will be listed in the log file.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
MSUM	Directory and file name	${str("Output Data Directory")}\msum.txt	Provides a summary of the time and exposure by microenvironment for each profile modeled in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Maximum Age	Integer	–	Maximum age for simulated profiles (persons).	User-specified. Type a value directly into the "Value" column.
Minimum Age	Integer	–	Minimum age for simulated profiles (persons).	User-specified. Type a value directly into the "Value" column.
Missing Age Diary Probability Factor	Number	–	Diary probability factor for missing age. Some of the supplied CHAD diaries are for persons of unknown age. This factor operates to lower the selection probability for such diaries. . If set to zero, such diaries will never be selected; if set to one, such diaries are equally likely to be selected as diaries of known age.	User-specified. Type a value directly into the "Value" column.
Missing Employment Diary Probability Factor	Number	–	Diary probability factor for missing employment. Some of the supplied CHAD diaries are for persons of unknown employment status. This factor operates to lower the selection probability for such diaries. If set to zero, such diaries will never be selected; if set to one, such diaries are equally likely to be selected as diaries of known employment status.	User-specified. Type a value directly into the "Value" column.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Missing Gender Diary Probability Factor	Number	–	Diary probability factor for missing gender. Some of the supplied CHAD diaries are for persons of unknown gender. All profiles are assigned a gender, however, and the CHAD diaries are selected from those of the same gender or from the unknowns. If set to zero, such diaries will never be selected; if set to one, such diaries are equally likely to be selected as diaries of the correct, known gender.	User-specified. Type a value directly into the "Value" column.
Multiplicative factor for average concentration	Number	–	Multiplicative factor for city-wide average concentration, applied when working outside study area (only used if people who work outside the study area are included in the simulation; see "Include people who work outside study area?" input parameter.)	User-specified. Type a value directly into the "Value" column.
Output Data Directory	Directory and file name	${str("APEX Directory")}\output_${str("Facility")}_${str("Source Type")}_${str("Pollutant")}\${str("Run Name")}	Name and location of the directory containing the output files of the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
PSUM	Directory and file name	${str("Output Data Directory")}\psum.txt	Provides a summary of each profile modeled in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Params File	Directory and file name	${str("APEX Directory")}\Params_${str("Facility")}_${str("Source Type")}_${str("Pollutant")}_${str("Run Name")}.txt	The file that specifies input and output files, model parameters, and format of output files for this execution of APEX (i.e., TRIM.Expo$_{Inhalation}$).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Persons to include in EVENTS file	Integer	–	The EVENTS file can become very large, averaging about 1.4 MB per person-year. For this reason, the user is given the option of only writing the events for only a fraction of the simulated persons.	User-specified. Type a value directly into the "Value" column.
Pollutant Notification Threshold	Number	–	The pollutant concentration threshold for user notification. If a simulated individual experiences a concentration above the value specified here, then a message is printed to the log file.	User-specified. Type a value directly into the "Value" column.
Population Input Files	List	–	Name and location of gender and/or race specific population data files with defined age groups.	User-specified. Click the "Edit" button in this row.
Primary Age Window Width	Integer	–	Specifies the width of the main age window (%). Each simulated profile is assigned a specific year of age. A window is created around this target age, of size equal to the Primary Age Window Width percent of the target age.	User-specified. Type a value directly into the "Value" column.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Random Seed	Number	–	This value determines how modeled individuals are selected for a simulation. If the same random seed is used for two simulations with the same population and number of profiles, the same set of modeled individuals will be simulated. If different random seeds are used for these same two simulations, a different set of modeled individuals will be simulated.	User-specified. Type a value directly into the "Value" column.
Rollback Background Concentration	Number	–	Rollback background concentrations; use the same units as the input units.	User-specified. Type a value directly into the "Value" column.
Rollback Maximum Target Concentration	Number	–	Rollback maximum concentration; use the same units as the input units.	User-specified. Type a value directly into the "Value" column.
Rollback Target Concentration	Number	–	Rollback target concentration; use the same units as the input units.	User-specified. Type a value directly into the "Value" column.
SITES	Directory and file name	${str("Output Data Directory")}\sites.txt	Lists the sectors, districts, and zones in the study area, and identifies mapping between them.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Scenario	Text string	–	Name of the TRIM.Expo scenario.	User-specified. Type a value directly into the "Value" column.
Shoulder Age Window Width	Number	–	Diary probability factor for "shoulder" ages. This parameter allows an optional shoulder window of ages outside the primary age window. The shoulders have the same width in years as the main age window.	User-specified. Type a value directly into the "Value" column.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Specific Input Directory	Directory and file name	–	Location of the input directory with files specific to this scenario and/or simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Start Date	Integer	–	The start date of the simulation.	User-specified. Type a value directly into the "Value" column.
TABLESB	Directory and file name	${str("Output Data Directory")}\tablesb.txt	Contains tables summarizing the results of the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Table - COHb Dose Cutpoints	List	List of 13	Specifies cut points in %COHb for summing time spent at various blood dose levels. Apart from this statistic, the tables resemble the Exposure Cutpoints table.	User-specified. Click the "Edit" button in this row.
Table - Daily Average COHb Dose Cutpoints	List	List of 13	Specifies the cutpoints in %COHb for the Daily Average Blood Dose. The cut points are used to bin all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table - Daily Max 1-Hour COHb Dose Cutpoints	List	List of 13	Specifies the cutpoints in %COHb for Daily Maximum 1-Hour Blood Dose. The cut points were used to bin all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table - Daily Max 8-Hour COHb Dose	List	List of 13	Specifies cut points in %COHb for Daily Maximum 8-Hour Blood Dose. The cut points were used to bin all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Table - Daily Max End-of-Hour COHb Dose Cutpoints	List	List of 13	Specifies cut points in %COHb for Daily Maximum End-of-Hour Blood Dose. The cut points are used to bin all the person-days in the simulation period.	User-specified. Click the "Edit" button in this row.
Table - Number of Hours End-of-Hour Dose Cutpoints	List	List of 13	Similar to the Daily Max End-of-Hour COHb Dose Cutpoints, except that this parameter collects results for all 24 end-of-hour doses on each day.	User-specified. Click the "Edit" button in this row.
Table - Percentiles	List	List of 7	Specifies the levels of percentile of the exposed population for exposure or dose in APEX output files. Values can include up to one digit beyond the decimal point. Percentiles can only be distinguished from nearby ones if there are enough profiles in the simulation (i.e., at least 100 profiles are needed to properly determine a 99th percentile).	User-specified. Click the "Edit" button in this row.
Table - Simulation Average COHb Dose Cutpoints	List	List of 13	Specifies the cut points in %COHb for the Average Blood Dose over the entire simulation. The cut points are used to bin all the profiles created in the APEX run.	User-specified. Click the "Edit" button in this row.
Use Daylight Savings Time?	True/false	False	If true, the Air Quality Data file will be adjusted for Daylight Savings Time in the summer.	User-specified. To select this option, click the check box in the "Value" column.
Write Hourly Output?	True/false	False	If true, the hourly exposure and dose (if applicable) output files are created.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit E-3. Iterator [APEX] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Write Microenvironment Summary	True/false	–	Indicates whether the microenvironment summary file is generated.	User-specified. To select this option, click the check box in the "Value" column.
Write Ventilation Rates to Events File	True/false	–	Indicates whether ventilation rate information will be included in the EVENTS output file will be generated.	User-specified. To select this option, click the check box in the "Value" column.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Air Quality District Radius	List	–	The maximum distance in kilometers that a sector can be from the nearest air district to remain in the study.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Air Quality District Radius parameter, type a value directly into the "Value" column. Set the Air Quality District Radius for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of CAS number	List	–	The assigned CAS numbers for the chemicals under analysis.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the CAS number parameter, type a value directly into the "Value" column. Set the CAS number for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of County FIPS Codes	List	–	FIPS codes for the counties to which the study areas are restricted.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the County FIPS Codes, parameter, click on the "Edit" button and type the county FIPS codes corresponding to that facility/study area. Set the County FIPS codes for each facility/study area under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Facility	List	–	The facilities being modeled.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Facility parameter, type a value directly into the "Value" column. Set the Facility name (or other identifier) for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Input Concentration Units	List	–	Pollutant concentration units used for the input data, in ppm or ug/m^3.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the Input Concentration Units parameter, type a value directly into the "Value" column. Set the Input Concentrations Units for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Latitude	List	–	The latitudes in decimal degrees of the center of the study areas.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Latitude parameter, type a value directly into the "Value" column. Set latitude for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Location	List	–	The location of the facilities/study areas.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Location parameter, type a value directly into the "Value" column. Set the location for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Longitude	List	–	The longitudes in decimal degrees of the center of the study areas.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Longitude parameter, type a value directly into the "Value" column. Set the longitude for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Maximum Microenvironment Number	List	–	The number of microenvironments defined in the Micro Mapping and Micro Descriptions files.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Maximum Microenvironment Number parameter, type a value directly into the "Value" column. Set the Maximum Microenvironment Number for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Meteorological Zone Radius	List	–	The maximum application radius in kilometers of daily temperature data collected at weather stations.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Meteorological Zone Radius parameter, type a value directly into the "Value" column. Set the Meteorological Zone Radius for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Number of Profiles	List	–	The number of profiles to simulate.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Number of Profiles parameter, type a value directly into the "Value" column. Set the Number of Profiles for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Number of Sources	List	–	The largest number of sources in any microenvironment	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Number of Sources parameter, type a value directly into the "Value" column. Set the Number of Sources for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Output Concentration Units	List	–	Pollutant concentrations units used for the input data, in ppm or ug/m^3.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the Output Concentration Units parameter, type a value directly into the "Value" column. Set the Output Concentration Units for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of PPM to ug/m^3 Factor	List	–	Units conversion factor (1 ppm = ppmfact µg/m^3). For CO, ppmfact = 1,145. It is used when source strengths are expressed in micrograms per hour but concentrations are in parts per million (ppm) and when the input and output concentration units are different.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the PPM to ug/m^3 Factor parameter, type a value directly into the "Value" column. Set the PPM to ug/m^3 Factor for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Pollutant	List	–	The chemicals under analysis.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the Pollutant parameter, type a value directly into the "Value" column. Set the Pollutant for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Source Type	List	–	The types of sources being modeled.	User-specified. Click on the "Edit Synchronized Lists" button. On the SourceType tab, in the row with the Source Type parameter, click on the "Edit" button and type in the desired cuptoints. Set multiple types of sources for analysis by navigating through the source type profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Study Area Radius	List	–	The distances in kilometers from the centers to the edge of the study areas.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Study Area Radius parameter, type a value directly into the "Value" column. Set the Study Area Radius for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Table - Daily Average Exposure Cutpoints	List	–	Specifies the daily average exposure cut points (ppm) for binning all the person-days in the simulation period.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the Daily Average Exposure Cutpoints parameter, click on the "Edit" button and type in the desired cuptoints. Set the Daily Average Exposure Cutpoints for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Table - Daily Max 1-Hour Exposure Cutpoints	List	–	Specify the daily maximum 1-hour exposure cut points (ppm) for binning all the person-days in the simulation period.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the Daily Max 1-Hour Cutpoints parameter, click on the "Edit" button and type in the desired cuptoints. Set the Daily Max 1-Hour Cutpoints for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Table - Daily Max 8-Hour Exposure Cutpoints	List	–	Specifies the daily maximum 8-hour average exposure cut points (ppm) for binning all the person-days in the simulation period.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the Daily Max 8-Hour Exposure Cutpoints parameter, click on the "Edit" button and type in the desired cuptoints. Set the Daily Max 8-Hour Exposure Cutpoints for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Table - Exposure Cutpoints	List	–	Specifies the exposure cut points (ppm) for summing time spent at various exposure levels. The time is expressed in minutes and is summed across all profiles.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the Exposure Cutpoints parameter, click on the "Edit" button and type in the desired cuptoints. Set the Exposure Cutpoints for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Table - Simulation Average Exposure Cutpoints	List	–	Specifies the cut points (ppm) for average exposure over the simulation period. The cut points are used to bin all simulated persons created in the run.	User-specified. Click on the "Edit Synchronized Lists" button. On the Chemicals tab, in the row with the Simulation Average Exposure Cutpoints parameter, click on the "Edit" button and type in the desired cuptoints. Set the Simulation Average Exposure Cutpoints for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Use County List?	List	–	Specifies whether to use lists of counties to define each study area.	User-specified. Click on the "Edit Synchronized Lists" button. On the Facilities tab, in the row with the Use County List parameter, click on the check box to use county FIPS codes. Set the FIPS codes in the input list of County FIPS Codes parameter for each facility under analysis by navigating through the facility profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
output list of CAS Number	List	–	The assigned CAS numbers for the chemicals under analysis.	No user interaction required.
output list of Facility	List	–	The facilities modeled.	No user interaction required.
output list of Output File - Hourly COHb Dose Estimates	List	–	Lists the output file(s) providing an hourly time series of doses for each profile. Each record provides 24-hour dose values for a simulation day. Note that this file can become very large if a large number of profiles are simulated.	No user interaction required.
output list of Output File- Hourly Exposure Estimates	List	–	Lists the output file(s) providing an hourly time series of exposure concentrations for each profile. Each record provides 24-hour dose values for a simulation day. Note that this file can become very large if a large number of profiles are simulated.	No user interaction required.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
output list of Output File - Log	List	–	List the output file(s) recording the input files used, model parameters used, number of available diaries, model execution time, sectors, air districts, and temperature zones in the study area, mappings of sectors to air districts and temperature zones, statistical summaries of each simulated person, and output summary tables. Should a model run stop abnormally, an error message will be written to this file.	No user interaction required.
output list of Output File - Microenvironment Summary	List	–	Lists the output file(s) providing information on the amount of time spent, mean exposure concentration and maximum exposure concentration in each micorenvironment for during the simulation period, for each simulated person.	No user interaction required.
output list of Output File - Person Summary	List	–	Lists the output file(s) providing a summary of profile characteristics and exposure dose for each simulated person.	No user interaction required.
output list of Output File - Site Mapping	List	–	Lists the output file(s) providing a list of the sectors, districts, and zones in the study area, and identifies mapping between them.	No user interaction required.

Exhibit E-4. Iterator [APEX] Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
output list of Output File - Tables	List	–	Lists the output file(s) providing 14 summary tables; the first six are exposure summary tables, and the remaining eight are dose summary tables.	No user interaction required.
output list of Params File	List	–	Lists the *Params* files generated during the simulation, each for a different combination of chemicals, facilities, and source types.	No user interaction required.
output list of Pollutant	List	–	The chemicals under analysis.	No user interaction required.
output list of Source Type	List	–	The types of sources modeled.	No user interaction required.

Exhibit E-5. TRIM.Expo Inhalation PostProcessor [single run] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Population Database	Text string	–	The database created by the $TRIM.Expo_{Inhalation}$ Population Processor.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX PopProcessor Executable	Directory and file name	${str("TRIM Directory")}\lib\apexpostproc.jar	Name and location of the executable file that executes the Population Processor for the population data in the $TRIM.Expo_{Inhalation}$ Population Database.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
CAS Number	Number	–	The assigned CAS number for the chemical under analysis.	User-specified. Type a value directly into the "Value" column.
Class Path	Directory and file name	${str("ApexDBProcessor Executable")};${str("TRIM Directory")}\lib\connectorJ.jar	Specifies the classpath required to run this module.	Set automatically by MIMS if APEX is run as part of the scenario. Otherwise, user-specified. Can be edited in the "Value" column. Alternatively, click "Browse" button to search your computer for the file, select the file in the Browse window, and click "Select."
Control File	Directory and file name	${str("Default Directory")}\apexpostproc_control.txt	Indicates the name of the file created by MIMS that specifies the inputs for the module.	Set automatically by MIMS if APEX is run as part of the scenario. Otherwise, user-specified. Can be edited in the "Value" column. Alternatively, click "Browse" button to search your computer for the file, select the file in the Browse window, and click "Select."
Facility	Text string	–	The type of facility being modeled.	User-specified. Type a value directly into the "Value" column.

Exhibit E-5. TRIM.Expo Inhalation PostProcessor [single run] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Inhalation Exposure DB Name	Database name	–	The name of the database with inhalation exposure estimates generated by $TRIM.Expo_{Inhalation}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Exposure Database	Database name	–	The database created by the APEXPostProcessor with inhalation exposure estimates generated by $TRIM.Expo_{Inhalation}$.	User-specified. Click "Set Name" under "Additional Type Info" column.
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Output File - Person Summary		–	Provides a summary of profile characteristics and exposure dose for each simulated person.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Overwrite Existing Database?	True/false	False	Dictates whether an Inhalation Exposure database previously generated by the APEXPostProcessor will be overwritten by a new database with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Params File	Directory and file name	–	Names input and output files, sets model parameters, and controls the format of output files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-5. TRIM.Expo Inhalation PostProcessor [single run] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Pollutant	Text string	–	The chemical under analysis.	User-specified. Type a value directly into the "Value" column.
Source Type	Text string	–	The type of source being modeled.	User-specified. Type a value directly into the "Value" column.
Summary File	Directory and file name	–	Indicates the location of the parameters file and logs a summary of the input parameter settings used by the TRIM.Expo$_{\text{Inhalation}}$ Postprocessor to generate the MySQL database of exposure estimates.	User-specified. Click "Set Name" under "Additional Type Info" column.
Summary File Name	Directory and file name	–	Indicates the name of summary file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-6. TRIM.Expo$_{Inhalation}$ PostProcessor [multiple run] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Population Database	Text string	–	The database created by the TRIM.Expo$_{Inhalation}$ Population Processor.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
APEX PopProcessor Executable	Directory and file name	${str("TRIM Directory")}\lib\apexpostproc.jar	Name and location of the executable file that executes the Population Processor for the population data in the TRIM.Expo$_{Inhalation}$ Population Database.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Class Path	Directory and file name	${str("ApexDBProcessor Executable")};${str("TRIM Directory")}\lib\connectorJ.jar	Specifies the classpath required to run this module.	Set automatically by MIMS if APEX is run as part of the scenario. Otherwise, user-specified. Can be edited in the "Value" column. Alternatively, click "Browse" button to search your computer for the file, select the file in the Browse window, and click "Select."
Control File	Directory and file name	${str("Default Directory")}\apexpostproc_control.txt	Indicates the name of the file created by MIMS that specifies the inputs for the module.	Set automatically by MIMS if APEX is run as part of the scenario. Otherwise, user-specified. Can be edited in the "Value" column. Alternatively, click "Browse" button to search your computer for the file, select the file in the Browse window, and click "Select."
Inhalation Exposure DB Name	Database name	–	The name of the database with inhalation exposure estimates generated by TRIM.Expo$_{Inhalation}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-6. TRIM.Expo$_{Inhalation}$ PostProcessor [multiple run] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Inhalation Exposure Database	Database name	–	The database created by the APEX PostProcessor with inhalation exposure estimates generated by TRIM.Expo$_{Inhalation}$..	User-specified. Click "Set Name" under "Additional Type Info" column.
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Overwrite Existing Database?	True/false	True	Dictates whether an Inhalation Exposure database previously generated by the APEXPostProcessor will be overwritten by a new database with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Summary File	Directory and file name	–	Indicates the location of the parameters file and logs a summary of the input parameter settings used by the TRIM.Expo$_{Inhalation}$ Postprocessor to generate the MySQL database of exposure estimates.	User-specified. Click "Set Name" under "Additional Type Info" column.
Summary File Name	Directory and file name	–	Indicates the name of summary file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-6. TRIM.Expo$_{Inhalation}$ PostProcessor [multiple run] Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
output list of CAS Number	List	–	The assigned CAS numbers for the chemicals analyzed in the simulation.	User-specified. Click the "Edit" button in this row.
output list of Facility	List	–	The facilities used in the simulation.	User-specified. Click the "Edit" button in this row.
output list of Params File	List	–	The *Params* files generated during the simulation, each for a different combination of chemicals, facilities, and source types.	User-specified. Click the "Edit" button in this row.
output list of Source Type	List	–	The type of source(s) modeled in the simulation.	User-specified. Click the "Edit" button in this row.

Exhibit E-7. TRIM.Risk Module Instance Parameters (TRIM.Expo$_{Inhalation}$)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
APEX Population Database	Text string	–	The database created by the TRIM Inhalation Population Processor.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Control File	Directory and file name	${str("Default Directory")}\hhrisk_control.txt	Indicates the name of the file created by MIMS that specifies the inputs for the module.	Set automatically by MIMS if APEX is run as part of the scenario. Otherwise, user-specified. Can be edited in the "Value" column. Alternatively, click "Browse" button to search your computer for the file, select the file in the Browse window, and click "Select."
Human Health Toxicity Database	Database name	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Ingestion Exposure Database	Database name	–	The name of the database containing ingestion exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Ingestion Risk DB	Database name	–	The name of the database containing ingestion risk data.	Click "Set Name" button under "Additional Type Info" column.
Ingestion Risk Database	Database name	–	The database containing ingestion risk data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Exposure Database	Database name	–	The name of the database created by the APEXPostProcessor containing inhalation exposure information.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-7. TRIM.Risk Module Instance Parameters ($TRIM.Expo_{Inhalation}$)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Inhalation Risk DB Name	Database name	–	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk Database	Database name	–	The database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.	User-specified. Click "Set Name" button under "Additional Type Info" column.
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Overwrite Output Database	True/false	False	If true, an output database previously generated by a simulation will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
Perform ingestion related calculation	True/false	False	Indicates whether ingestion-related calculations will be performed as part of the simulation.	User-specified. To select this option, click the check box in the "Value" column.
Perform inhalation related calculation	True/false	True	Indicates whether ingestion-related calculations will be performed as part of the simulation.	User-specified. To select this option, click the check box in the "Value" column.
Residency Period Database	Database name	–	The name of the database containing residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-8. TRIM.Risk Metrics Module Instance Parameters (TRIM.Expo$_{Inhalation}$)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Control File	Directory and file name	${str("Default Directory")}\hhmetrics_control.txt	Indicates the name of the file created by MIMS that specifies the inputs for the module.	Set automatically by MIMS if APEX is run as part of the scenario. Otherwise, user-specified. Can be edited in the "Value" column. Alternatively, click "Browse" button to search your computer for the file, select the file in the Browse window, and click "Select."
Human Health Toxicity Database	Database name	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Ingestion Exposure Database	Database name	–	The name of the database containing ingestion exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Ingestion Risk Database	Database name	–	The name of the database containing ingestion risk data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Exposure Database	Database name	–	The name of the database created by the APEXPostProcessor containing inhalation exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk Database	Database name	–	The name of the database created by TRIM.Risk containing inhalation risk data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-8. TRIM.Risk Metrics Module Instance Parameters (TRIM.Expo$_{Inhalation}$)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Residency Period Database	Database name	–	The name of the database containing residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics Database	Database name	–	The database containing risk metrics output by the TRIM.Risk metrics generator.	User-specified. Click "Set Name" button under Additional Type Info Column.
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-9. DAVE Module Instance Parameters (TRIM.Expo$_{Inhalation}$)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
DAVE Executable	Directory and file name	${str("TRIM Directory")}\lib\dave.jar	The executable that initiates the DAVE program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Database Name	Database name	–	The TRIM database exported into DAVE.	User-specified. Type a value directly into the "Value" column.
Inhalation Exposure Database	Database name	–	The name of the database created by the APEXPostProcessor containing inhalation exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk Database	Database name	–	The name of the database created by TRIM.Risk containing inhalation risk data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Risk Metrics Database	Database name	–	The name of the database created by the TRIM.Risk metrics generator containing inhalation risk metrics data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
TRIM Database Type	Database type	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.

Exhibit E-10. HAPEM Module Instance Parameters

DURAV				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Counter File Name	Directory and file name	${str("Output Data Directory")}\counter.dat	Name of the *Counter* file, which records the number of records in various data input and output files, and may be useful for keeping track of which files were used in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - durhw.da	Directory and file name	${str("Activity Pattern Directory")}\durhw.da	HAPEM-defined DURAV output file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
FIXED NAME - durhw.nonzero	Directory and file name	${str("Activity Pattern Directory")}\durhw.nonzero	HAPEM-defined DURAV output file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
FIXED NAME - durhw.wrong_chad	Directory and file name	${str("Activity Pattern Directory")}\durhw.wrong_chad	HAPEM-defined DURAV output file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
Include Commuting in Analysis?	Yes/No/Not Set	Yes	If yes, commuting to work is allowed/simulated.	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.
Input - Activity File	Directory and file name	–	Describes the amount of time spent in various microenvironments by individuals; the total number of minutes spent in each microenvironment during each time block throughout the day.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

DURAV				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Input - Cluster File	Directory and file name	–	Specifies the cluster category for each CHAD record, identified by the CHAD identification code.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.
Log File Name	Directory and file name	${str("Output Data Directory")}\log_file.txt.${str("SAROAD Pollutant Code")}	Name of the HAPEM log file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Number of Day Types	Integer	–	The number of day types (input in the parameter files of DURAV and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Demographic Groups	Integer	–	The number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Microenvironments	Integer	–	The number of microenvironments in both the Activity file and Factors file.	User-specified. Type a value directly into the "Value" column.
Number of Time Blocks for Analysis	Integer	–	The number of time blocks for the analysis; may be less than or equal to the number of time blocks in the Activity file, but must be an integral factor of the number of time blocks in the Activity file.	User-specified. Type a value directly into the "Value" column.

Exhibit E-10. HAPEM Module Instance Parameters

DURAV				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Number of Time Blocks in the Activity File	Integer	–	The number of time blocks in the Activity file.	User-specified. Type a value directly into the “Value” column.
Output - Counter File	Directory and file name	${str("Output Data Directory")}\counter.dat	The DURAV module counter file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
Output - Log File	Directory and file name	${str("Output Data Directory")}\log_file.txt.${str("SAROAD Pollutant Code")}	The DURAV module log file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
Param File 1	Directory and file name	${str("HAPEM Directory")}\param_file.1	Indicates the name and location of the Params file which is an input file for HAPEM used to specify the simulation parameters.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
SAROAD Pollutant Code	Integer	–	Specifies the SAROAD code corresponding to the chemical under analysis.	User-specified. Type a value directly into the “Value” column.
Simulation Year	Integer	–	The year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the “Value” column.
Units	Text string	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the “Value” column.
durhw.da	Directory and file name	${str("Activity Pattern Directory")}\durhw.da	Name and location of this HAPEM-defined DURAV output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

DURAV				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
durhw.nonzero	Directory and file name	${str("Activity Pattern Directory")}\durhw.non zero	Name and location of this HAPEM-defined DURAV output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
durhw.wrong_chad	Directory and file name	${str("Activity Pattern Directory")}\durhw.wr ong_chad	Name and location of this HAPEM-defined DURAV output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

INDEXPOP				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
FIXED NAME - census.county_tract_pop_range	Directory and file name	${str("Population Directory")}\census2000.county_tract_pop_range	HAPEM-defined INDEXPOP output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - census.da	Directory and file name	${str("Population Directory")}\census2000.da	HAPEM-defined INDEXPOP output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - census.state_county_pop_range	Directory and file name	${str("Population Directory")}\census2000.state_county_pop_range	HAPEM-defined INDEXPOP output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - census_direct.ind	Directory and file name	${str("Population Directory")}\census2000_direct.ind	HAPEM-defined INDEXPOP output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Input - State FIPS File	Directory and file name	–	Supplies the state FIPS, county FIPS, and tract code for the Population file data.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from options in the drop-down menu by clicking in the “Value” column.

Exhibit E-10. HAPEM Module Instance Parameters

INDEXPOP				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Number of Demographic Groups	Integer	–	Specifies the number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the “Value” column.
Output - Counter File	File name	–	The INDEXPOP module counter file.	HAPEM-defined.
Output - Log File	File name	–	The INDEXPOP module log file.	HAPEM-defined.
Param File 1	Directory and file name	${str("HAPEM Directory")}\param_file.1	Indicates the name and location of the Params file which is an input file for HAPEM used to specify the simulation parameters.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Region 1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the “Value” column.
Region 2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the “Value” column.
Simulation Year	Integer	–	Specifies the year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the “Value” column.
Units	Text string	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the “Value” column.

Exhibit E-10. HAPEM Module Instance Parameters

INDEXPOP				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
census.county_tract_pop_range	Directory and file name	${str("Population Directory")}\census2000.county_tract_pop_range	The name and location of this HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
census.da	Directory and file name	${str("Population Directory")}\census2000.da	The name and location of this HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
census.state_county_pop_range	Directory and file name	${str("Population Directory")}\census2000.state_county_pop_range	The name and location of this HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
census_direct.ind	Directory and file name	${str("Population Directory")}\census2000_direct.ind	The name and location of this HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

COMMUTE				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
FIXED NAME - allcomm.da	Directory and file name	${str("Commuting Directory")}\comm2000.da	HAPEM-defined COMMUTE output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - allcomm.ind	Directory and file name	${str("Commuting Directory")}\comm2000.ind	HAPEM-defined COMMUTE output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - allcomm.st_comm1_fip_range	Directory and file name	${str("Commuting Directory")}\comm2000.st_comm1_fip_range	HAPEM-defined COMMUTE output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - census.county_tract_pop_range	Directory and file name	–	HAPEM-defined COMMUTE input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
FIXED NAME - census.state_county_pop_range	Directory and file name	–	HAPEM-defined COMMUTE input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
FIXED NAME - census_direct.ind	Directory and file name	–	HAPEM-defined COMMUTE input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Input - Commuting File	Directory and file name	–	Identifies the tract of work and tract of residence for individuals.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

COMMUTE				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - State FIPS File	Directory and file name	–	Supplies the state FIPS, county FIPS, and tract code for the Population file data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.
Mistract File Name	Directory and file name	${str("Output Data Directory")}\mistract.${str("SAROAD Pollutant Code")}.dat	Name of the *Mistract* file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Output - Counter File	File name	–	The COMMUTE module counter file.	HAPEM-defined.
Output - Log File	File name	–	The COMMUTE module log file.	HAPEM-defined.
Output - Mistract File	Directory and file name	${str("Output Data Directory")}\mistract.${str("SAROAD Pollutant Code")}.dat	Records the state, county, and tract FIPS codes of each tract in the *Population* file that is not matched by a home tract in the *Commuting* file. These unmatched tracts are still processed b COMMUTE.	User-specified. Click "Set Name" under the "Additional Type Info" column.

Exhibit E-10. HAPEM Module Instance Parameters

COMMUTE				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Param File 1	Directory and file name	${str("HAPEM Directory")}\param_file.1	Indicates the name and location of the Params file which is an input file for HAPEM used to specify the simulation parameters.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Region 1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Region 2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
SAROAD Pollutant Code	Integer	–	Specifies the SAROAD code corresponding to the chemical under analysis.	User-specified. Type a value directly into the "Value" column.
Simulation Year	Integer	–	The year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the "Value" column.
Units	Integer	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the "Value" column.
allcomm.da	Directory and file name	${str("Commuting Directory")}\comm2000.da	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

COMMUTE				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
allcomm.ind	Directory and file name	${str("Commuting Directory")}\comm2000.ind	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
allcomm.st.comm1_fip_range	Directory and file name	${str("Commuting Directory")}\comm2000.st_comm1_fip_range	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

AIRQUAL				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
EPA Region	Integer	–	The EPA region number of indoor emission source data.	User-specified. Type a value directly into the “Value” column.
FIXED NAME - benzout.air_da	Directory and file name	${str("Air Quality Directory")}\air_61.air_da	HAPEM-defined AIRQUAL output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - benzout.da	Directory and file name	${str("Air Quality Directory")}\air_61.da	HAPEM-defined AIRQUAL output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - benzout.pop_air_da	Directory and file name	${str("Air Quality Directory")}\air_61.pop_air_da	HAPEM-defined AIRQUAL output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - benzout.state_air1_fip_range	Directory and file name	${str("Air Quality Directory")}\air_61.state_air_fip_range	HAPEM-defined AIRQUAL output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - benzout.state_air2_fip_range	Directory and file name	${str("Air Quality Directory")}\air_61.state_air_fip_range	HAPEM-defined AIRQUAL output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - benzout.state_air_fip_range	Directory and file name	${str("Air Quality Directory")}\air_61.state_air_fip_range	HAPEM-defined AIRQUAL output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - census.da	Directory and file name	–	HAPEM-defined AIRQUAL input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

AIRQUAL				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
FIXED NAME - census_direct.ind	Directory and file name	–	HAPEM-defined AIRQUAL input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Include Commuting in Analysis?	Yes/No/Not Set	Yes	Specifies whether commuting will be included in the analysis (input in parameter files of DURAV and HAPEM).	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.
Input - Air Quality File	Directory and file name	–	Contains the ambient air concentrations as recorded concentration contributions from multiple emission source categories for multiple time blocks for a census tract; also includes location-specific background concentration data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - State FIPS File	Directory and file name	–	Supplies the state FIPS, county FIPS, and tract code for the Population file data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.

Exhibit E-10. HAPEM Module Instance Parameters

AIRQUAL				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Number of Demographic Groups	Integer	–	The number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Emission Source Categories	Integer	–	The number of outdoor emission source categories, which must match the number in the Factors file (input in the parameter files of AIRQUAL and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Replicates	Integer	–	The number of replicates for each demographic group/tract.	User-specified. Type a value directly into the "Value" column.
Number of Time Blocks for Analysis	Integer	–	The number of time blocks for the analysis; may be less than or equal to the number of time blocks in the Activity file, but must be an integral factor of the number of time blocks in the Activity file.	User-specified. Type a value directly into the "Value" column.
Output - Counter File	File name	–	The AIRQUAL module counter file.	HAPEM-defined.
Output - Log File	File name	–	The AIRQUAL module log file.	HAPEM-defined.
Output - Mistract File	File name	–	Records the record number, state and county FIPS, and tract code of each tract in the *Population* file that is not matched by a tract in the *Air Quality* file. Only tracts that are included in both files are processed by HAPEM.	HAPEM-defined.

Exhibit E-10. HAPEM Module Instance Parameters

AIRQUAL				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Param File 2	Directory and file name	${str("HAPEM Directory")}\param_file.2	Indicates the name and location of the Params file which is an input file for HAPEM used to specify the simulation parameters.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Region 1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Region 2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
SAROAD Pollutant Code	Integer	–	Specifies the SAROAD code corresponding to the chemical under analysis.	User-specified. Type a value directly into the "Value" column.
Simulation Year	Integer	–	The year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the "Value" column.
Units	Text string	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the "Value" column.
benzout.air_da	Directory and file name	${str("Air Quality Directory")}\air_61.air_da	Name and location of this HAPEM-defined AIRQUAL output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

AIRQUAL				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
benzout.da	Directory and file name	${str("Air Quality Directory")}\air_61.da	Name and location of this HAPEM-defined AIRQUAL output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.pop_air_da	Directory and file name	${str("Air Quality Directory")}\air_61.pop_air_da	Name and location of this HAPEM-defined AIRQUAL output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air1_fip_range	Directory and file name	${str("Air Quality Directory")}\air_61.state_air_fip_range	Name and location of this HAPEM-defined AIRQUAL output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air2_fip_range	Directory and file name	${str("Air Quality Directory")}\air_61.state_air_fip_range	Name and location of this HAPEM-defined AIRQUAL output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air_fip_range	Directory and file name	${str("Air Quality Directory")}\air_61.state_air_fip_range	Name and location of this HAPEM-defined AIRQUAL output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

HAPEM				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Background Concentration	Number	–	Specifies the uniform background concentration throughout the study area.	User-specified. Type a value directly into the "Value" column.
EPA Region	Integer	–	The EPA region number of indoor emission source data.	User-specified. Type a value directly into the "Value" column.
FIXED NAME - allcomm.da	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - allcomm.ind	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - allcomm.st_comm1_fip_range	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - benzout.air_da	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - benzout.da	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

HAPEM				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
FIXED NAME - benzout.state_air1_fip_range	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - benzout_air2_fip_range	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - benzout.state_air_fip_range	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - durhw.da	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - durhw.nonzero	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Include Commuting in Analysis?	Yes/No/Not Set	Yes	Specifies whether commuting will be included in the analysis (input in parameter files of DURAV and HAPEM).	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.

Exhibit E-10. HAPEM Module Instance Parameters

HAPEM				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Input - Activity File	Directory and file name	–	Describes the amount of time spent in various microenvironments by individuals; the total number of minutes spent in each microenvironment during each time block throughout the day.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Air Quality File	Directory and file name	–	Contains the ambient air concentrations as recorded concentration contributions from multiple emission source categories for multiple time blocks for a census tract; also includes location-specific background concentration data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - AutoPduct File	Directory and file name	–	The full path name of any existing file (except other HAPEM input or output files) must be specified as the *AutoPduct* file. In the future this file will comprise part of the input for evaluating indoor source algorithms. Currently, the file is not utilized by the HAPEM program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Cluster Transition File	Directory and file name	–	Specifies the number of activity patterns in each group of two to three clusters and cluster-to-cluster transition probabilities for each demographic group/day type combination.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Commuting File	Directory and file name	–	Identifies the tract of work and tract of residence for individuals.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

HAPEM				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Input - Factors File	Directory and file name	–	Includes values for the penetration, proximity, additive, and slow diffusion factor (PEN, PROX, ADD, and LAG, respectively) for each microenvironment and emission source category combination. The number of microenvironments in the Factors file must match the number in the Activity file (i.e., *nmicro).*	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.
Number of Day Types	Integer	–	The number of day types (input in the parameter files of DURAV and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Demographic Groups	Integer	–	The number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Emission Source Categories	Integer	–	The number of outdoor emission source categories, which must match the number in the Factors file (input in the parameter files of AIRQUAL and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Microenvironments	Integer	–	The number of microenvironments in both the Activity file and Factors file.	User-specified. Type a value directly into the "Value" column.

Exhibit E-10. HAPEM Module Instance Parameters

HAPEM				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Number of Replicates	Integer	–	The number of replicates for each demographic group/tract.	User-specified. Type a value directly into the "Value" column.
Number of Time Blocks for Analysis	Integer	–	The number of time blocks for the analysis; may be less than or equal to the number of time blocks in the Activity file, but must be an integral factor of the number of time blocks in the Activity file.	User-specified. Type a value directly into the "Value" column.
Output - Counter File	File name	–	The HAPEM module counter file.	HAPEM-defined.
Output - Log File	File name	–	The HAPEM module log file.	HAPEM-defined.
Output - Mistract File	File name	–	Records the state, county, and tract FIPS codes of each home tract in the *Commuting* file that is not matched by a tract in the air quality index files. These index files contain information on tracts that were included in both the *Population* and *Air Quality* files. The unmatched home tracts are not processed further. Note that HAPEM records information on this file only if commuting is included in the simulation.	HAPEM-defined.
Output - Path of Final Exposure File	Directory and file name	–	Indicates the file name and location of the HAPEM exposure output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-10. HAPEM Module Instance Parameters

HAPEM				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Output File Name	Directory and file name	–	The name of the HAPEM exposure output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Output File from HAPEM	File name	${str("Output - Log File")}	The HAPEM exposure output file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
Param File 2	Directory and file name	${str("HAPEM Directory")}\param_file.2	Indicates the name and location of the Params file which is an input file for HAPEM used to specify the simulation parameters.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Random Seed for Selecting Activity Pattern Data	Integer	–	Allows for the random selection of activity pattern data for analysis. Using the same random seed for two simulations for the same scenario will select the same activity patterns.	User-specified. Type a value directly into the "Value" column.
Random Seed for Selecting Air Quality Dataset	Integer	–	Allows for the random selection of air quality data for analysis. Using the same random seed for two simulations for the same scenario will select the same air quality data.	User-specified. Type a value directly into the "Value" column.
Random Seed for Selecting MicroFactors	Integer	–	Allows for the random selection of microenvironment factors for analysis. Using the same random seed for two simulations for the same scenario will select the same microenvironment factors.	User-specified. Type a value directly into the "Value" column.

Exhibit E-10. HAPEM Module Instance Parameters

HAPEM				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Region1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Region2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
SAROAD Pollutant Code	Integer	–	Specifies the SAROAD code corresponding to the chemical under analysis.	User-specified. Type a value directly into the "Value" column.
Simulation Year	Integer	–	The year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the "Value" column.
Units	Integer	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the "Value" column.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

DURAV				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Counter File DURAV	Directory and file name	${str("Output Data Directory")}\counter.dat	Records the number of records in various data input and output files, and may be useful for keeping track of which files were used in the simulation.	User-specified. Click “Set Name” under the “Additional Type Info” column.
Counter File Name	Directory and file name	${str("Output Data Directory")}\counter.dat	Name of the *Counter* file, which records the number of records in various data input and output files, and may be useful for keeping track of which files were used in the simulation.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
FIXED NAME - durhw.da	File name	${str("Activity Pattern Directory")}\durhw.da	HAPEM-defined DURAV output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - durhw.nonzero	File name	${str("Activity Pattern Directory")}\durhw.nonzero	HAPEM-defined DURAV output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - druhw.wrong_chad	File name	${str("Activity Pattern Directory")}\durhw.wrong_chad	HAPEM-defined DURAV output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
Include Commuting in Analysis?	Yes/No/Not Set	Yes	If yes, commuting to work is allowed/simulated.	User-specified. Select from options in the drop-down menu by clicking in the “Value” column.
Input - Activity File	Directory and file name	–	Describes the amount of time spent in various microenvironments by individuals; the total number of minutes spent in each microenvironment during each time block throughout the day.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

DURAV				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Input - Cluster File	Directory and file name	–	Specifies the cluster category for each CHAD record, identified by the CHAD identification code.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Not Set	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from options in the drop-down menu by clicking in the “Value” column.
Log File DURAV	Directory and file name	${str("Output Data Directory")}\log_file.txt	The DURAV module log file.	User-specified. Click “Set Name” under “Additional Type Info” column.
Log File Name	Directory and file name	${str("Output Data Directory")}\log_file.txt	Name of the DURAV log file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Number of Day Types	Integer	–	The number of day types (input in the parameter files of DURAV and HAPEM).	User-specified. Type a value directly into the “Value” column.
Number of Demographic Groups	Integer	–	The number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the “Value” column.
Number of Microenvironments	Integer	–	The number of microenvironments in both the Activity file and Factors file.	User-specified. Type a value directly into the “Value” column.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

DURAV				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Number of Time Blocks for Analysis	Integer	–	The number of time blocks for the analysis; may be less than or equal to the number of time blocks in the Activity file, but must be an integral factor of the number of time blocks in the Activity file.	User-specified. Type a value directly into the “Value” column.
Number of Time Blocks in the Activity File	Integer	–	The number of time blocks in the Activity file.	User-specified. Type a value directly into the “Value” column.
Param File 1	Directory and file name	${str("HAPEM Directory")}\param_file.1	Indicates the name and location of the Params file which is an input file for HAPEM used to specify the simulation parameters.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Simulation Year	Integer	–	The year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the “Value” column.
Units	Text string	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the “Value” column.
durhw.da	Directory and file name	${str("Activity Pattern Directory")}\durhw.da	Name and location of this HAPEM-defined DURAV output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
durhw.nonzero	Directory and file name	${str("Activity Pattern Directory")}\durhw.nonzero	Name and location of this HAPEM-defined DURAV output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

DURAV				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
durhw.wrong_chad	Directory and file name	${str("Activity Pattern Directory")}\durhw.wrong_chad	Name and location of this HAPEM-defined DURAV output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

INDEXPOP				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Counter File DURAV	Directory and file name	–	The DURAV module counter file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Counter File INDEXPOP	File name	${str("Counter File DURAV")}	The INDEXPOP module counter file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
Counter File Name	Directory and file name	–	Name of the *Counter* file, which records the number of records in various data input and output files, and may be useful for keeping track of which files were used in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - census.county_tract_pop_range	File name	${str("Population Directory")}\census2000.county_tract_pop_range	HAPEM-defined INDEXPOP output file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
FIXED NAME - census.da	File name	${str("Population Directory")}\census2000.da	HAPEM-defined INDEXPOP output file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
FIXED NAME - census.state_county_pop_range	File name	${str("Population Directory")}\census2000.state_county_pop_range	HAPEM-defined INDEXPOP output file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
FIXED NAME - census_direct.ind	File name	${str("Population Directory")}\census2000_direct.ind	HAPEM-defined INDEXPOP output file.	User-specified. Click "Set Name" under the "Additional Type Info" column.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

INDEXPOP				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Input - State FIPS File	Directory and file name	–	Supplies the state FIPS, county FIPS, and tract code for the Population file data.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from options in the drop-down menu by clicking in the “Value” column.
Log File DURAV	Directory and file name	–	The DURAV module log file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Log File INDEXPOP	File name	${str("Log File DURAV")}	The INDEXPOP module log file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
Log File Name	Directory and file name	–	Name of the HAPEM log file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Number of Demographic Groups	Integer	–	Specifies the number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the “Value” column.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

INDEXPOP				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Param File 1	Directory and file name	${str("HAPEM Directory")}\param_file.1	Indicates the name and location of the Params file which is an input file for HAPEM used to specify the simulation parameters.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Region 1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Region 2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Simulation Year	Integer	–	Specifies the year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the "Value" column.
Units	Text string	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the "Value" column.
census_county_tract_pop_range	Directory and file name	${str("Population Directory")}\census2000.county_tract_pop_range	The name and location of this HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
census.da	Directory and file name	${str("Population Directory")}\census2000.da	The name and location of this HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

INDEXPOP				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
census.state_county_pop_range	Directory and file name	${str("Population Directory")}\census2000.state_county_pop_range	The name and location of this HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
census_direct.ind	Directory and file name	${str("Population Directory")}\census2000_direct.ind	The name and location of this HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

COMMUTE				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Counter File COMMUTE	File name	${str("Counter File INDEXPOP")}	The COMMUTE module counter file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
Counter File INDEXPOP	Directory and file name	–	The INDEXPOP module counter file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
FIXED NAME - allcomm.da	Directory and file name	${str("Commuting Directory")}\comm2000.da	HAPEM-defined COMMUTE output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - allcomm.ind	Directory and file name	${str("Commuting Directory")}\comm2000.ind	HAPEM-defined COMMUTE output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - allcomm.st_comm1_fip_range	Directory and file name	${str("Commuting Directory")}\comm2000.st_comm1_fip_range	HAPEM-defined COMMUTE output file.	User-specified. Click “Set Name” under the “Additional Type Info” column.
FIXED NAME - census.county_tract_pop_range	Directory and file name	–	HAPEM-defined COMMUTE input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
FIXED NAME - census.state_county_pop_range	Directory and file name	–	HAPEM-defined COMMUTE input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

COMMUTE				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
FIXED NAME - census_direct.ind	Directory and file name	–	HAPEM-defined COMMUTE input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Commuting File	Directory and file name	–	Identifies the tract of work and tract of residence for individuals.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - State FIPS File	Directory and file name	–	Supplies the state FIPS, county FIPS, and tract code for the Population file data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Yes	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.
Log File COMMUTE	File name	${str("Log File INDEXPOP")}	The COMMUTE module log file.	User-specified. Click "Set Name" under the "Additional Type Info" column.
Log File INDEXPOP	Directory and file name	–	The INDEXPOP module log file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

COMMUTE				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Log File Name	Directory and file name	–	Name of the HAPEM log file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Mistract File COMMUTE	Directory and file name	${str("Output Data Directory")}\mistract.dat	Records the state, county, and tract FIPS codes of each tract in the *Population* file that is not matched by a home tract in the *Commuting* file. These unmatched tracts are still processed b COMMUTE.	User-specified. Click "Set Name" under the "Additional Type Info" column.
Mistract File Name	Directory and file name	${str("Output Data Directory")}\mistract.dat	Name of the *Mistract* file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Param File 1	Directory and file name	–	Indicates the name and location of the Params file which is an input file for HAPEM used to specify the simulation parameters.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Region 1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Region 2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.

Exhibit E-11. HAPEM (Part 1) Module Instance Parameters

COMMUTE				
Parameter	**Data Type**	**Default Value**	**Description**	**How Parameter Value is Set**
Simulation Year	Integer	–	The year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the “Value” column.
Units	Text string	–	Specifies the units for exposure concentration data.	User-specified. Type a value directly into the “Value” column.
allcomm.da	Directory and file name	${str("Commuting Directory")}\comm2000.da	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
allcomm.ind	Directory and file name	${str("Commuting Directory")}\comm2000.ind	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
allcomm.st_comm1_fip_range	Directory and file name	${str("Commuting Directory")}\comm2000.st_comm1_fip_range	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Activity Pattern Directory	Directory name	${str("Input Data Directory")}\Activity Pattern	The directory containing the Activity file(s).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Additional Input Directory	Directory name	${str("Input Data Directory")}\Add	The directory containing additional input file(s).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Air Quality Directory	Directory name	${str("Input Data Directory")}\airqual	The directory containing the Air Quality file(s).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Commuting Directory	Directory name	${str("Input Data Directory")}\commute	The directory containing the Commuting file(s).	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Counter File COMMUTE	File name	–	The COMMUTE module counter file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Counter File Name	Directory and file name	${str("Output Data Directory")}\counter.dat	Name of the *Counter* file, which records the number of records in various data input and output files, and may be useful for keeping track of which files were used in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Create Output Directories	True/false	True	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Default Directory	Directory name	${str("TRIM Directory")}\logs\HAPEMWRiskmult	Name of the *Counter* file, which records the number of records in various data input and output files, and may be useful for keeping track of which files were used in the simulation.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Delete Generated Batch Files	True/false	False	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Delete Generated Input Files	True/false	False	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Delete Intermediate Files When Done	True/false	False	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Delete Old Output Files	True/false	False	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Delete Unused Final Files	True/false	False	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
EPA Region	Integer	False	The EPA region number of indoor emission source data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Execution Method	Text string	Local Execution	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Execution Path	Directory name	–	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
FIXED NAME - allcomm.da	Directory and file name	–	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
FIXED NAME - allcomm.ind	Directory and file name	–	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - allcomm.st_comm1_fip_range	Directory and file name	–	HAPEM-defined COMMUTE output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - census.da	Directory and file name	–	HAPEM-defined COMMUTE input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - census_direct.ind	Directory and file name	–	HAPEM-defined COMMUTE input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - durhw.da	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
FIXED NAME - durhw.nonzero	Directory and file name	–	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Factors Directory	Directory name	${str("Input Data Directory")}\factor	The directory containing the Factors file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
HAPEM Directory	Directory name	Set by user during installation.	Directory in which HAPEM is installed.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Include Commuting in Analysis?	Yes/No/Not Set	Yes	If yes, commuting to work is allowed/simulated.	User-specified. Select from the drop-down menu in the "Value"column.
Input - Activity File	Directory and file name	–	Describes the amount of time spent in various microenvironments by individuals; the total number of minutes spent in each microenvironment during each time block throughout the day.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - AutoPduct File	Directory and file name	–	The full path name of any existing file (except other HAPEM input or output files) must be specified as the AutoPduct file. In the future this file will comprise part of the input for evaluating indoor source algorithms. Currently, the file is not utilized by the HAPEM program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Cluster Transition File	Directory and file name	–	Specifies the number of activity patterns in each group of two to three clusters and cluster-to-cluster transition probabilities for each demographic group/day type combination.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - Commuting File	Directory and file name	–	Identifies the tract of work and tract of residence for individuals.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input - State FIPS File	Directory and file name	–	Supplies the state FIPS, county FIPS, and tract code for the Population file data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Input Data Directory	Directory name	–	Directory containing input data files.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Keep Intermediate Files?	Yes/No/Not Set	Not Set	Indicates whether temporary files generated by the HAPEM program during execution are preserved or deleted upon completion of HAPEM.	User-specified. Select from the drop-down menu in the "Value"column.
Keep Module Logs	Yes/No/Not Set	Yes	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Log File COMMUTE	Directory and file name	–	The COMMUTE module log file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Log File Name	Directory and file name	${str("Output Data Directory")}\log_file.txt	Name of the HAPEM log file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Log Module Start and Finish	True/false	True	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Mistract File COMMUTE	Directory and file name	–	Records the state, county, and tract FIPS codes of each tract in the population file that is not matched by a home tract in the *Commuting* file. These unmatched tracts are still processed b COMMUTE.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Models Directory	Directory name	–	Directory containing TRIM models.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Number of Day Types	Integer	–	The number of day types (input in the parameter files of DURAV and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Demographic Groups	Integer	–	The number of demographic groups (input in the parameter files of DURAV, INDEXPOP, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Emission Source Categories	Integer	–	The number of outdoor emission source categories, which must match the number in the Factors file (input in the parameter files of AIRQUAL and HAPEM).	User-specified. Type a value directly into the "Value" column.
Number of Microenvironments	Integer	–	The number of microenvironments in both the Activity file and Factors file.	User-specified. Type a value directly into the "Value" column.
Number of Replicates	Integer	–	The number of replicates for each demographic group/tract.	User-specified. Type a value directly into the "Value" column.

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Number of Time Blocks for Analysis	Integer	–	The number of time blocks for the analysis; may be less than or equal to the number of time blocks in the Activity file, but must be an integral factor of the number of time blocks in the Activity file.	User-specified. Type a value directly into the “Value” column.
Number of Time Blocks in the Activity File	Integer	–	The number of time blocks in the Activity file.	User-specified. Type a value directly into the “Value” column.
Output - Path of Final Exposure File	Directory name	–	Indicates the file name and location of the HAPEM exposure output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Output Data Directory	Directory name	–	Directory containing output dat a files.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Overwrite Log Files	True/false	False	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Overwrite Script Files	True/false	False	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	
Population Directory	Directory name	${str("Input Data Directory")}\population	Directory containing the Population files.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Random Number Seed	Integer	–	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Random Seed for Selecting Activity Pattern Data	Integer	–	Allows for the random selection of activity pattern data for analysis. Using the same random seed for two simulations for the same scenario will select the same activity patterns.	User-specified. Type a value directly into the "Value" column.
Random Seed for Selecting Air Quality Dataset	Integer	–	Allows for the random selection of microenvironment factors for analysis. Using the same random seed for two simulations for the same scenario will select the same microenvironment factors.	User-specified. Type a value directly into the "Value" column.
Random Seed for Selecting Micro Factors	Integer	–	Allows for the random selection of air quality data for analysis. Using the same random seed for two simulations for the same scenario will select the same air quality data.	User-specified. Type a value directly into the "Value" column.
Region 1	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Region 2	Integer	–	Specifies the states for which the program looks for data in the input files (input in parameter files of INDEXPOP, COMMUTE, AIRQUAL, and HAPEM).	User-specified. Type a value directly into the "Value" column.
Run Name	Text string	–	Name of the unique scenario run.	User-specified. Type a value directly into the "Value" column.
Saving Frequency	Integer	0	No user interaction is required for this parameters. They are set correctly in the TRIM.Risk projects, or are not used at all.	

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Simulation Year	Integer	–	Specifies the year to be simulated by the model run (the year of the air quality data).	User-specified. Type a value directly into the “Value” column.
TRIM Directory	Directory name	Set by user during installation	TRIM installation directory (i.e., the directory into which the TRIM files were placed during installation).	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
allcomm.da	Directory and file name	${str("Commuting Directory")}\comm2000.da	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
allcomm.ind	Directory and file name	${str("Commuting Directory")}\comm2000.ind	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
allcomm.st_comm1_fip_range	Directory and file name	${str("Commuting Directory")}\comm2000.st_comm1_fip_range	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
benzout.air_da	Directory and file name	${str("Air Quality Directory")}\con${str("SAROAD Pollutant Code")}.air_da	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
benzout.da	Directory and file name	${str("Air Quality Directory")}\con${str("SAROAD Pollutant Code")}.da	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
benzout.pop_air_da	Directory and file name	{str("Air Quality Directory")}\con${str("SAROAD Pollutant Code")}.pop_air_da	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air1_fip_range	Directory and file name	${str("Air Quality Directory")}\con${str("SAROAD Pollutant Code")}.state_air1_fip_range	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air2_fip_range	Directory and file name	${str("Air Quality Directory")}\con${str("SAROAD Pollutant Code")}.state_air2_fip_range	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
benzout.state_air_fip_range	Directory and file name	${str("Air Quality Directory")}\con${str("SAROAD Pollutant Code")}.state_air_fip_range	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
census.county_tract_pop_range	Directory and file name	${str("Population Directory")}\census2000.county_tract_pop_range	HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
census.da	Directory and file name	${str("Population Directory")}\census2000.da	HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
census.state_county_pop_range	Directory and file name	${str("Population Directory")}\census2000.state_county_pop_range	HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-12. HAPEM (Part 2) Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
census_direct.ind	Directory and file name	${str("Population Directory")}\census2000_direct.ind	HAPEM-defined INDEXPOP output file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
durhw.da	Directory and file name	${str("Activity Pattern Directory")}\durhw.da	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
durhw.nonzero	Directory and file name	${str("Activity Pattern Directory")}\durhw.nonzero	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
durhw.wrong_chad	Directory and file name	${str("Activity Pattern Directory")}\durhw.wrong_chad	HAPEM-defined HAPEM input file.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.

Exhibit E-13. HAPEM (Part 2) Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Background Concentration	List	–	Specifies the uniform background concentration throughout each study area.	User-specified. Click on the "Edit Synchronized Lists" button, and in the row with the Background Concentration parameter, type a value directly into the "Value" column. Set a background concentration for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of Input - Air Quality File	List	–	Contains the list of *Air Quality* files containing ambient air concentrations as recorded concentration contributions from multiple emission source categories for multiple time blocks for a census tract; also includes location-specific background concentration data.	User-specified. Click on the "Edit Synchronized Lists" button, and in the row with the Air Quality File parameter, type a value directly into the "Value" column. or use the "Browse" button to select the file on your computer. Set an *Air Quality* file for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-13. HAPEM (Part 2) Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Input - Factors File	List	–	Includes values for the penetration, proximity, additive, and slow diffusion factor (PEN, PROX, ADD, and LAG, respectively) for each microenvironment/emission source category combination. The number of microenvironments in the Factors file must match the number in the Activity file (i.e., *nmicro).*	User-specified. Click on the "Edit Synchronized Lists" button, and in the row with the Factors File parameter, type a value directly into the "Value" column. or use the "Browse" button to select the file on your computer. Set a *Factors* file for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
input list of SAROAD Pollutant Code	List	–	Specifies the SAROAD code corresponding to the chemical under analysis.	User-specified. Click on the "Edit Synchronized Lists" button, and in the row with the SAROAD Pollutant Code parameter, type a value directly into the "Value" column. Set a SAROAD Pollutant Code for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.

Exhibit E-13. HAPEM (Part 2) Iterating Lists Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
input list of Units	List	–	Specifies the units for exposure concentration data.	User-specified. Click on the "Edit Synchronized Lists" button, and in the row with the Units parameter, type a value directly into the "Value" column. Set input units for each chemical under analysis by navigating through the chemical profiles using the arrow buttons (← →) at the top of the Selected Iteration pane.
output list of Output - Path of Final Exposure File	List	–	Indicates the file name and location of the HAPEM exposure output file.	No user interaction required.
output list of SAROAD Pollutant Code	List	–	Specifies the SAROAD code corresponding to the chemical analyzed.	No user interaction required.
output list of Units	List	–	Specifies the units for exposure concentration data.	No user interaction required.

Exhibit E-14. HAPEM PostProcessor Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
CLASSPATH	Directory and file name	${str("TRIM Directory")}\lib\connectorJ.jar;${str("HAPEM Processor Executable")}	Specifies the classpath required to run HAPEM.	User-specified. Type a value directly into the “Value” column.
Control File	Directory and file name	${str("Output Data Directory")}\control_hapempostproc.txt	Indicates the name of the file created by MIMS that specifies the inputs for the module.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
HAPEM County Database	Database name	–	Database containing the HAPEM County/State data.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
HAPEMProcessor Executable	Directory and file name	${str("TRIM Directory")}\lib\HapemProc.jar	Name and location of the HAPEMPostProcessor executable.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Human Health Toxicity Database	Database name	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Inhalation Exposure DB Name	Database name	–	The name of the database with inhalation exposure estimates generated by HAPEM.	User-specified. Type file name and location directly into the “Value” column or use the “Browse” button to select the file on your computer.
Inhalation Exposure Database	Database name	–	The database created by the HAPEM PostProcessor with inhalation exposure estimates generated by HAPEM.	User-specified. Click “Set Name” under the “Additional Type Info” column.

Exhibit E-14. HAPEM PostProcessor Module Instance Parameters

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Input - Population File	Directory and file name	–	Provides the number of people in each demographic group (defined in DURAV source code) for each census tract in the study area.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Output File from HAPEM	Directory name and location.	–	The HAPEM exposure output file.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
output list of Output - Path of Final Exposure File	List	–	Indicates the file name and location of the HAPEM exposure output file.	User-specified. Click the "Edit" button in this row.

Exhibit E-15. TRIM.Risk Module Instance Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Control File	Directory and file name	${str("Default Directory")}\control_hhrisk.txt	Indicates the name of the file created by MIMS that specifies the inputs for the module.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Human Health Toxicity Database	Database name	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Ingestion Risk DB Name	Database name	–	The name of the database containing ingestion exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Ingestion Risk Database	Database name	–	The database containing ingestion risk data.	User-specified. Click "Set Name" button under "Additional Type Info" column.
Inhalation Exposure Database	Database name	–	The name of the database created by the APEXPostProcessor containing inhalation exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk DB Name	Database name	–	The name of the database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk Database	Database name	–	The database with inhalation risk estimates generated by $TRIM.Risk_{HH-NP}$.	User-specified. Click "Set Name" button under "Additional Type Info" column.
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.

Exhibit E-15. TRIM.Risk Module Instance Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Overwrite Output Database	True/false	False	If true, an output database previously generated by a simulation will be overwritten if a new database is specified with an identical name.	User-specified. To select this option, click the check box in the "Value" column.
PATH	Directory name	%PATH%;${str("TRIM Directory")}\dlls\Win32\Winnt	By default, this parameter will be set correctly. No user interaction required.	
Perform ingestion related calculations	True/false	False	Indicates whether ingestion-related calculations will be performed as part of the simulation.	User-specified. To select this option, click the check box in the "Value" column.
Perform inhalation related calculations	True/false	True	Indicates whether ingestion-related calculations will be performed as part of the simulation.	User-specified. To select this option, click the check box in the "Value" column.
Residency Period Database	Database name	–	The name of the database containing residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-16. TRIM.Risk Metrics Module Instance Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Control File	Directory and file name	${str("Default Directory")}\control_hhmetrics.txt	Indicates the name of the file created by MIMS that specifies the inputs for the module.	Set automatically by MIMS if HAPEM is run as part of the scenario. Otherwise, user-specified. Can be edited in the "Value" column. Alternatively, click "Browse" button to search your computer for the file, select the file in the Browse window, and click "Select."
Human Health Toxicity Database	Database name	–	The name of the database containing chemical-specific information on human health effects.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Ingestion Exposure Database	Database name	–	The name of the database containing ingestion exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Ingestion Risk Database	Database name	–	The name of the database containing ingestion risk data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
PATH	Directory name	%PATH%;${str("TRIM Directory")}\dlls\Win32\Winnt	By default, this parameter will be set correctly. No user interaction required.	

Exhibit E-16. TRIM.Risk Metrics Module Instance Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
Residency Period Database	Database name	–	The name of the database containing residency period data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics DB Name	Database name	–	The name of the database with risk metrics output generated by the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Risk Metrics Database	Database name	–	The database containing risk metrics output by the TRIM.Risk metrics generator.	User-specified. Click "Set Name" button under Additional Type Info Column.
Risk Metrics Summary File	Directory and file name	–	Summarizes the selected metrics generated for a particular run of the TRIM.Risk metrics generator.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-17. DAVE Module Instance Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
DAVE Executable	Directory and file name	${str("TRIM Directory")}\lib\dave.jar	The executable that initiates the DAVE program.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Database Name	Database name	–	The TRIM database exported into DAVE.	User-specified. Type a value directly into the "Value" column.
Inhalation Exposure Database	Database name	–	The name of the database created by the APEXPostProcessor containing inhalation exposure data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
Inhalation Risk Database	Database name	–	The name of the database created by TRIM.Risk containing inhalation risk data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.
MySQL Password	Text string	Set by user during installation.	Password for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
MySQL User Name	Text string	Set by user during installation.	User name for access to the MySQL databases created or used for the TRIM.Risk projects.	User-specified. Type a value directly into the "Value" column.
Risk Metrics Database	Database name	–	The name of the database created by the TRIM.Risk metrics generator containing inhalation risk metrics data.	User-specified. Type file name and location directly into the "Value" column or use the "Browse" button to select the file on your computer.

Exhibit E-17. DAVE Module Instance Parameters (HAPEM)

Parameter	Data Type	Default Value	Description	How Parameter Value is Set
TRIM Database Type	Database type	Human Health Risk Metrics	Specifies the type of database to be exported into DAVE, at which point DAVE will "execute" and analysis/export of that database type becomes available in the DAVE GUI.	User-specified. Select from options in the drop-down menu by clicking in the "Value" column.

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Appendix F
MySQL Database Schema

There are four MySQL databases used and/or created specifically in the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" MIMS project:

- **TRIM Inhalation Population database** - generated by the "TRIM Inhalation Population Processor" scenario; contains the population data used by $\text{TRIM.Expo}_{\text{Inhalation}}$.

- **$\text{TRIM.Expo}_{\text{Inhalation}}$ database** - generated by the $\text{TRIM.Expo}_{\text{Inhalation}}$ PostProcessor; contains the exposure estimates generated by $\text{TRIM.Expo}_{\text{Inhalation}}$.

- **TRIM.Risk Inhalation Risk database** - generated by TRIM.Risk; contains risk estimates from $\text{TRIM.Expo}_{\text{Inhalation}}$ derived exposure data.

- **TRIM.Risk Inhalation Risk Metrics database** - generated by the TRIM.Risk metrics generator; contains risk metrics from $\text{TRIM.Expo}_{\text{Inhalation}}$ derived exposure data.

There are four MySQL databases used and/or created specifically in the "Inhalation risk assessment using RfCs and UREs, with HAPEM" MIMS Project:

- **HAPEM County/State database** - contains the HAPEM County/State data.

- **HAPEM PostProcessor database** - generated by the HAPEM PostProcessor; contains the exposure estimates generated by HAPEM.

- **TRIM.Risk Inhalation Risk database** - generated by TRIM.Risk; contains risk estimates from HAPEM-derived exposure data.

- **TRIM.Risk Inhalation Risk Metrics database** - generated by the TRIM.Risk metrics generator; contains risk metrics from HAPEM-derived exposure data.

There are two MySQL databases common to both TRIM.Expo$_{Inhalation}$ and HAPEM Inhalation risk assessment projects:

- **Human Health Toxicity database -** contains chemical-specific information regarding RfCs and UREs for human health assessment.

- **Residency Period database -** contains residency period data.

The database schemas are presented in this appendix for these ten databases in the exhibits that follow:

Exhibit F-1. Schema for TRIM Inhalation Population MySQL Database

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database

Exhibit F-3. Schema for TRIM.Risk MySQL Database for TRIM.Expo-derived Data

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data

Exhibit F-5. Schema for HAPEM County/State MySQL Database

Exhibit F-6. Schema for HAPEM PostProcessor MySQL Database

Exhibit F-7. Schema for TRIM.Risk MySQL Database for HAPEM-derived data

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived data

Exhibit F-9. Schema for Human Health Toxicity MySQL Database

Exhibit F-10. Schema for Residency Period MySQL Database

Exhibit F-1. Schema for TRIM Inhalation Population MySQL Database (*current as of April 2005*)

TABLE: AgePop

Field	Data Type	Key	Not Null	Units	Description
hsectID	mediumint, unsigned	primary	X	unitless	Unique home sector identification number.
Gender	mediumint, unsigned	primary	X	unitless	Single character used to denote gender. Gender is read from the control file for each file processed.
RaceID	char(1)	primary	X	unitless	Unique ID used to denote race. Race is read from the control file for each file processed. The race string read is recorded on the TABLE: Races.
AgeBin	tinyint, unsigned	primary	X	unitless	Unique ID used to denote age bin.
PopCnt	tinyint, unsigned			unitless	Total population count for a given hsect, gender, race, and age bin combination.

TABLE: Ages

Field	Data Type	Key	Not Null	Units	Description
AgeBin	integer, unsigned	primary	X	unitless	Unique age bin identification number, auto_increment.
MinAge	tinyint, unsigned		X	years	Minimum age reported for an age bin.
MaxAge	tinyint, unsigned		X	years	Maximum age reported for an age bin.

TABLE: dbdate

Field	Data Type	Key	Not Null	Units	Description
recnum	tinyint, unsigned	primary	X	unitless	Record number.

Exhibit F-1. Schema for TRIM.Expo Inhalation Population MySQL Database (*continued*)

TABLE: hsectTable

Field	Data Type	Key	Not Null	Units	Description
hsectID	mediumint, unsigned	primary	X	unitless	Unique home sector identification number, auto_increment.
hsectString	varchar(20)		X	unitless	String representation of the home sector ID read from the population files.

TABLE: Races

Field	Data Type	Key	Not Null	Units	Description
RaceID	tinyint	primary	X	unitless	Unique race identification number, auto_increment.
RaceDesc	varchar(50)			unitless	Long description of race.
ShortDesc	char(6)			unitless	Short description of race.

TABLE: TotPop

Field	Data Type	Key	Not Null	Units	Description
hsectID	mediumint, unsigned	primary	X	unitless	Unique home sector identification number.
Gender	char(1)	primary	X	unitless	Single character used to denote gender. Gender is read from the control file for each file processed.
RaceID	tinyint, unsigned	primary	X	unitless	Unique ID used to denote race. Race is read from the control file (or params file) for each file processed. The race string read is recorded on the TABLE: Races.
PopCnt	mediumint, unsigned			unitless	Total population count summed across all age bins for a given home sector.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(current as of August 2005)*

TABLE: AirDistricts

Field	Data Type	Key	Not Null	Units	Description
airdistrict_num	integer	primary	X	unitless	The air district to map into the TABLE: Sectors.
airlatitude	double			degrees	The latitude of the air district.
airlongitude	double			degrees	The longitude of the air district.
airname	string			unitless	The name of the air district.
StudyAreaID	integer	foreign	X	unitless	The study area identifier.

TABLE: Chemicals

Field	Data Type	Key	Not Null	Units	Description
chemical_num	integer	primary		unitless	The chemical ID used for the chemical modeled in the run.
cas	varchar(50)			unitless	The CAS number.
pollutant	varchar(100)			unitless	The pollutant name.

TABLE: CompleteCheck

Field	Data Type	Key	Not Null	Units	Description
isComplete	boolean		X	unitless	Indicates whether the database is complete or not.

TABLE: Counties

Field	Data Type	Key	Not Null	Units	Description
StudyAreaID			X	unitless	The study area identifier.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: Counties					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
CountyFIPS	varchar(5)	primary		unitless	The county FIPS code.

TABLE: Facilities					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
FacilityID	integer	primary	X	unitless	The unique identifier for the facility.
FacilityName	varchar(80)			unitless	The facility name.
Location Description	varchar(120)			unitless	Some description or coordinates of location.
Latitude	double			degrees	The location latitude of the facility. This could be the same as the location in TABLE: RunParams.
Longitude	double			degrees	The location longitude of the facility. This could be the same as the location in TABLE: RunParams
StudyAreaID	integer		X	unitless	The study area ID.

TABLE: OutputUnits					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
Output	varchar(15)		X		The output name.
Units	varchar(30)		X		The units of output.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: Persons					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
RunID	integer	foreign	X	unitless	The unique identifier for the model run in which this person is used.
PersonID	integer	primary	X	unitless	The unique identifier for the person in the run.
HSect	integer			unitless	The sector number the person's home is in.
WSect	integer			unitless	The sector number where the person works.
HDis	integer			unitless	The district number the person's home is in.
WDis	integer			unitless	The district number where the person works.
Zone	integer			unitless	The zone which the person is in.
DGRP	integer			unitless	The demographic group number (1-11).
Age	integer			years	The age of the person.
Gender	varchar(1)			unitless	The gender of the person.
Race	tinyint			unitless	The race identifier of the person (see TABLE: Races)
Empl	boolean			unitless	Whether the person is employed.
Stove	boolean			unitless	Whether the person has a gas stove.
Pilot	boolean			unitless	Whether the gas stove has a pilot flame.
ACHom	boolean			unitless	Whether the person has AC at home.
ACCar	boolean			unitless	Whether the person has AC in her car.
Height	double			inches	The person's height.
Weight	double			pounds	The person's weight.
Hemoglob	double			g/mL	The hemoglobin content of the person's blood stream.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: Persons					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
Diffus	double			mL/min/ torr	Lung diffusivity parameter.
RMR	double			kcal/min	Resting metabolic rate.
BloodVol	double			mL	The volume of blood in the person's body.
Endgn1	double			mL/min	Endogenous CO production rate.
Endgn2	double			mL/min	Endogenous CO production rate used only for women between ages of 12 and 50 for half the menstrual cycle.
VEinter	double				Related to the new algorithm for total ventilation rate VE.
VEslope	double				Related to the new algorithm for total ventilation rate VE.
VEresid	double				Related to the new algorithm for total ventilation rate VE.
recnum	integer		X	unitless	The record number for the person in the particular run.

TABLE: PopulationFiles					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
RunID	integer	primary	X	unitless	The run identification number for these results.
PopFileName	varchar(5)	primary		unitless	The name of the population file.
PopFileLocation	varchar(255)			unitless	The location of the population file.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: Races					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
RaceID	tinyint	primary	X	unitless	The race identifier.
ShortDesc	char(5)			unitless	The short race description.
RaceDesc	varchar(30)			unitless	The long race description.

TABLE: Results					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
RunID	integer	foreign	X	unitless	The run identification number for these results.
PersonID	integer	primary	X	unitless	The unique identifier for this person in the run.
_Events	integer			unitless	The number of events.
AvgExp	double			ppm or µg/m^3	The average exposure for the person.
AvgDose	double			blood % COHb level	The average dose for the person.
MaxExp	double			ppm or µg/m^3	The maximum exposure for the person.
MaxDose	double			blood % COHb level	The maximum dose for the person.
chemical_num	integer	primary		unitless	The chemical ID used for the chemical modeled in this run.
Risk_timestep	integer	primary			The risk timestep for the run.
SourceTypeID	integer	primary		unitless	The sourcetype ID used for the sources in this run.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: Results					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
FacilityID	integer	primary		unitless	The facility ID used to uniquely identify each facility.
StudyAreaID	integer	foreign		unitless	The identifier for the study area. The study area ID is also included in the TABLE: Facilities and the TABLE: RunParams.

TABLE: RunParams					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
RunID	integer	primary	X	unitless	The run identification number for these results.
sectors_file	varchar(255)			unitless	The location of the sector file.
districts_file	varchar(255)			unitless	The location of the district file.
zones_file	varchar(255)			unitless	The location of the zone file.
employment_file	varchar(255)			unitless	The location of the employment file.
commuting_file	varchar(255)			unitless	The location of the commuting file.
temperature_file	varchar(255)			unitless	The location of the temperature file.
air_quality_file	varchar(255)			unitless	The location of the air quality file.
metabolic_file	varchar(255)			unitless	The location of the metabolic file.
physiology_file	varchar(255)			unitless	The location of the physiology file.
ventilation_file	varchar(255)			unitless	The location of the ventilation file.
distribution_file	varchar(255)			unitless	The location of the distribution file.
microenv_file	varchar(255)			unitless	The location of the microenvironment file.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: RunParams					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
diaryevent_file	varchar(255)			unitless	The location of the diary event file.
diarysum_file	varchar(255)			unitless	The location of the diary sum file.
diarymap_file	varchar(255)			unitless	The location of the diary map file.
log_file	varchar(255)			unitless	The location of the output log file.
exposure_file	varchar(255)			unitless	The location of the output exposure file.
dose_file	varchar(255)			unitless	The location of the output dose file.
persons_file	varchar(255)			unitless	The location of the output persons file.
microsum_file	varchar(255)			unitless	The location of the MicroSum output file.
tables_file	varchar(255)			unitless	The location of the output tables file.
site_file	varchar(255)			unitless	The location of the sites file.
InputUnits	varchar(50)			ppm or µg/m^3	The input units for the pollutant value.
OutputUnits	varchar(100)			ppm or µg/m^3	The output units for the pollutant value.
scenario	integer			unitless	The scenario name.
_profiles	integer			unitless	The number of profiles.
_micros	integer			unitless	The number of micros.
_sources	date/time			unitless	The number of sources.
start_date	date/time			unitless	The start date for the model run.
end_date	double			unitless	The end date for the model run.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: RunParams					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
Latitude	double			degrees	The latitude of the modeling domain.
Longitude	double			degrees	The longitude of the modeling domain.
CityRadius	double			km	The radius of the city being modeled.
AirRadius	double			km	The radius of the air district.
ZoneRadius	double			km	The radius of the temperature zone.
CountyList	varchar(5)			unitless	Switch to determine if modeling area contains counties.
Commuting	varchar(5)			unitless	Whether commuting should be considered.
AgeMin	integer			years	The minimum age of the population being modeled.
AgeMax	integer			years	The maximum age of the population being modeled.
DSTadjust	varchar(5)			unitless	Whether to account for daylight savings time (DST).
HourlyOut	varchar(5)			unitless	Whether output is hourly.
DoDose	varchar(5)			unitless	Whether to consider dose calculations.
rollback	varchar(5)			unitless	Whether rollback adjustments are performed.
RBtarget	double			ppm or $\mu g/m^3$	Rollback target concentration.
RBbackgnd	double			ppm or $\mu g/m^3$	Rollback background concentration.
RBmax	double			ppm or $\mu g/m^3$	Rollback maximum concentration.
PPMFact	double			unitless	A factor to convert from PPM to other units.
MissGender	double			unitless	Probability of missing gender information.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: RunParams					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
MissEmpl	double			unitless	Probability of missing employment information.
MissAge	double			unitless	Probability of missing age information.
AgeCutPct	double			unitless	Primary age window width.
Age2Probab	double			unitless	Shoulder age window width.
Altitude	double			feet	The region altitude.
COHbFact	double			unitless	COHb convergence factor.
AlertThresh	double			unitless	Pollutant notification threshold.
DebugLevel	integer			unitless	The debug setting for this APEX run.
RandomSeed	integer			unitless	The random seed used for this modeling run.
KeepLeavers	varchar(5)			unitless	Whether persons who commute to destinations outside the study area are included in the modeled population.
LeaverMult	double			unitless	Multiplicative factor for city-wide average concentration, applied when working outside study area (only used if KeepLeavers = yes).
LeaverAdd	double			unitless	Additive term applied when working outside study area (only used if KeepLeavers = yes).
EventsOut	varchar(5)			unitless	Whether to produce events output file.
EventSample	integer			unitless	The number of persons written to the EVENTS file.
LogDistrict	varchar(5)			unitless	Whether to log districts information.
LogPopulate	varchar(5)			unitless	Whether to log population information.
LogProfiles	varchar(5)			unitless	Whether to log profile information.
LogSectors	varchar(5)			unitless	Whether to log sectors information.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: RunParams					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
LogTables	varchar(5)			unitless	Whether to write all tables to log (as well as Tables file).
LogZones	varchar(5)			unitless	Whether to log zones information.
VAOutput	varchar(5)			unitless	Whether to write VA values to the events output file.
MSumOut	varchar(5)			unitless	Whether to produce MSUM output file.
CustomSample	varchar(5)			unitless	Provides an option to write out events for user-specified profiles.
chemical_num	integer	foreign	X	unitless	The chemical ID used for the chemical modeled in this run.
risk_timestep	integer				The risk time step for the run.
StudyAreaID	integer	foreign	X	unitless	The study area identifier (linked from the TABLE: StudyAreas).

TABLE: Sectors					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
sector_num	integer	primary	X	unitless	The sector ID to link to the Hsect and Wsect fields in the TABLE: Persons.
StudyAreaID	integer	foreign	X	unitless	The study area identifier.
Latitude	double			degrees	The latitude of the sector.
Longitude	double			degrees	The longitude of the sector.
sectorname	string			unitless	The name of the sector (census tract ID).
hsectID	mediumint		X	unitless	The home sector ID to map into the APEX Population database.
airdistrict_num	integer			unitless	The air district in which this sector lies.
airdistance	double			km	The distance of this sector from the air monitoring station.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: Sectors					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
tempzone_num	integer			unitless	The temperature monitoring zone in which this sector lies.
tempdistance	double			km	The distance of this sector from the temperature monitoring station.

TABLE: Source Types					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
SourceTypeID	integer	primary	X	unitless	The unique identifier for the source type (e.g., quenching, door leaks, etc.).
SourceTypeName	varchar(80)			unitless	The name of the source type.

TABLE: StudyAreas					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
StudyAreaID	integer	primary	X	unitless	The unique identifier for the study area.
StudyAreaName	varchar(80)			unitless	The study area name. (Assumes that the location provided in the params file is the study area name.)
Location Description	varchar(120)			unitless	The longer description for the study area/location.

TABLE: Summary					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
RunID	integer	primary	X	unitless	The unique identifier for this run.
RandomSeed	integer			unitless	The random seed used for this modeling run.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: Summary					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
_profiles	integer			unitless	The number of profiles.
start_date	date/time			unitless	The start date of the model run.
end_date	date/time			unitless	The end date of the model run.
risk_timestep	integer				The risk timestep for the run.
chemical_num	integer	foreign	X	unitless	The chemical ID used for the chemical modeled in this run.
CAS	varchar(50)			unitless	The CAS number.
StudyAreaID	integer	foreign	X	unitless	The study area ID (linked from TABLE: StudyAreas).
StudyAreaName	varchar(80)			unitless	The study area name. (Assumes that the location provided in the params file is the study area name.)
FacilityID	integer	foreign	X	unitless	The unique identifier for the facility
FacilityName	varchar(80)			unitless	The facility name.
SourceTypeID	integer	foreign	X	unitless	The unique identifier for the source type (e.g., quenching, door leaks, etc.).
SourceTypeName	varchar(80)			unitless	The name of the source type.
Params_File	varchar(255)			unitless	The location of the params file used in this run.

TABLE: TempZones					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
tempzone_num	integer	primary	X	unitless	The temperature zone ID to map into the TABLE: Sectors.
templatitude	double			degrees	The latitude for the temperature zone.
templongitude	double			degrees	The longitude for the temperature zone.

Exhibit F-2. Schema for TRIM.Expo$_{Inhalation}$ MySQL Database *(continued)*

TABLE: TempZones					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
tempname	string			unitless	The name of the temperature zone.
StudyAreaID	integer	foreign	X	unitless	The study area identifier.

Exhibit F-3. Schema for TRIM.Risk MySQL Database for TRIM.Expo-derived Data *(current as of August 2005)*

TABLE: cancer_risk

Field	Data Type	Key	Not Null	Units	Description
recnum	int	primary	X	unitless	Auto_increment.
p_recnum	int		X	unitless	Recnum from input file.
run_id	int		X	unitless	RunID from input file.
person_num	unsigned int		X	unitless	Person from input file.
year_num	unsigned smallint		X	year	Risk_timestep from input file.
hsect	unsigned int		X	unitless	Hsect from input file.
StudyAreaID	unsigned smallint			unitless	Link to TABLE: StudyAreas.
FacilityID	unsigned smallint			unitless	Link to TABLE: Facilities.
SourceTypeID	unsigned smallint			unitless	Link to TABLE: SourceTypes.
chemical_num	unsigned smallint		X	unitless	Link to TABLE: Chemicals.
risk_value	float		X	CR per year exposure	Excess lifetime cancer risk resulting from modeled year of exposure.

TABLE: chemicals

Field	Data Type	Key	Not Null	Units	Description
chemical_num	unsigned smallint	primary	X	unitless	Internal chemical number.
CAS	varchar(20)		X	unitless	CAS number, link to human health toxicity database.
ChemName	varchar(80)			unitless	Name of chemical.

Exhibit F-3. Schema for TRIM.Risk MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: control

Field	Data Type	Key	Not Null	Units	Description
control_info	varchar(40)	primary	X	unitless	Informational description of control line.
control_value	varchar(190)			unitless	Value of item described by control_info.

TABLE: Facilities

Field	Data Type	Key	Not Null	Units	Description
FacilityID	unsigned smallint	primary	X	unitless	Facility ID.
FacilityName	varchar(80)			unitless	Name of facility.
LocationDescription	varchar(120)			unitless	Location of facility.
Latitude	float			degrees	Latitude of facility.
Longitude	float			degrees	Longitude of facility.
StudyAreaID	unsigned smallint			unitless	Link to TABLE: StudyAreas.

TABLE: noncancer_risk

Field	Data Type	Key	Not Null	Units	Description
recnum	int	primary	X	unitless	Auto_increment.
p_recnum	int		X	unitless	Recnum from input file.
run_id	int		X	unitless	RunID from input file.
person_num	unsigned int		X	unitless	Person from input file.
year_num	unsigned smallint		X	year	Risk_timestep from input file.

Exhibit F-3. Schema for TRIM.Risk MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: noncancer_risk

Field	Data Type	Key	Not Null	Units	Description
hsect	unsigned int		X	unitless	Hsect from input file.
StudyAreaID	unsigned smallint			unitless	Link to TABLE: StudyAreas.
FacilityID	unsigned smallint			unitless	Link to TABLE: Facilities.
SourceTypeID	unsigned smallint			unitless	Link to TABLE: SourceTypes.
chemical_num	unsigned smallint		X	unitless	Link to TABLE: Chemicals.
risk_value	float		X	chronic HQ per year exposure	Chronic HQ for modeled year of exposure.

TABLE: outputunits

Field	Data Type	Key	Not Null	Units	Description
Output	varchar(15)	primary	X	unitless	"cancer_risk" or "non-cancer_risk"
Units	varchar(30)		X	unitless	Units associated with this output.

TABLE: races

Field	Data Type	Key	Not Null	Units	Description
RaceID	tinyint	primary	X	unitless	Link to TABLE: Races input values.
RaceDesc	varchar(20)			unitless	Full race description.
ShortDesc	varchar(6)		X	unitless	Short race description.

Exhibit F-3. Schema for TRIM.Risk MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: sectors

Field	Data Type	Key	Not Null	Units	Description
hsect	unsigned int	primary	X	unitless	ID of home sector.
sectorName	varchar(50)		X	unitless	Name of home sector.

TABLE: SourceTypes

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	unsigned smallint	primary	X	unitless	ID of type of source.
SourceTypeName	varchar(80)			unitless	Name of source.

TABLE: StudyAreas

Field	Data Type	Key	Not Null	Units	Description
StudyAreaID	unsigned smallint	primary	X	unitless	ID of study area.
StudyAreaName	varchar(80)			unitless	Name of study area.
LocationDescription	varchar(120)			unitless	Description of study area location.

TABLE: times

Field	Data Type	Key	Not Null	Units	Description
recnum	unsigned tinyint	primary	X	unitless	Record number.
begtime	datetime			unitless	Time stamp database creation (beginning of module).
endtime	datetime			unitless	Time stamp end of module execution (successful completion only).

Exhibit F-3. Schema for TRIM.Risk MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: acr

Field	Data Type	Key	Not Null	Units	Description
person_num	integer, unsigned	primary	X	unitless	Person number.
hsect	integer, unsigned		X	unitless	Home sector number.
age	tinyint, unsigned		X	years	Age of modeled individual.
gender	char(1)		X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint		X	unitless	Race number (link to TABLE: Races), 0=sum across races.

TABLE: acr_risk

Field	Data Type	Key	Not Null	Units	Description
person_num	integer, unsigned	primary	X	unitless	Person number.
StudyAreaID	smallint, unsigned	primary	X	unitless	ID of study area containing this person's home sector.
FacilityID	smallint, unsigned	primary	X	unitless	Facility ID.
SourceTypeID	smallint, unsigned	primary	X	unitless	Source type ID.
chemical_num	smallint, unsigned	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	tinyint, unsigned	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
year_num	smallint, unsigned	primary	X	unitless	Year.
risk_value	float			CR per year exposure	Excess lifetime cancer risk per modeled individual resulting from one year of inhalation exposure.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(current as of September 2005)*

TABLE: agebins

Field	Data Type	Key	Not Null	Units	Description
agebin_num	tinyint, unsigned	primary	X	unitless	Number of this age bin.
max_age	tinyint, unsigned		X	unitless	Maximum age for this bin.
duration	tinyint, unsigned		X	unitless	Number of years contained in this bin.
RType	tinyint, unsigned	primary	X	unitless	C=Cancer, NC=Non-cancer

TABLE: ahq

Field	Data Type	Key	Not Null	Units	Description
person_num	unsigned int	primary	X	unitless	Person number.
hsect	unsigned int		X	unitless	Home sector number.
age	unsigned tinyint		X	years	Age of modeled individual.
gender	char(1)		X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint		X	unitless	Race number (link to TABLE: Races), 0=sum across races.

TABLE: ahq_risk

Field	Data Type	Key	Not Null	Units	Description
risk_value	float			CR per year exposure	Excess lifetime cancer risk per modeled individual resulting from one year of inhalation exposure.
person_num	unsigned int	primary	X	unitless	Person_num from input file.
StudyAreaID	unsigned smallint	primary	X	unitless	ID of study area containing this person's home sector.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: ahq_risk

Field	Data Type	Key	Not Null	Units	Description
FacilityID	unsigned smallint	primary	X	unitless	Facility ID.
SourceTypeID	unsigned smallint	primary	X	unitless	Source number.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: organs), 0 if sum across target organs.
year_num	unsigned smallint	primary	X	unitless	Analysis year.
risk_value	float			chronic HQ per year exposure	Chronic non-cancer HQ per modeled individual resulting from one year of inhalation exposure.

TABLE: chemicals

Field	Data Type	Key	Not Null	Units	Description
chemical_num	unsigned smallint	primary	X	unitless	Internal chemical number.
CAS	varchar(20)		X	unitless	CAS number, link to human health toxicity database.
ChemName	varchar(80)			unitless	Name of chemical.
isCancer	bool		X	unitless	Boolean for cancer-causing.
isNoncancer	bool		X	unitless	Boolean for non-cancer-causing.
Woe_id	unsigned smallint		X	unitless	Weight-of-evidence code (link to TABLE: woes).
TargetOrgan_ID	unsigned smallint	primary	X	unitless	Name of target organ for this chemical.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: control

Field	Data Type	Key	Not Null	Units	Description
control_info	varchar(40)	primary	X	unitless	Informational description of control line.
control_value	varchar(190)			unitless	Value of item described by control_info.

TABLE: critical_effects

Field	Data Type	Key	Not Null	Units	Description
CAS	varchar(20)	primary	X	unitless	CAS number, link to human health toxicity database.
ChemName	varchar(80)			unitless	Name of chemical.
BenchmarkType	boolean	primary	X	unitless	Type of benchmark from human health toxicity database.
TargetOrgan_ID	boolean	primary	X	unitless	Target organ for this chemical/benchmark/ critical effects, link to TABLE: organs.
Critical_Effect	unsigned smallint			unitless	Description of critical effect(s).
Benchmark_Src	unsigned smallint			unitless	Source for this benchmark.

TABLE: Facilities

Field	Data Type	Key	Not Null	Units	Description
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility.
FacilityName	varchar(80)			unitless	Name of this facility.
LocationDescription	varchar(120)			unitless	Descriptive location of this facility.
Latitude	float			degrees	Latitude of facility in decimal degrees.
Longitude	float			degrees	Longitude of facility in decimal degrees.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: Facilities

Field	Data Type	Key	Not Null	Units	Description
StudyAreaID	unsigned smallint			unitless	Number of study area that contains this facility.

TABLE: Gender

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer
GenderID	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.

TABLE: geo_xref[a]

Field	Data Type	Key	Not Null	Units	Description
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
hsect	unsigned int	primary	X	unitless	Home sector number.

[a] Note: geo_xref_nc has the same database structure as geo_xref.

TABLE: hbf[b]

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: hbf[b]					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Target organ number (link to TABLE: organs), 0 if sum across target organ.
bin_num	unsigned tinyint	primary	X	unitless	Number of this hazard bin.
num_people	unsigned int			# persons	Number of people in this demographic group with HQ/HI belonging to this hazard bin.

[b] Note: hbf_l and hbf_7_l have the same database structure as hbf.

TABLE: hbf_lt[c]					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
RP_percentile	char(4)	primary	X	unitless	Residency period percentile.
agebin_num	unsigned tinyint	primary	X	unitless	Age bin number (link to TABLE: agebins).
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: chemicals), 0 if sum across chemicals.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: hbf_lt[c]					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
organ_num	unsigned smallint	primary	X	unitless	Target organ number (link to TABLE: organs), 0 if sum across target organs.
bin_num	unsigned tinyint	primary	X	unitless	Number of this hazard bin.
num_people	unsigned int			# persons	Number of people in this demographic group with HQ/HI belonging to this hazard bin.

[c] Note: hbf_7_lt has the same database structure as hbf_lt.

TABLE: hq_l[d]					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
year_num	unsigned smallint	primary	X	unitless	Analysis year.
hsect	unsigned int	primary	X	unitless	Home sector ID.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals, 0=sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: Organs), 0=sum across target organs.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: hq_l[d]

Field	Data Type	Key	Not Null	Units	Description
risk_value	float		X	chronic HQ/yr exposure	Chronic HQ estimate resulting from 70-year inhalation exposure.

[d] Note: max7hq_l has the same database structure as hq_l.

TABLE: hq_lt[e]

Field	Data Type	Key	Not Null	Units	Description
RP_Percentile	char(4)	primary	X	percentile	Residency period percentile.
agebin_num	unsigned tinyint	primary	X	unitless	Age bin number (link to TABLE: agebins).
year_num	unsigned smallint	primary	X	unitless	Analysis year.
hsect	unsigned int	primary	X	unitless	Home sector ID.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.

[e] Note: max7hq_lt has the same database structure as hq_lt.

TABLE: lcr

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: lcr

Field	Data Type	Key	Not Null	Units	Description
hsect	unsigned int	primary	X	unitless	Home sector ID.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
risk_value	float		X	CR per lifetime exposure	Excess lifetime cancer risk per constructed individual resulting from lifetime inhalation exposure.

TABLE: lcr_lt

Field	Data Type	Key	Not Null	Units	Description
RP_Percentile	char(4)	primary	X	percentile	Residency period percentile.
agebin_num	unsigned tinyint	primary	X	unitless	Age bin number (link to TABLE: agebins).
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: lcr_lt

Field	Data Type	Key	Not Null	Units	Description
hsect	unsigned int	primary	X	unitless	Home sector ID.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
risk_value	float		X	CR per exposure period	Excess lifetime cancer risk per constructed individual resulting from inhalation exposure based on residency period percentile and age bin.

TABLE: metrics

Field	Data Type	Key	Not Null	Units	Description
metric_num	tinyint	primary	X	unitless	Number of risk metric (1 … n).
metric_desc	varchar(9)		X	unitless	Code description of metric.
genders	char(4)			unitless	Concatenated genders.
races	text			unitless	Concatenated race IDs.
chemicals	text			unitless	Concatenated CAS numbers.
units	varchar(30)			unitless	Units for this metric.
description	text			unitless	Description of metric including selected percentile and demographic/chemical/organ selection.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: organs

Field	Data Type	Key	Not Null	Units	Description
organ_num	unsigned tinyint	primary	X	unitless	Internal target organ number.
organ_name	varchar(20)			unitless	Name of target organ.
cas_list	text			unitless	List of CAS numbers for chemicals with this target organ.

TABLE: pahq

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
hsect	unsigned int	primary	X	unitless	Home sector ID.
studyareaid	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
facilityid	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
sourcetypeid	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
raceid	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: organs), 0 if sum across target organs.
risk_value	float			chronic HQ/yr exposure	Chronic HQ resulting from 1 year inhalation exposure.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: phd[f]

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: Organs), 0 if sum across target organs.
hsect	unsigned int	primary	X	unitless	Home sector ID.
num_people	unsigned int		X	# people	Number of people in this demographic group in this home sector.
risk_value	float		X	unitless	HQ/HI for this demographic group in this home sector.
percentage	float		X	per hundred	Percentage of total demographic group in this home sector.
cum_percentile	float		X	NA	After ranking lowest to highest risk, cumulative percentile for this demographic group in this home sector.
rank	int		X	unitless	1 … number of home sectors where 1 has lowest risk_value.

[f] Note: phd_l and phd_7_l have the same database structure as phd.

TABLE: phd_lt[g]

Field	Data Type	Key	Not Null	Units	Description
RP_Percentile	char(4)	primary	X	percentile	Residency period percentile.
agebin_num	unsigned tinyint	primary	X	unitless	Age bin number (link to TABLE: agebins).

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: phd_lt[g]

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: Organs), 0 if sum across target organs.
hsect	unsigned int	primary	X	unitless	Home sector ID.
num_people	unsigned int		X	# people	Number of people in this demographic group in this home sector.
risk_value	float		X	unitless	HQ/HI for this demographic group in this home sector.
percentage	float		X	per hundred	Percentage of total demographic group in this home sector.
cum_percentile	float		X	NA	After ranking lowest to highest risk, cumulative percentile for this demographic group in this home sector.
rank	int		X	unitless	1 … number of home sectors where 1 has lowest risk_value.

[g] Note: phd_7_lt has the same database structure as phd_lt.

TABLE: prd

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: prd

Field	Data Type	Key	Not Null	Units	Description
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
hsect	unsigned int	primary	X	unitless	Home sector ID.
num_people	unsigned int		X	# people	Number of people in this demographic group in this home sector.
risk_value	float		X	CR per lifetime exposure	Risk value for this demographic group in this home sector.
percentage	float		X	per hundred	Percentage of total demographic group in this home sector.
cum_percentile	float		X	NA	After ranking lowest to highest risk, cumulative percentile for this demographic group in this home sector.
rank	int		X	unitless	1 … number of home sectors where 1 has lowest risk_value.

TABLE: prd_lt

Field	Data Type	Key	Not Null	Units	Description
RP_Percentile	char(4)	primary	X	percentile	Residency period percentile.
agebin_num	unsigned tinyint	primary	X	unitless	Age bin number (link to TABLE: agebins).
year_num	unsigned smallint	primary	X	unitless	Analysis year.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: prd_lt

Field	Data Type	Key	Not Null	Units	Description
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
hsect	unsigned int	primary	X	unitless	Home sector ID.
num_people	unsigned int		X	# people	Number of people in this demographic group in this home sector.
risk_value	float		X	CR per exposure period	Risk value for this demographic group in this home sector based on residency period and age bin.
percentage	float		X	per hundred	Percentage of total demographic group in this home sector.
cum_percentile	float		X	NA	After ranking lowest to highest risk, cumulative percentile for this demographic group in this home sector.
rank	int		X	unitless	1 … number of home sectors where 1 has lowest risk_value.

TABLE: races

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer
RaceID	tinyint	primary	X	unitless	Race number.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: races

Field	Data Type	Key	Not Null	Units	Description
RaceDesc	varchar(20)			unitless	Full description of race.
ShortDesc	char(6)			unitless	Short description of race.

TABLE: rbf

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
bin_num	unsigned tinyint	primary	X	unitless	Number of this risk bin.
num_people	unsigned int			# people	Number of people of this demographic group with risk value belonging to this risk bin.

TABLE: rbf_lt

Field	Data Type	Key	Not Null	Units	Description
RP_Percentile	char(4)	primary	X	percentile	Residency period percentile.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: rbf_lt

Field	Data Type	Key	Not Null	Units	Description
agebin_num	unsigned tinyint	primary	X	unitless	Age bin number (link to TABLE: agebins).
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
bin_num	unsigned tinyint	primary	X	unitless	Number of this risk bin.
num_people	unsigned int			# people	Number of people of this demographic group with risk value belonging to this risk bin.

TABLE: riskbins

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer
bin_num	unsigned tinyint	primary	X	unitless	Number of this bin.
max_value	unsigned float		X	CR or chronic HQ per year exposure	Maximum value for this bin.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: sci

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area, link to TABLE: StudyAreas.
FacilityID	unsigned smallint	primary	X	unitless	Number of this facility, link to TABLE: Facilities.
SourceTypeID	unsigned smallint	primary	X	unitless	Number of this source, link to TABLE: SourceTypes.
hsect	unsigned int	primary	X	unitless	Home sector ID.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
sci_ann	float		X	cancer incidence	Statistical cancer incidence estimates based on excess lifetime cancer risk resulting from 1 year inhalation exposure.
sci_nyrs	float		X	cancer incidence	Statistical cancer incidence estimates based on excess lifetime cancer risk resulting from nyrs years inhalation exposure.

TABLE: sectors

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer
hsect	unsigned int	primary	X	unitless	Hsect from input file.
sectorName	varchar(50)		X	unitless	Sector name from population file.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: SourceType

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	tinyint	primary	X	unitless	ID for source type.
SourceTypeName	varchar(100)		X	unitless	Name of source type (e.g., area, on-road mobile, etc.).

TABLE: StudyAreas

Field	Data Type	Key	Not Null	Units	Description
StudyAreaID	unsigned smallint	primary	X	unitless	Number of this study area.
StudyAreaName	varchar(80)			unitless	Descriptive name of this study area.
LocationDescription	varchar(120)			unitless	Descriptive location of this study area.

TABLE: Times

Field	Data Type	Key	Not Null	Units	Description
recnum	unsigned tinyint	primary	X	unitless	Record number.
begtime	datetime			unitless	Time stamp database creation (beginning of module).
endtime	datetime			unitless	Time stamp end of module execution (successful completion only).

TABLE: woes

Field	Data Type	Key	Not Null	Units	Description
Woe_ID	unsigned tinyint	primary	X	unitless	Weight-of-evidence code.
Woe_descrp	varchar(30)			unitless	Description of this weight-of-evidence classification.

Exhibit F-4. Schema for TRIM.Risk Metrics MySQL Database for TRIM.Expo-derived Data *(continued)*

TABLE: woes

Field	Data Type	Key	Not Null	Units	Description
cas_list	text			unitless	Concatenated list of CAS numbers for chemicals in the analysis that use this weight-of-evidence.

TABLE: years

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Selected analysis year.

Exhibit F-5. Schema for HAPEM County/State MySQL Database *(current as of April 2005)*

TABLE: censusyear

Field	Data Type	Key	Not Null	Units	Description
CensusYear	smallint, not null	primary	X	unitless	Census year that U/R designation is based on.

TABLE: dbdate

Field	Data Type	Key	Not Null	Units	Description
recnum	tinyint, not null	primary	X	unitless	Record number.
dbdate	datetime		X	unitless	Date and time database was last created or modified.

TABLE: hapem_info

Field	Data Type	Key	Not Null	Units	Description
State	varchar(75), not null		X	unitless	State name.
County	varchar(75), not null		X	unitless	County Name.
Urban_Rural	char(1), not null		X	unitless	U = Urban, R = Rural
State_County	varchar(10), not null	primary	X	unitless	String representation of 5-digit FIPS (2 for state and 3 for county - leading zeros included).

Exhibit F-6. Schema for HAPEM PostProcessor MySQL Database *(current as of April 2005)*

TABLE: AgeBins

Field	Data Type	Key	Not Null	Units	Description
agebin	tinyint	primary	X	unitless	Unique age bin identification number, auto_increment.
start_age	tinyint			unitless	Starting age (or minimum age) of the age bin.
end_age	tinyint			unitless	Ending age (or minimum age) of the age bin.

TABLE: chemicals

Field	Data Type	Key	Not Null	Units	Description
chemical_num	int	primary	X	unitless	Unique chemical identification number, auto_increment.
CAS	varchar (20)			unitless	Formatted CAS number.
SAROAD	varchar (10)		X	unitless	Storage and Retrieval of Aerometric Data (SAROAD) pollutant identification number.
Pollutant	varchar (100)			unitless	Pollutant description as maintained in the human health toxicity database, saroad_xref table. Read from control file.

TABLE: counties

Field	Data Type	Key	Not Null	Units	Description
county_id	mediumint unsigned	primary	X	unitless	Integer representation of 5-digit FIPS.
state_county_string	varchar(10)		X	unitless	String representation of 5-digit FIPS (leading zeros included).
county_name	varchar (75)		X	unitless	Name of county.
state_id	tinyint		X	unitless	2-digit FIPS, link to TABLE: state.
urban_rural_id	tinyint		X	unitless	1=urban, 2=rural (default is rural).

Exhibit F-6. Schema for HAPEM PostProcessor MySQL Database *(continued)*

TABLE: dbdate

Field	Data Type	Key	Not Null	Units	Description
rec_num	tinyint unsinged	primary	X	unitless	Record number for tracking when db is created and appended.
db_date	datetime		X	unitless	Datetime of when db was created or appended.

TABLE: demo_grp

Field	Data Type	Key	Not Null	Units	Description
demo_grp	tinyint	primary	X	unitless	Unique demographic group identification number, auto_increment.
gender	char(1)		X	unitless	Group gender definition M = male F = Female.
RaceID	tinyint		X	unitless	Unique race identifiaction number.
agebin	tinyint		X	unitless	Unique age bin identification number.

TABLE: files

Field	Data Type	Key	Not Null	Units	Description
fileName	char(30)	primary	X	unitless	Name of the *.dat file processed (HAPEM exposure data).
num_replicates	int		X	unitless	Number of replicates read from *.dat file header.
totalGroups	int		X	unitless	Number of total groups read from *.dat file header.
state_id	tinyint		X	unitless	2-digit FIPS.
SAROAD	varchar(10)		X	unitless	5 character string for SAROAD code from the file name.
AQYear	smallint		X	unitless	Year of Air Quality Data.
numOutdoor	smallint		X	unitless	Number of outdoor Air Source Categories.

Exhibit F-6. Schema for HAPEM PostProcessor MySQL Database *(continued)*

TABLE: files

Field	Data Type	Key	Not Null	Units	Description
rand_act	int		X	unitless	Random Seed for Activity Pattern.
rand_micro	int		X	unitless	Random Seed for Micro Factors.
rand_AQ	int		X	unitless	Random Seed for Air Quality Data.
num_indoor_prod	smallint		X	unitless	Total indoor product sources.
num_indoor_mat	smallint		X	unitless	Total indoor material sources.
num_indoor_combust	smallint		X	unitless	Total indoor combustion sources.
num_vehicle	smallint		X	unitless	Vehicle emission in resid. garage.
EPA_region_indoor	smallint		X	unitless	EPA Region.

TABLE: hsectTable

Field	Data Type	Key	Not Null	Units	Description
hsect	int	primary	X	unitless	Unique home sector identification number, auto_increment.
hsectString	varchar(15)		X	unitless	String of 11 digits (2 character state FIPS code + 3 character county FIPS code + 6 character tract ID).

TABLE: OutputUnits

Field	Data Type	Key	Not Null	Units	Description
Output	varchar(15)	primary	X	unitless	Variable name of the output field.
Units	varchar(30)		X	units	Units associated with the output field.

Exhibit F-6. Schema for HAPEM PostProcessor MySQL Database *(continued)*

TABLE: persons

Field	Data Type	Key	Not Null	Units	Description
RunID	int		X	unitless	Unique identification number for run (currently set to 1).
person	int		X	unitless	Unique identification number for people being modeled.
RaceID	tinyint		X	unitless	Unique race identification number.
chemical_num	smallint		X	unitless	Unique chemical identification number.
hsect	int		X	unitless	Unique home sector identification number.
state_id	tinyint		X	unitless	Integer representation of 2-digit FIPS.
county_id	mediumint		X	unitless	Integer representation of 5-digit FIPS (2 for state and 3 for county).
urban_rural_id	tinyint		X	unitless	(1 digit) 1=urban 2=rural (determined from HAPEM5 census information database).
SourceTypeID	tinyint		X	unitless	Unique identification number for sources being modeled.
risk_timestep	smallint		X	unitless	Unique identification number for time-step (currently identifies the AQYear).
demo_grp	tinyint		X	unitless	Unique group identification number.
pop_factor	float		X	unitless	HAPEM output: Number of people to which the exposure estimates in the data record apply, equal to the population of the group/tract combination divided by the number of replicates.
AvgExp	double		X	varies	HAPEM output for annual average exposure concentration. Units recorded on the OutputUnits table.
recnum	integer	primary	X	unitless	Record number, auto_increment.

TABLE: Races

Field	Data Type	Key	Not Null	Units	Description
RaceID	tinyint	primary	X	unitless	Unique race identification number, auto_increment.

Exhibit F-6. Schema for HAPEM PostProcessor MySQL Database *(continued)*

TABLE: Races

Field	Data Type	Key	Not Null	Units	Description
RaceDesc	varchar(20)			unitless	Long description of race.
ShortDesc	char(6)		X	unitless	Short description of race.

TABLE: SourceTypes

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	tinyint	primary	X	unitless	Unique identification number for sources being modeled.
SourceType_name	varchar (100)		X	unitless	Description of source type.

TABLE: states

Field	Data Type	Key	Not Null	Units	Description
state_id	tinyint	primary	X	unitless	2-digit FIPS.
state_name	varchar (75)		X	unitless	Name of state.

TABLE: Urban_Rural

Field	Data Type	Key	Not Null	Units	Description
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural
Name	varchar(15)		X	unitless	Description of the IDs, "Urban" for 1 and "Rural" for 2.

Exhibit F-7. Schema for TRIM.Risk MySQL Database for HAPEM-derived Data *(current as of August 2005)*

TABLE: cancer_risk

Field	Data Type	Key	Not Null	Units	Description
recnum	int	primary	X	unitless	Auto_increment.
p_recnum	int		X	unitless	Recnum from input file.
run_id	int		X	unitless	RunID from input file.
person_num	unsigned int		X	unitless	Person from input file.
demo_grp	tinyint		X	unitless	Link to TABLE: demo_grp (demographic group).
year_num	unsigned smallint		X	year	Risk_timestep from input file.
hsect	unsigned int		X	unitless	Hsect from input file.
state_id	tinyint		X	unitless	Link to TABLE: states.
county_id	mediumint		X	unitless	Link to TABLE: counties.
urban_rural_id	tinyint		X	unitless	From persons.urban_rural_id in input database.
SourceTypeID	unsigned tinyint			unitless	Link to TABLE: SourceTypes.
chemical_num	unsigned smallint		X	unitless	Link to TABLE: Chemicals.
risk_value	float		X	CR per year exposure	Excess lifetime cancer risk resulting from modeled year of exposure.

TABLE: chemicals

Field	Data Type	Key	Not Null	Units	Description
chemical_num	unsigned smallint	primary	X	unitless	Internal chemical number.
CAS	varchar(20)		X	unitless	CAS number, link to human health toxicity database.
ChemName	varchar(80)			unitless	Name of chemical.

Exhibit F-7. Schema for TRIM.Risk MySQL Database for HAPEM-derived Data *(continued)*

TABLE: control

Field	Data Type	Key	Not Null	Units	Description
control_info	varchar(40)	primary	X	unitless	Informational description of control line.
control_value	varchar(190)			unitless	Value of item described by control_info.

TABLE: counties

Field	Data Type	Key	Not Null	Units	Description
county_id	unsigned mediumint	primary	X	unitless	ID of county.
county_name	varchar(75)			unitless	Name of county.
state_id	unsigned tinyint		X	unitless	Link to TABLE: states.
urban_rural_id	unsigned tinyint		X	unitless	From persons.urban_rural_id in input database.

TABLE: demo_grp

Field	Data Type	Key	Not Null	Units	Description
demo_grp	tinyint	primary	X	unitless	ID of demographic group; table loaded from demo_grp table in HAPEM post-processed database.
gender	char(1)		X	unitless	Gender.
RaceID	tinyint		X	unitless	Link to TABLE: Races.
agebin	tinyint		X	unitless	Assigned bin.

Exhibit F-7. Schema for TRIM.Risk MySQL Database for HAPEM-derived Data *(continued)*

TABLE: noncancer_risk

Field	Data Type	Key	Not Null	Units	Description
recnum	int	primary	X	unitless	Auto_increment.
p_recnum	int		X	unitless	Recnum from input file.
run_id	int		X	unitless	RunID from input file.
person_num	unsigned int		X	unitless	Person from input file.
demo_grp	tinyint		X	unitless	Link to TABLE: demo_grp (demographic group).
year_num	unsigned smallint		X	year	Risk_timestep from input file.
hsect	unsigned int		X	unitless	Hsect from input file.
state_id	tinyint		X	unitless	Link to TABLE: states.
county_id	mediumint		X	unitless	Link to TABLE: counties.
urban_rural_id	tinyint		X	unitless	From persons urban_rural_id in input database.
SourceTypeID	unsigned tinyint			unitless	Link to TABLE: SourceTypes.
chemical_num	unsigned smallint		X	unitless	Link to TABLE: Chemicals.
risk_value	float		X	chronic HQ per yr exposure	Chronic HQ for modeled year of exposure.

TABLE: outputunits

Field	Data Type	Key	Not Null	Units	Description
Output	varchar(15)	primary	X	unitless	"cancer_risk" or "non-cancer_risk"
Units	varchar(30)		X	unitless	Units associated with this output.

Exhibit F-7. Schema for TRIM.Risk MySQL Database for HAPEM-derived Data *(continued)*

TABLE: races

Field	Data Type	Key	Not Null	Units	Description
RaceID	tinyint	primary	X	unitless	Link to input race values.
RaceDesc	varchar(20)			unitless	Full race description.
ShortDesc	varchar(6)		X	unitless	Short race description.

TABLE: sectors

Field	Data Type	Key	Not Null	Units	Description
hsect	unsigned int	primary	X	unitless	ID of home sector.
sectorName	varchar(50)		X	unitless	Name of home sector.

TABLE: SourceTypes

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	unsigned smallint	primary	X	unitless	ID of type of source.
SourceTypeName	varchar(80)			unitless	Name of source.

TABLE: states

Field	Data Type	Key	Not Null	Units	Description
state_id	unsigned tinyint		X	unitless	ID of state.
state_name	varchar(75)			unitless	Name of state.

Exhibit F-7. Schema for TRIM.Risk MySQL Database for HAPEM-derived Data *(continued)*

TABLE: times					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
recnum	unsigned tinyint	primary	X	unitless	Record number.
begtime	datetime			unitless	Time stamp database creation (beginning of module).
endtime	datetime			unitless	Time stamp end of module execution (successful completion only).

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(current as of May 2005)*

TABLE: acr

Field	Data Type	Key	Not Null	Units	Description
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.
person_num	unsigned int	primary	X	unitless	Person_num from input file.
hsect	unsigned int	primary	X	unitless	Home sector (hsect from input file).
age	unsigned tinyint		X	years	Age of modeled individual.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: races), 0=sum across races.

TABLE: acr_risk

Field	Data Type	Key	Not Null	Units	Description
person_num	unsigned int	primary	X	unitless	Person_num from input file.
SourceTypeID	tinyint	primary	X	unitless	Source number.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	unsigned tinyint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes)
year_num	unsigned smallint	primary	X	unitless	Analysis year.
risk_value	float			CR per year exposure	Excess lifetime cancer risk per modeled individual resulting from one year of inhalation exposure.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: agebins

Field	Data Type	Key	Not Null	Units	Description
agebin_num	unsigned tinyint	primary	X	unitless	Number of this age bin.
max_age	unsigned tinyint		X	years	Maximum age for this bin.
duration	unsigned tinyint		X	years	Number of years contained in this bin.
RType	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer.

TABLE: ahq

Field	Data Type	Key	Not Null	Units	Description
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.
person_num	unsigned int	primary	X	unitless	Person_num from input file.
hsect	unsigned int	primary	X	unitless	Hsect from input file.
age	unsigned tinyint		X	years	Age of modeled individual.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0 if sum across races.

TABLE: ahq_risk

Field	Data Type	Key	Not Null	Units	Description
person_num	unsigned int	primary	X	unitless	Person_num from input file.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: ahq_risk

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	tinyint	primary	X	unitless	Source number.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: Organs), 0 if sum across target organs.
year_num	unsigned smallint	primary	X	unitless	Analysis year.
risk_value	float			chronic HQ per year exposure	Chronic non-cancer HQ per modeled individual resulting from one year of inhalation exposure.

TABLE: chemicals

Field	Data Type	Key	Not Null	Units	Description
chemical_num	unsigned smallint	primary	X	unitless	Internal chemical number.
CAS	varchar(20)		X	unitless	CAS number, link to human health toxicity database.
ChemName	varchar(80)			unitless	Name of chemical.
isCancer	bool		X	unitless	Boolean for cancer-causing.
isNoncancer	bool		X	unitless	Boolean for non-cancer-causing.
Woe_id	unsigned smallint		X	unitless	Weight-of-evidence code (link to TABLE: woes).
TargetOrgan_ID	unsigned smallint	primary	X	unitless	Name of target organ for this chemical.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: control

Field	Data Type	Key	Not Null	Units	Description
control_info	varchar(40)	X	X	unitless	Informational description of control line.
control_value	varchar(190)			unitless	Value of item described by control_info.

TABLE: counties

Field	Data Type	Key	Not Null	Units	Description
county_id	mediumint	X	X	unitless	ID for county, typically 5-digit FIPS code.
county_name	varchar(75)		X	unitless	Name of county.
state_id	tinyint		X	unitless	ID for state (link to TABLE: states).
urban_rural_id	tinyint		X	unitless	1=urban, 2=rural.

TABLE: critical effects

Field	Data Type	Key	Not Null	Units	Description
CAS	varchar(20)	primary	X	unitless	CAS number, link to human health toxicity database.
ChemName	varchar(80)			unitless	Name of chemical.
BenchmarkType	varchar(4)	primary	X	unitless	Type of benchmark from human health toxicity database.
TargetOrgan_ID	unsigned smallint	primary	X	unitless	Target organ for this chemical/benchmark/ critical effects, link to TABLE: organs.
Critical_Effect	varchar(100)			unitless	Description of critical effect(s).
Benchmark_Src	varchar(20)			unitless	Source for this benchmark.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: genders

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer
GenderID	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.

TABLE: hbf [h]

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural..
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0 if sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: Organs), 0 if sum across target organs.
bin_num	unsigned tinyint	primary	X	unitless	Number of this hazard quotient bin.
num_people	unsigned int			# people	Population count per user-specified hazard bin due to HQ resulting from inhalation exposure.

[h] Note: hbf_l and hbf_7_l have the same database structure as hbf.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: hq_l

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
hsect	unsigned int	primary	X	unitless	Hsect from input file.
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0 if sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: Organs), 0 if sum across target organs.
risk_value	float		X	chronic HQ/yr exposure	Chronic HQ estimate resulting from 70-year inhalation exposure.

TABLE: lcr

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
hsect	unsigned int	primary	X	unitless	Hsect from input file.
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: lcr

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0 if sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
Woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
risk_value	float		X	CR per lifetime exposure	Excess lifetime cancer risk per constructed individual resulting from lifetime inhalation exposure.

TABLE: max7hq_l

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
hsect	unsigned int	primary	X	unitless	Hsect from input file.
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0 if sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: max7hq_l

Field	Data Type	Key	Not Null	Units	Description
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: Organs), 0 if sum across target organs.
risk_value	float		X	chronic HQ/yr exposure	Maximum 7-year rolling average of HQ estimates resulting from 70-year inhalation exposure..

TABLE: metrics

Field	Data Type	Key	Not Null	Units	Description
metric_num	tinyint	primary	X	unitless	Number of risk metric (1 … n).
metric_desc	varchar(9)		X	unitless	Code description of metric.
genders	char(4)			unitless	Concatenated genders.
races	text			unitless	Concatenated race IDs.
chemicals	text			unitless	Concatenated CAS numbers.
units	varchar(30)			unitless	Units for this metric.
description	text			unitless	Description of metric including selected percentile and demographic/chemical/organ selection.

TABLE: organs

Field	Data Type	Key	Not Null	Units	Description
organ_num	unsigned tinyint	X	X	unitless	Internal target organ number.
organ_name	varchar(20)			unitless	Name of target organ.
cas_list	text			unitless	List of CAS numbers for chemicals with this target organ.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: pahq

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
hsect	unsigned int	primary	X	unitless	Hsect from input file.
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: races), 0 if sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: chemicals), 0 if sum across chemicals.
organ_num	unsigned smallint	primary	X	unitless	Organ number (link to TABLE: organs), 0 if sum across target organs.
risk_value	float.		X	chronic HQ/yr exposure	Chronic HQ resulting from 1 year inhalation exposure

TABLE: phd[i]

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: phd[i]

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to races), 0 if sum across races.

[i] Note: phd_l and phd_7_l have the same database structure as phd.

TABLE: prd

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0=sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0=sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
hsect	unsigned int	primary	X	unitless	Hsect from input file
num_people	unsigned int			people	Number of people of this demographic group in this home sector.
risk_value	float		X	CR per lifetime exposure	Risk value for this demographic group in this home sector.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: prd

Field	Data Type	Key	Not Null	Units	Description
percentage	float		X	per hundred	Percentage of total demographic group in this home sector.
cum_percentile	float		X	NA	After ranking lowest to highest risk, cumulative percentile for this demographic group in this home sector.
hsect_cum_percentile	float		X	NA	After ranking lowest to highest risk, cumulative percentile (ignoring population) for this demographic group in this home sector.
rank	int		X	unitless	1 … number of home sectors where 1 has lowest risk_value.

TABLE: races

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer
RaceID	tinyint	primary	X	unitless	Race number.
RaceDesc	varchar(20)			unitless	Full description of race.
ShortDesc	char(6)			unitless	Short description of race.

TABLE: rbf

Field	Data Type	Key	Not Null	Units	Description
year_num	unsigned smallint	primary	X	unitless	Analysis year.
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: rbf

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0 if sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
bin_num	unsigned tinyint	primary	X	unitless	Number of this cancer risk bin.
num_people	unsigned int			# people	Population count per user-specified risk bin due to excess individual lifetime cancer risk resulting from lifetime inhalation exposure.

TABLE: riskbins

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer
bin_num	unsigned tinyint	primary	X	unitless	Number of this bin.
max_value	unsigned float		X	CR or chronic HQ per year exposure	Maximum value for this bin.

TABLE: sci

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: sci

Field	Data Type	Key	Not Null	Units	Description
bin_num	unsigned tinyint	primary	X	unitless	Number of this bin.
year_num	unsigned smallint	primary	X	unitless	Analysis year.
hsect	unsigned int	primary	X	unitless	Hsect from input file.
state_id	tinyint	primary	X	unitless	State ID (link to states file), 0=sum across (national level).
county_id	mediumint	primary	X	unitless	County ID (link to counties file); usually FIPS code, 0=sum across (state level).
urban_rural_id	tinyint	primary	X	unitless	1=urban, 2=rural, 0=sum across urban/rural.
SourceTypeID	tinyint	primary	X	unitless	Source number.
gender	char(1)	primary	X	unitless	M=Male, F=Female, blank=sum across genders.
RaceID	tinyint	primary	X	unitless	Race number (link to TABLE: Races), 0 if sum across races.
chemical_num	unsigned smallint	primary	X	unitless	Chemical number (link to TABLE: Chemicals), 0 if sum across chemicals.
woe_id	unsigned smallint	primary	X	unitless	Weight-of-evidence code (link to TABLE: woes).
sci_ann	float		X	cancer incidence	Statistical cancer incidence estimates based on excess lifetime cancer risk resulting from 1 year inhalation exposure.
sci_nyrs	float		X	cancer incidence	Statistical cancer incidence estimates based on excess lifetime cancer risk resulting from nyrs years inhalation exposure.

TABLE: sectors

Field	Data Type	Key	Not Null	Units	Description
Rtype	char(2)	primary	X	unitless	C=Cancer, NC=Non-cancer
hsect	unsigned int	primary	X	unitless	Hsect from input file.
sectorName	varchar(50)		X	unitless	Sector name from population file.

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: SourceTypes

Field	Data Type	Key	Not Null	Units	Description
SourceTypeID	tinyint	primary	X	unitless	ID for source type.
SourceTypeName	varchar(100)		X	unitless	Name of source type (e.g., area, on-road mobile, etc.).

TABLE: states

Field	Data Type	Key	Not Null	Units	Description
state_id	tinyint	primary	X	unitless	State ID, 0=sum across (national level).
state_name	varchar(75)		X	unitless	Name of state.

TABLE: times

Field	Data Type	Key	Not Null	Units	Description
recnum	unsigned tinyint	primary	X	unitless	Record number.
begtime	datetime			unitless	Time stamp database creation (beginning of module).
endtime	datetime			unitless	Time stamp end of module execution (successful completion only).

TABLE: woes

Field	Data Type	Key	Not Null	Units	Description
Woe_ID	unsigned tinyint	primary	X	unitless	Weight-of-evidence code.
Woe_descrp	varchar(30)			unitless	Description of this weight-of-evidence classification.
cas_list	text			unitless	Concatenated list of CAS numbers for chemicals in the analysis that use this

Exhibit F-8. Schema for TRIM.Risk Metrics MySQL Database for HAPEM-derived Data *(continued)*

TABLE: woes					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
					weight-of-evidence.

TABLE: years					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
year_num	unsigned smallint	primary	X	unitless	Selected analysis year.

Exhibit F-9. Schema for Human Health Toxicity MySQL Database *(current as of May 2005)*

TABLE: dbdate					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
Recnum	tinyint, unsigned	primary	X	unitless	Record number.
Db_date	date/time		X	unitless	Date/time when database was created.

TABLE:hhbenchmark					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
CAS	varchar(20)	X	X	unitless	CAS number.
ChemName	varchar(50)			unitless	Chemical name.
ChemCSF	float			$(mg/kg/day)^{-1}$	Cancer slope factor.
ChemRFC	float			mg/m^3	Reference concentration.
ChemRFD	float			mg/kg/day	Reference dose.
ChemURF	float			$(\mu g/m^3)^{-1}$	Unit risk factor.
WOE_Inh	int	primary	X	unitless	Weight of evidence ID for inhalation..
WOE_Ing	int	primary	X	unitless	Weight of evidence ID for ingestion
TEF	float			unitless	
ChemBM	float			$(mg/kg/day)^{-1}$	Breast milk.
ChemBreastMilkExp	unsignedtinyint		X	unitless	Flag indicating whether or not this chemical has breast milk effects (1 = true, 0 = false).

Exhibit F-9. Schema for Human Health Toxicity MySQL Database *(continued)*

TABLE: hheffects

Field	Data Type	Key	Not Null	Units	Description
CAS	varchar(20)	primary	X	unitless	CAS number.
ChemName	varchar(50)			unitless	Chemical name.
BenchmarkType	varchar(4)	primary	X	unitless	Benchmark value (RfD, RfC, CSF, UR).
Benchmark_Src	varchar(20)			unitless	Source.
BenchmarkID	int			unitless	Link to ATHED database.
Critical_Effect	varchar(250)			unitless	Critical effect of this chemical/benchmark.
TargetOrgan_ID	int	primary	X	unitless	Primary target organ ID affected by this chemical/benchmark.

TABLE: organ_codes

Field	Data Type	Key	Not Null	Units	Description
TargetOrgan_ID	int	primary	X	unitless	Target organ ID.
TargetOrgan_Desc	varchar(20)			unitless	Description.

TABLE: saroad_xref

Field	Data Type	Key	Not Null	Units	Description
saroad	int	primary	X	unitless	SAROAD pollutant code.
parameter description	varchar(100)			unitless	Pollutant description.
CAS	varchar(20)		X	unitless	CAS number, NA if not known.

Exhibit F-9. Schema for Human Health Toxicity MySQL Database *(continued)*

TABLE: WOE_codes					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
WOE_ID	int	primary	X	unitless	Weight of evidence ID.
WOE_Desc	varchar(20)			unitless	Description.

Exhibit F-10. Schema for Residency Period MySQL Database *(current as of April 2005)*

TABLE: dbdate					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
Recnum	tinyint	primary	X	unitless	Record number.
Db_date	date/time		X	unitless	Date/time when database was created.

TABLE: ed_data					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
ED_tag	int	primary	X	unitless	1, 2 etc. label.
cohort_type	char(2)	primary	X	unitless	R = Resident, F = Farmer.
ED_type	varchar(5)	primary	X	unitless	Mean or percentile.
end_age	tinyint	primary	X	unitless	Ending age that period.
ED_cancer_value	tinyint		X	unitless	Exposure duration (residency period).

TABLE: res_period					
Field	**Data Type**	**Key**	**Not Null**	**Units**	**Description**
beg_age	tinyint	primary	X	unitless	Beginning age.
end_age	tinyint		X	unitless	Ending age.
duration	tinyint		X	unitless	Number of years in that age bracket.
res_per	tinyint	primary	X	unitless	Exposure duration (residency period).
percentile	char(4)		X	unitless	Mean or percentile.

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Appendix G
Troubleshooting

This Appendix includes troubleshooting tips for common problems encountered using the "Inhalation risk assessment using RfCs and UREs, with TRIM.Expo" and "Inhalation risk assessment using RfCs and UREs, with HAPEM" TRIM.Risk projects. Some of the tips describe known bugs. Permanent fixes to these bugs will be incorporated into a later version of TRIM.Risk, but for now these tips will aid users in getting around the bug. This Appendix is separated into sections based on the project components to aid the user in finding a tip.

G.1 Scenario Troubleshooting

Why did my scenario fail when I tried to run it?

Information to help you diagnose the reason a run failed is available in the logs produced during the simulation. The error logs include information such as a property or setting that needs modification, the name of a missing input file, or the process that was running when the scenario failed. In many cases, the error will be associated with a specific module instance. To view errors associated with a module instance, right-click on the module instance that failed, evidenced by a red X (⊗) and select one or more of the following options:

- View Run Script, which opens a text editor showing the batch script files for the MIMS module instance;
- View Output Log, which opens a text editor showing the output logs for the MIMS module instance;
- View Error Log, which opens a text editor showing the error log for the MIMS module instance (the module instance error log provides a detailed message regarding the specific error encountered); and/or
- View Error Message, which re-opens the initial pop-up error message generated when the module failed.

To view errors associated with running the scenario, select one or more of the following options presented under the "View Systems Logs..." menu of the "File" menu:

- Error Log, which opens a text editor showing the error log for the MIMS scenario (the scenario error log provides a more detailed message regarding the specific error encountered); and/or
- Standard Log, which opens a text editor showing status messages, including the start and completion time of simulations.

Under the “Scenario” menu, select:

- View Execution Log, which opens the file that recorded starts and completions of the module instance(s).

One or more of these logs may contain useful information about the problem causing the scenario to fail.

I was able to execute my scenario successfully before; why did it fail when I tried to run it a second time?

To re-run a previously executed scenario, you must select “Reset All” under the “Scenario” menu. This returns all processes that have been executed to a ready-to-execute state. Individual module instances can be reset by highlighting and right-clicking on the module instance in the “Graph View” pane and selecting “Reset” from the drop-down menu. Also, to clear all previous selections made in the GUI(s), reload the HAPEM5 Post-Processor and/or the TRIM.Risk$_{HH}$ Inhalation Metrics GUI(s) by right-clicking on each module instance and selecting “Reload Custom GUI” from the drop-down menu before re-running the scenario.

My computer goes to sleep during a TRIM.Risk simulation, preventing MIMS from functioning properly.

If the computer goes to sleep (i.e., into a power-saving mode) while running a scenario, and a module with a GUI has started executing (i.e., so that the user would need to manually fill in the GUI inputs before the module will run), the GUI window may not automatically pop up when the computer is woken up. This is the case if there is a filled-in green circle next to the GUI module, indicating the module is running, but user selections have not yet been specified on the GUI, and no pop-up window has appeared to make these input selections. One option is to “refresh” the screen by opening another window or program on the computer. Opening, then minimizing the Windows Task Manager (by holding down Ctrl+Alt+Delete keys and clicking the “Task Manager” button) usually works (alternatively, another program could be opened instead, but this may overwhelm the computer’s resources). After refreshing the screen in this way, return to MIMS and the GUI screen should appear. If it does not, highlight the module instance with the GUI and select the “stop” button ( ) at the top of the scenario window to terminate the scenario. Then right-click on the module instance and select “Reset” from the menu. With the module instance highlighted, press the “play” button ( ) at the top of the scenario window, and the GUI pop-up window should appear shortly.

The filled-in green circle ( ) next to an executing module changed to a hollow green circle ( ), but the module did not deliver an error message.

This is a known bug. The module may be running properly even if a hollow green circle has replaced the filled-in green circle. If other tasks or applications are opened on the computer after the scenario is initiated, the green circle next to a running module may turn hollow. To be sure that the module is still running, open Task Manager (opened by

holding down Ctrl+Alt+Delete keys and clicking the "Task Manager" button) and click on the "Processes" tab to see what application, if any, is utilizing computer resources. Note that running MIMS while running other programs on your computer is not recommended because it can significantly increase the execution time of time of a scenario.

G.2 Module Instance Troubleshooting

G.2.1 Iterator

The iterator failed.

1. Look at log files: If the iterator failed without a useful pop-up error message, navigate to the logs folder in the TRIM directory, which should contain at least one folder named to indicate the type of simulation being performed (e.g., $\text{TRIM.Expo}_{\text{Inhalation}}$ or HAPEM, single or multiple run/chemical), and then open the folder with the run name specific to the simulation (designated on the "Settings" tab of the input panels). Each module instance should have an accompanying log or summary file that is specific to its execution and completion or termination. Look through the log text file of a failed module instance for diagnostic errors or failure messages. See Section G.1 for the location of other log files (Execution, Standard, and Error logs) that may be helpful in isolating the reason for this failure.

2. Check dates on input files: All input data files for the iterator must be for the same time period (e.g., year). If some input files are for different years, all files with a date/time reference must be edited so the dates appearing in those files correspond to the dates entered as the "Start Date" and "End Date" ($\text{TRIM.Expo}_{\text{Inhalation}}$) or "Simulation Year" (HAPEM) on the input panels. This assumes that the input files for a certain time period are not specific to that time period and would be representative of *any* one year (or other designated time period). If different years were originally used in the creation of input files, it is possible the year being simulated in TRIM.Risk and the year that an input file(s) corresponds to have a different number of days (due to a leap year).

3. Check file and reference names: If multiple files are being referred to using the '${str("Name Reference")}' method, check that there are no typos or extra spaces, that these files and file paths exist, and that the "Name" is correctly defined in the chemical, and if applicable, source type, and facility profiles (click on the "Edit Synchronized Lists" button on the "Iterating Lists" tab of the iterator module instance to edit profile parameters). For example, if various air quality data files are specific to different locations, make sure those locations are correctly listed in the Directory\${str("Location")} file reference, in the name of the file you want to reference, *and* in the "Location" input parameter under the "Facility" tab of the "Synchronized Lists Input Editor" window.

4. Check the error log for errors related to input files not being found: Check the error log to see if the iterator is unable to find a particular file; if so, check the file path/reference specified on the "Parameters" tab for that input file of the "Iterator(APEX)" module instance. Confirm that the file path and name is pointing to the desired input files.

If the "Iterator(APEX)" is failing and is unable to find air quality data files, view the error log to see if it is unable to find any air quality data files. If the iterator is not finding *any* air quality data files, check the file/path reference to the air quality data files to confirm that it is correctly pointing to the input files. To do this, open the "Parameters" tab of the "Iterator(APEX)" module instance, and check the input for the "Input File - Air Quality Data" parameter. If the simulation has multiple facilities, source types, and/or chemicals, and thus demands multiple air quality data files, these files must be referenced using environmental variables (refer to Volume 1, Section 3.1.12 for information on environmental variables). Edit the file reference for the "Input File - Air Quality Data" as needed to properly point to the air quality data files.

There is a known bug in the Iterator(APEX), that occurs most commonly when the iterator is initially being configured and run. Sometimes, the iterator fails or does not properly progress on to the next module when it is unable to find air quality files for facility-source type-pollutant combinations that do not exist (and therefore do not require air quality files). If the iterator is unable to find air quality data files for facility-source type-pollutant combinations that do not exist, you may see records in the error log similar to the following:

```
10:10:06 >>>> Starting Iterations
10:10:06 >>>>   Realization 0: executing
10:11:32 >>>>   Realization 0: completed
10:11:32 >>>>   Realization 1: executing
10:12:58 >>>>   Realization 1: completed
10:12:58 >>>>   Realization 2: executing
10:13:00 >>>>   Realization 2: Exception Required file
[C:\Models\APEX\input\AirQuality\Facility3_Area_CrVI_aq.txt]
needed for parameter [Input File - Air Quality Data] in execution
[APEX] does not exist.
10:13:00 >>>>   Realization 2: failed, but continuing
10:13:00 >>>>   Realization 3: executing
10:13:25 >>>>   Realization 3: completed
```

The above error is not necessarily indicative of a problem; when the iterator cannot find an input file (as in "Realization 2" above), that iteration of APEX fails, but APEX continues on to the next possible facility-source type-pollutant combination. However, if the "Iterator(APEX)" is failing due to this (i.e., there is no other error message written to the logs or scripts detailed in Section G.1), then reset the iterator by either resetting the scenario (select "Reset All" from the "Scenario" menu), or resetting the "Iterator(APEX)" module instance (right-click on "Iterator(APEX)" in the "Graph View" pane and select "Reset" from the drop-down menu). Then press the "play" button ( ) at the top of the scenario window to run the scenario.

The iterator has taken more than several hours to run.

Depending on the size of the input files and the number of profiles being simulated, the iterator may take several hours to run to completion. To be sure that the iterator is actually running, go to Task Manager (opened by holding down Ctrl+Alt+Delete keys and clicking the "Task Manager" button), and check on the "Processes" tab to see what program, if any, is utilizing the computer's resources. If System Idle or any program other than an APEX-related, HAPEM-related, JAVA, or MySQL executable is utilizing the majority of the computer's resources, the iterator is not running properly and should be manually terminated. Highlight the iterator module instance and select the "stop" button ( ) at the top of the scenario window.

I want to set up references to multiple input files for one input parameter (for example, in a "TRIM.Expo w. TRIM.Risk (>1 run)" scenario multiple air quality data files might be used to represent study areas or facilities in different geographical locations).

Iterator(APEX)

Applications using the "Iterator(APEX)" require the user to provide multiple sets of inputs – essentially one set of inputs for each iteration performed. Users can input numeric values to be iterated over using the "Synchronized Input Lists Editor," as explained in Section 5.2.2. For input files, users must create references to the required files on the "Parameters" tab of the "Iterator(APEX)" module instance. Use of environmental variables (refer to Volume I, Section 3.1.12, for information on environmental variables) enables multiple files to be iterated over if the input files being referenced are named properly. This file referencing format must be used for any single input parameter for which there are multiple input files required for running the iterator (i.e., files that are specific to a chemical, facility, or source type or combination thereof). Types of input files for which multiple files for a single input may be required include (but are not limited to) air quality data files, district location files, profile functions files, and microenvironment mapping and descriptions files.

Input files to be iterated over must be named such that they can be distinguished from one another based on parameter names defined in the three tabs of the "Synchronized Input Lists Editor." For example, assume there are two Facilities, Facility1 and Facility2; two source types, Point and Area; and two chemicals, TCE and benzene. If these facilities have different emissions characteristics or are in different locations, eight air quality data input files would be required (files are not needed for facility-source type-pollutant combinations that do not exist). These files could be named as follows:

AQ_Facility1_Area_benzene.txt

AQ_Facility1_Area_TCE.txt

AQ_Facility1_Point_benzene.txt

AQ_Facility1_Point_TCE.txt

AQ_Facility2_Area_benzene.txt

AQ_Facility2_Area_TCE.txt

AQ_Facility2_Point_benzene.txt

AQ_Facility2_Point_TCE.txt

The most important consideration in naming the files in this example is that the facilities, source types, and chemicals must be named in parameters on the tabs of the "Synchronized Input Lists Editor" exactly as they are referenced in these file names.

For each type of input file, only one value can be entered on the "Parameters" tab of the "Iterator(APEX)" module instance. This value must reference parameter names from the tabs of the "Synchronized Input Lists Editor" in such a way that the files will be properly referenced because the "Iterator(APEX)" replaces these parameter name references with the values for the parameters. For example, the "Input File - Air Quality Data" parameter on the "Parameters" tab could be defined as follows to reference the file names listed above:

${str("Input Data Directory")}\AQ_${str("Facility")}_${str("Source Type")}_${str("Pollutant")}.txt

where:

- All files are located in the directory defined by the "Input Data Directory" parameter.
- The "Facility" parameter on the "Facility" tab of the "Synchronized Input Lists Editor" has two values, Facility1 and Facility2.
- The "Source Type" parameter on the "SourceType" tab of the "Synchronized Input Lists Editor" has two values, Point and Area.
- The "Pollutant" parameter on the "Chemical" tab of the "Synchronized Input Lists Editor" has two values, TCE and benzene.

If invalid facility-source type-pollutant combinations are created based on the combination of file references (e.g., if Facility1 does not emit benzene from an area source type, and thus a corresponding air quality data file does not exist), the iterator will ignore those combinations and only perform simulations for the valid ones.

Note that the naming and referencing formats are very flexible. If, for example, your application dealt with multiple facilities but only one source type and one chemical, the file names and references would only need to distinguish between facilities.

Iterator [Internal-use only (>1 chem)]

For the two types of input files that are iterated over (air quality files and factors files), users can create references to the required files using the "Synchronized Input Lists Editor" on the "Iterating Lists" tab of the "Iterator[Internal-use only (>1 chem)]" module instance. These references can be created in three different ways. One option is to use the "Browse" button for the parameter for each chemical. To do this, the user would select the chemical (as described earlier in this section), click the "Browse" button, and then locate and select the file for this chemical. This process would be repeated for all chemicals included in the simulation. A second option is to type the file path into the "Value" column for the chemical. To do this, the user would select the chemical, double-click on the "Value" column for the parameter, and then type the file path for the file corresponding to this chemical. This process would be repeated for all chemicals included in the simulation.

The third option is to use environmental variables (refer to Volume I, Section 3.1.12, for information on environmental variables). This option is identical to the second option, except that it uses environmental variables in the file path that is entered in the "Value" column and allows users to enter the exact same file path for multiple chemicals for a given file type. For example, assume there are three chemicals with SAROAD pollutant codes of 43218, 43301, and 43367 in a particular HAPEM simulation. The "Chemicals" tab would then have three chemical profiles, each with one unique SAROAD value input for the "SAROAD Pollutant Code" parameter. For all three profiles, the "Value" for the "Input File - Air Quality data" parameter could be:

${str("Input Data Directory"\AirQual\AQ_${str("SAROAD Pollutant Code")}.txt

For this file reference to work properly, the air quality data files must be named and located accordingly. The chemicals must be named in the "SAROAD Pollutant Code" parameter on the "Chemicals" tab of the "Synchronized Input Lists Editor" exactly as they are referenced in these file names. For the purposes of this example, the files must be located in the "AirQual" subdirectory of the "Input Data Directory" (defined on the "Settings" tab of the "Input Panels"). The three file names referenced using the above file path/reference would be:

AQ_43218.txt

AQ_43301.txt

AQ_43367.txt

Similarly, environmental variables could be used to reference the "SAROAD Pollutant Code" parameter in the "Input - Factors File" parameter on the "Chemicals" tab, making sure that the factors files are named accordingly.

G.2.2 GUI Troubleshooting

A module with a GUI fails when other module instances are running without a problem.

This is a known bug. Right-click on the GUI and choose "Reset" from the resulting menu. With the module instance highlighted, press the "play" button ( ) at the top of the scenario window. Sometimes a MIMS-initiated reset does not completely reset the GUIs, and manually resetting the GUI will solve the problem.

I'm unable to select multiple race categories on the second tab of the TRIM.Risk$_{HH}$ Inhalation Metrics GUI.

This is a known bug. Multiple race categories can be selected by using the "Ctrl" key, but this feature currently does not work properly and only race categories that are adjacent to each other (i.e., immediately before or after a selected race) can be selected.

G.2.3 DAVE Troubleshooting

DAVE runs before TRIM.Risk and/or TRIM.Risk metrics generator has executed.

Check the database type listed next to the input parameter "TRIM Database Type" on the "Other" tab of the input panels. DAVE will execute when the database type selected for this parameter is generated. The default database type is Human Health Risk Metrics. Therefore, DAVE executes when this database type has been generated by TRIM.Risk metrics generator and is available for analysis.

My database does not show up in the DAVE Database Selector window list.

The "Database Type" at the top of the window must be set to "Human Health Risk Metrics" to view the results from the TRIM.Risk metrics generator; "Human Health Risk" to view the results from TRIM.Risk$_{HH-NP}$; or "Human Inhalation Exposure" to view processed exposure estimates from TRIM.Expo$_{Inhalation}$ or HAPEM programs. Alternatively, the "Database Type" may be set to "All TRIM Databases," which results in the display of all available TRIM databases. If the database still is not in the list, be sure that the simulation executed successfully and double-check the database names specified on the "Databases" tab of the input panels.

I want to export human inhalation exposure databases generated by TRIM.Expo$_{Inhalation}$ (APEX) or HAPEM.

DAVE currently does not support the export of the inhalation exposure databases. However, individual inhalation exposure databases can be put into a table within DAVE (using the "Analyze" function), which can then be exported. Note that the "Analyze" function does not support those risk metrics represented by a distribution (i.e., PRD, PRD_LT, PHD, PHD_L, PHD_LT

I am analyzing a less-than-lifetime residency period (denoted by "< LT-RP") in DAVE for a human health risk metrics database and only some of the age bins (numbered 0 through 4) that I specified on the TRIM.Risk$_{HH}$ Inhalation Metrics GUI are showing up. These age bins may or may not show up in other less-than-lifetime residency period metrics.

In some cases, the population is insufficient to support an age bin (e.g., not enough people in a specified age range for a specified residency period). In this case, nothing is computed for that age bin and the age bin will not show up for that metric. There is no associated warning. A lower percentile residency period selection may result in some age bins without values. As a test, run the metric using a high percentile (e.g., 99th) for residency period selection, which should eliminate the problem of too-small residency periods. See related information on this topic in Appendix A, Volume II of the TRIM.Risk User's Guide.

When I try to generate a plot with All Home Sectors or All Persons, I get an error related to the R executable (e.g.," Rterm.exe has generated errors and will be closed by Windows...).

This is related to a capacity issue within DAVE/R. Within the "Analyze" function, if a user chooses to look at "All Persons" or "All Home Sectors," the number of available or selected persons or home sectors may be greater than the capacity handled by DAVE. Capacity (e.g., the number of home sectors or persons DAVE will be able to include on one plot) will vary depending on the computer.

To view results for all data sets, multiple plots will need to be produced by selecting a few home sectors or persons at a time. To select a subset of home sectors and/or persons, choose to select "All" home sectors or persons on the "DAVE Analysis" window. After progressing to the "MIMS Analysis Engine [Plot Type]" window, click on "Set" at the top of the screen, which opens the "Select Data Sets" window. Simply select any particular home sector or person number by highlighting it under the "Available Data Sets" pane and then clicking on "Add to Selected." The selected home sector or person number will appear under the "Selected Data Sets" pane. To select multiple data sets at a time, press the Ctrl key and highlight all desired data sets on the "Available Data Sets" pane and click "Add to Selected." The selected home sectors or persons will appear under the "Selected Data Sets pane."

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