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TRIM
Total Risk Integrated Methodology

Users Guide for TRIM.Risk$_{\text{Human Health-Probabilistic}}$ Application for the Ozone NAAQS Risk Assessment

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1 Introduction

1.1 Overview

The Total Risk Integrated Methodology (TRIM) is a time-series modeling system with multimedia capabilities for assessing human health and ecological risks from hazardous and criteria air pollutants. This system has been developed to support a variety of different types of applications with a scientifically sound, flexible, and user-friendly methodology. The TRIM modeling system consists of three modules:

- Environmental Fate, Transport, and Ecological Exposure module (TRIM.FaTE);
- Human Exposure Event module (TRIM.Expo); and
- Risk Characterization module (TRIM.Risk).

Figure 1 provides the conceptual design for the TRIM modeling system.

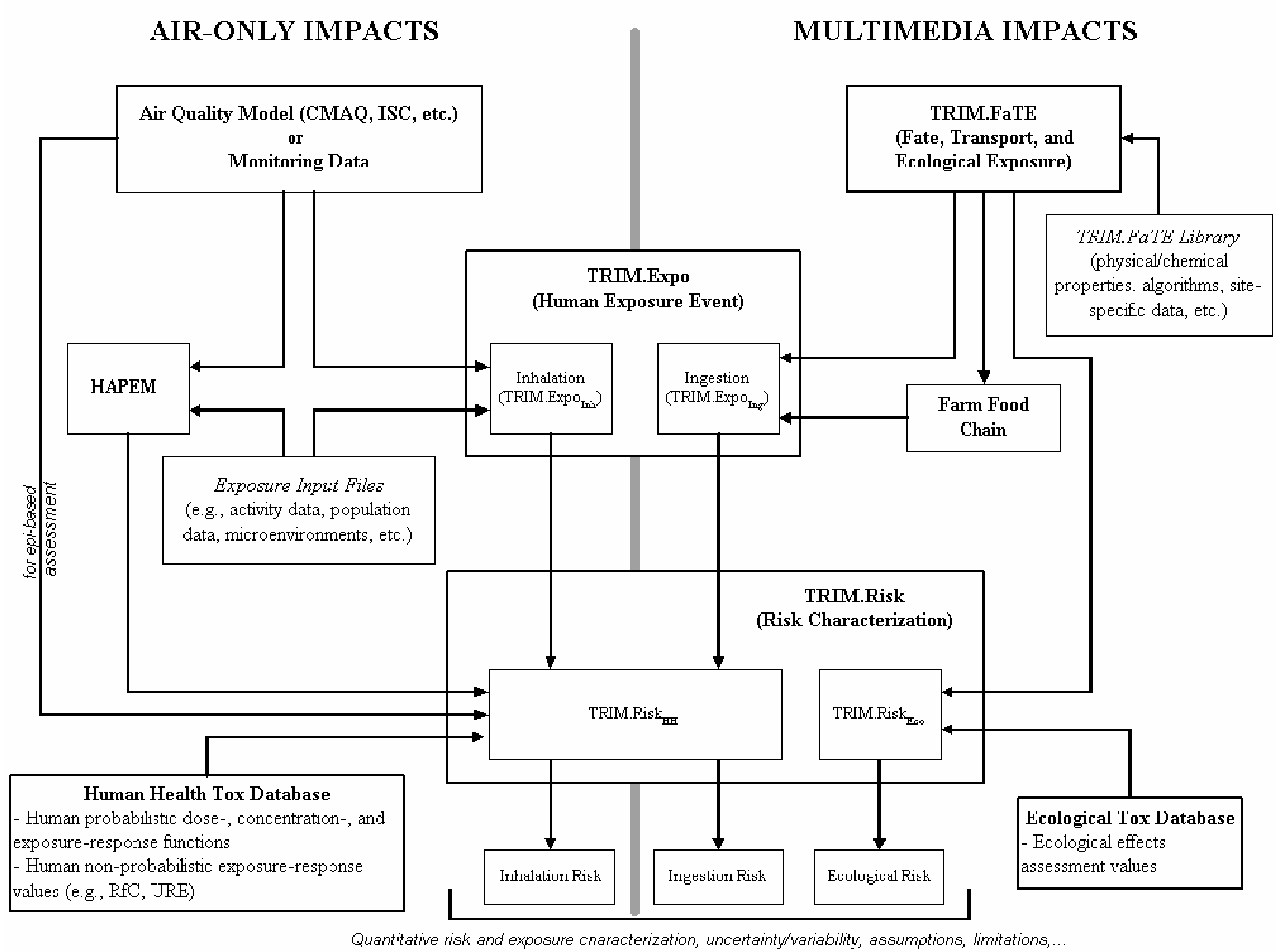
TRIM.Risk is a collection of tools used for the characterization of human health and ecological risks (U.S. EPA, 1999). The capabilities of TRIM.Risk include:

- Human inhalation risk and hazard assessment, using non-probabilistic response values (e.g., UREs, RfCs);
- Human inhalation risk and hazard assessment, using probabilistic response functions (e.g., probabilistic concentration-response or exposure-response functions);
- Human ingestion risk assessment; and
- Ecological hazard assessment, using non-probabilistic response values.

This document, along with the files accompanying it, focuses on the application of TRIM.Risk to estimate human health inhalation risks using probabilistic response values. This application of TRIM.Risk, referred to as TRIM.Risk$_{HH-P}$, was recently used to estimate risks associated with ozone (O_3) as part of EPA's review of the O_3 national ambient air quality standards (NAAQS) (U.S. EPA, 2007). The methods and results of that O_3 human health risk assessment are described in detail in an accompanying Technical Support Document (hereafter TSD) (Abt Associates, 2007) available on the EPA website (http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_td.html). This document is designed to enable users of the model to reproduce any or all of the results of the risk assessment presented in the TSD. This User's Guide assumes that the reader is already familiar with the terminology and methods described in the TSD.

Note that the instructions for running TRIM.Risk$_{HH-P}$ provided in this document assume that the user has already installed and has a basic working knowledge of MySQL. Instructions for installing MySQL for TRIM applications can be found on the TRIM installation website: http://www.epa.gov/ttn/fera/trim_install.html.

Figure 1. TRIM Modeling System



1.2 The Two Types of "Run"

The TSD describing the methods and results of EPA's O_3 health risk assessment presents results that fall into two broad categories:

- Changes in health risk associated with changes in ambient O_3 concentrations, based on concentration-response functions estimated in epidemiological studies. The health endpoints in this category include premature mortality, hospital admissions for respiratory illnesses, and asthmatic symptoms in children. A $TRIM.Risk_{HH-P}$ run to generate results in this category is hereafter referred to as an "**ambient run**."

- Changes in lung function response, measured as changes in forced expiratory volume in one second (FEV_1), associated with changes in personal exposures to O_3 concentrations in microenvironments, based on exposure-response functions estimated from controlled human exposure study data. The health endpoints in this category include changes in $FEV_1 \geq 10\%$, $\geq 15\%$, and $\geq 20\%$. A $TRIM.Risk_{HH-P}$ run to generate results in this category is hereafter referred to as a "**personal exposure run**."

1.3 The Component Parts of a Run

A run requires the following to be specified:

- **Location(s)** of interest;
- **Population(s)** of interest (e.g., all school age children);
- **Upper and lower bounds defining the change in O_3 concentrations** (for an ambient run) **or O_3 personal exposures** (for a personal exposure run);
- **Year of air quality data** to be used for ambient concentrations (for an ambient run) or personal exposures (for a personal exposure run);
- **Health endpoint(s)** of interest;
- **Concentration-response function(s)** (for an ambient run) **or exposure-response function(s)** (for a personal exposure run) to be used; and
- **Baseline incidence rates** (for ambient runs only).

For example, suppose a user wants to estimate the number of cases of non-accidental mortality associated with short-term exposures to a recent year of air quality ("as is") O_3 concentrations above policy relevant background (PRB) concentrations in Atlanta in 2004. $TRIM.Risk_{HH-P}$ would need to know that the location is Atlanta, the population is the population of Atlanta, the upper bound of O_3 concentrations is "as is" concentrations in Atlanta in 2004, and the lower bound is PRB concentrations in Atlanta in 2004.[1] The

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[1] The user of $TRIM.Risk_{HH-P}$ does not have to specify all of this information. As explained below, some information is automatically specified via links within $TRIM.Risk_{HH-P}$. For example, if the user selects a

user would select those concentration-response (C-R) functions he wanted to use – for example, any C-R functions that were estimated in Atlanta or were estimated in multiple locations ("multi-city" C-R functions) for short-term exposure non-accidental mortality. Once these specifications are made, $TRIM.Risk_{HH-P}$ finds the appropriate information to do the run – in this case, the population of Atlanta, the baseline incidence rate for short-term exposure non-accidental mortality in Atlanta, and the appropriate "as is" and PRB O_3 concentrations in Atlanta, as described below. [2]

1.4 Files Required for Ozone Risk Assessement

The following files, described more fully below, are required to produce the results that appear in the TSD and may be obtained on a DVD by emailing Harvey Richmond at Richmond.harvey@epa.gov.

- TRIMRiskCmd.exe;
- Trimrunner.exe;
- Two sample configuration files (*.cfg) – one for an ambient run and one for a personal exposure run;
- MySQL database backup files (*.sql);
- Excel files showing the scenarios in each of the MySQL database backup files;[3]
- Microsoft Access database;
- MySQL Database installer;
- MySQL Administrator installer; and
- MySQL ODBC driver.

2 TRIMRiskCmd.exe Internals

TRIMRiskCMD.exe reads a MySQL relational database restored into MySQL by the user of $TRIM.Risk_{HH-P}$. The data contained within this relational database will be organized in one of two structures, depending on the type of run being performed – one structure for ambient runs and one for personal exposure runs. The names of these tables and how they relate to each other (i.e., the database schema) are shown in Figures 2 and 3 below for ambient and personal exposure runs, respectively (for a detailed description of the database schema, see the appendix.)

To produce the results that appear in the TSD, Abt Associates populated the tables in the relational databases with the values necessary for $TRIM.Risk_{HH-P}$ to carry out the desired

particular concentration-response (C-R) function that was estimated for a population within a specified age range (e.g., ages 30+), $TRIM.Risk_{HH-P}$ will automatically select the corresponding population age range.

[2] Since different C-R functions use different O_3 metrics (e.g., some use the 24-hour average; others use the 1-hour maximum O_3 concentration), $TRIM.Risk_{HH-P}$ calculates the O_3 metric that is appropriate for each C-R function specified.

[3] There is one Excel file for each of the MySQL database backup files.

Figure 2. Schema of Relational Database for Ambient Runs

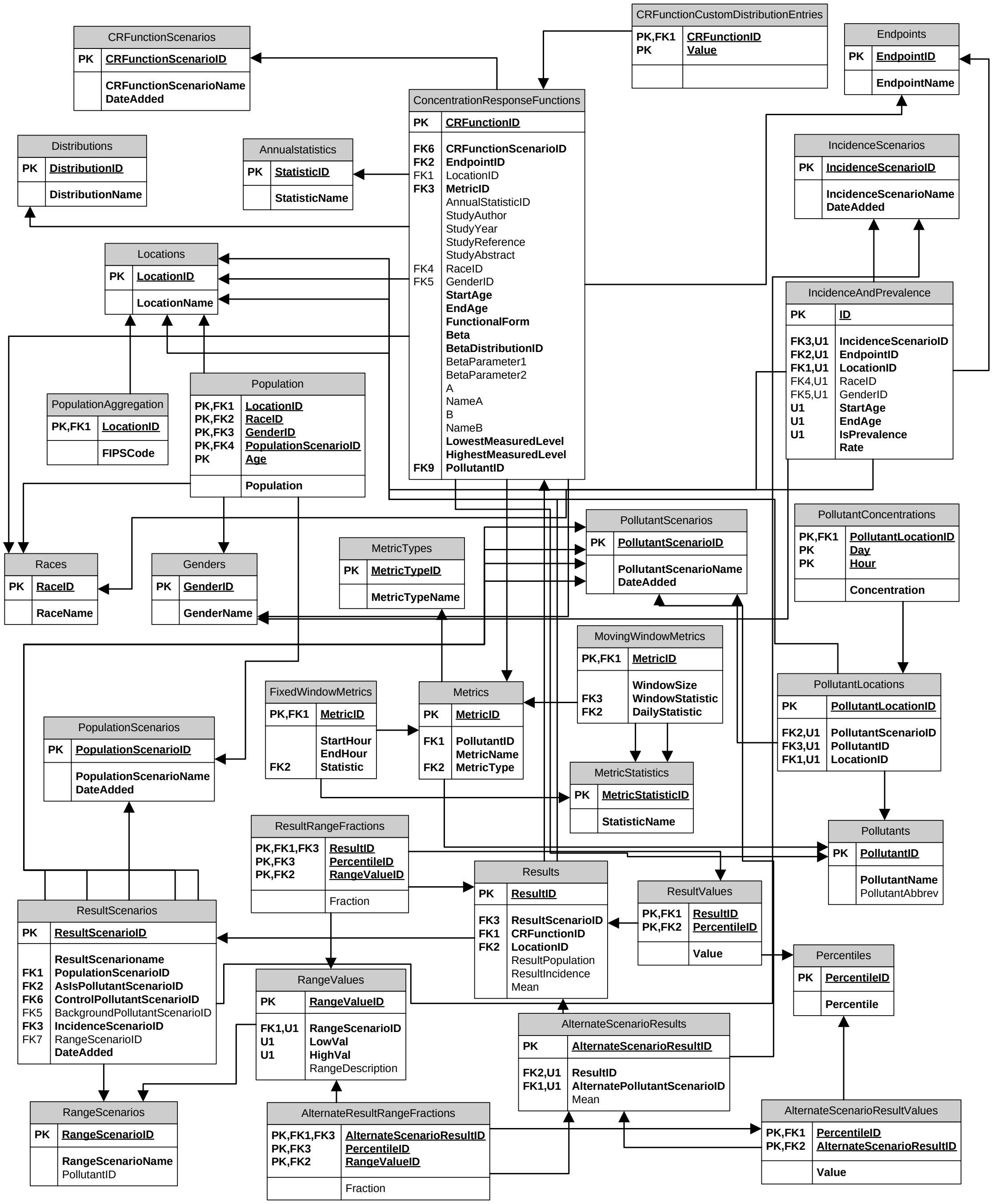
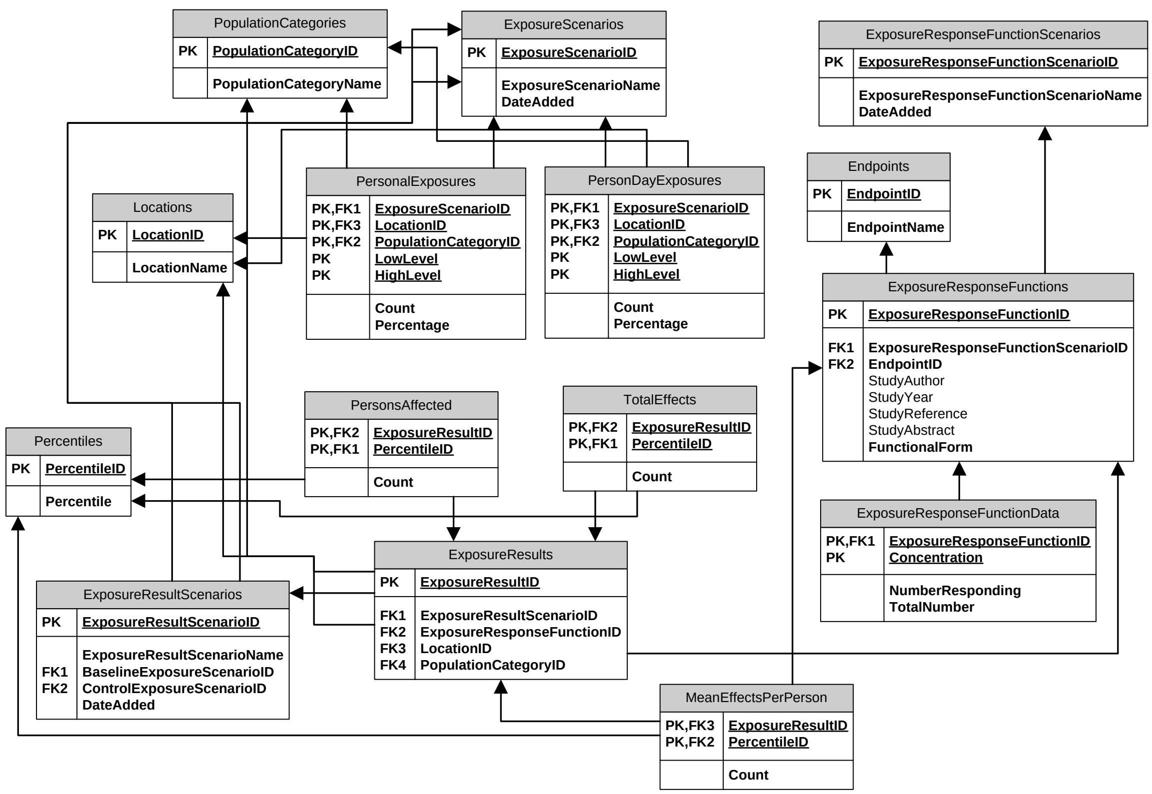


Figure 3. Schema of Relational Database for Personal Exposure Runs



runs. These MySQL database backup files are available from EPA so anyone can reproduce the results by restoring these files into MySQL and running TRIM.Risk$_{HH\text{-}P}$.

2.1 Ambient Run

For an ambient run, the user must specify the *ResultScenarioID* of an entry in the **ResultScenarios** table (see Figure 1) – i.e., select a specific row of this table. By specifying an entry in the **ResultScenarios** table, the user automatically specifies a *PopulationScenario*, an *AsIsPollutantScenario*, a *ControlPollutantScenario*, and an *IncidenceScenario*.[4] A *PopulationScenario* can be understood as a collection of population data for various locations. *AsIsPollutantScenarios* and *ControlPollutantScenarios* likewise contain various location-specific entries of air quality data. These are currently hourly O_3 values. The *IncidenceScenario* is a collection of incidence data for various health endpoints at various locations. For example, different incidence data collected for the same endpoint but using different survey methods may be grouped under different IncidenceScenarios.

Once the user has specified a *ResultScenarioID*, TRIM.Risk$_{HH\text{-}P}$ then scans the **Results** table and processes (i.e., selects for inclusion in the risk calculations) each entry that has a *ResultScenarioID* equal to the one specified for the run. This allows the user to run multiple C-R Functions for multiple locations in a single run. Each entry in the **Results** table also contains values for *LocationID* and *CRFunctionID*. The entries in these two columns indicate the locations for which results are to be processed and the C-R function to be used in the computation.

At this point in the process the program is able to retrieve data on the C-R function, the location-specific air quality, the relevant location-specific population, and the location- and health endpoint-specific incidence data (the endpoint is implicit in the specified C-R function) to be used in the calculation. Using these specified inputs, the program then computes the change in the health endpoint ("number of cases avoided") associated with the change in air quality specified via the two different *PollutantScenarios*. It stores the mean estimate for the number of cases in the field *Mean* in the **Results** table;[5] in addition, it stores the population total and the baseline incidence rate computed as a result of the AsIs air quality for that population in the fields *ResultPopulation* and *ResultIncidence*, respectively. Based on the entries in the **Percentiles** table (as fractions of 1), the program computes the number of cases at the specified percentiles of the C-R function. The computed values are stored in the **Resultvalues** table. This table cross-references the appropriate records in the **Percentiles** and **Results** tables.

If a *RangeScenarioID* is specified in the **ResultScenario** table record, the program will record the number of cases for each percentile specified in the **Percentiles** table and

[4] *AsIsPollutantScenario* and *ControlPollutantScenario* refer to the two levels of O_3 concentrations (or personal exposures) in a run.

[5] Because there is uncertainty surrounding the O_3 coefficient in a C-R or exposure-response function, TRIM.Risk$_{HH\text{-}P}$ calculates results based on the mean of a normal distribution of possible coefficient values, as well as on any user-specified percentile(s) of that normal distribution.

create a breakout based on the ozone ranges specified for that *RangeScenario* (ranges are specified in the **RangeValues** table). This breakout is stored in the **RangeResultFractions** table.

2.1.1 Notes

- Due to a problem with version 4.0 of MySQL (used for the O_3 human health risk assessment), the entries for the field *ResultPopulation* in the **Results** table are rounded to the nearest 10.[6]

- There is an additional field called *ForceIncidence* in the **ResultScenarios** table. By default, the program does not compute baseline incidences when the C-R function does not require such a calculation. Setting this field to "true" will force the program to compute the baseline incidence for such a case.[7]

- The *BackgroundPollutantID* in the **ResultScenarios** table is not currently used. The tables **AlternateResultRangeFractions**, **AlternateScenarioResults**, and **AlternateScenarioResultValues** are likewise not used in the current version.

- TRIM.Risk$_{HH\text{-}P}$ uses a method based on inverse cumulative distribution functions to compute C-R functions at various percentiles. Values obtained using this approach may diverge slightly from analytically obtained values.

2.2 Personal Exposure Run

For a personal exposure run, the user must specify the *ExposureResultScenarioID* of an entry in the **ExposureResultScenarios** table (see Figure 2).[8] The program then scans the **ExposureResults** table for all records with the specified value for *ExposureResultScenarioID*. This allows the user to run multiple ExposureResponseFunction/Location/PopulationCategory combinations under one ExposureResultScenario. For each matching record it then retrieves the relevant *PersonDayExposures* and *PersonExposures* based on the values in the fields *LocationID* and *PopulationCategoryID* specified in the **ExposureResults** table record. It also

[6] The impact of this rounding on the results that used population as an input was sufficiently small that it did not affect the results presented – e.g., percent of total incidence of a health effect associated with exposure to O_3, which was presented rounded to the nearest tenth of a percent.
[7] The majority of the C-R functions used for the O_3 health risk assessment were log-linear functions, for which the baseline incidence is needed in order to calculate "cases avoided" as a result of a reduction in O_3 concentrations. Some functions, however – e.g., linear functions – do not require a baseline incidence rate for this calculation.
[8] The schema for this process is somewhat simpler than the schema for the ambient process because the location dependence is implicit in the ExposureScenarios specified via the entries for *BaselineExposureScenarioID* and *ControlExposureScenarioID* – i.e., these values in these data sets are location-specific.

retrieves data on the exposure-response function based on the entry for *ExposureResponseFunctionID* in the **ExposureResults** table.

Using these records, the program then computes the number of persons affected for each of the percentiles of the exposure-response function as specified in the **Percentiles** table (the computation is based on the data contained in the **PersonalExposure** table). The cross-referenced result is stored in the **PersonsAffected** table. The computation for total effects (number of person-days with the effect) is analogous. The cross-referenced values for each percentile of the exposure-response function are stored in the **Totaleffects** table (computation is based on the data stored in PersonDayExposures).

2.2.1 Notes

- The computation of the percentile of the exposure-response function is not based on an inverse cumulative distribution function. The method used, which is outlined in Section 3.1.2 in the TSD, relies on the exposure-response function-specific values contained in the table **ExposureResponseFunctionData**.
- The total numbers of people exposed, obtained from the TRIM.$Expo_{Inh}$ (also called APEX) import files, showed some divergence between the PRB scenarios and other runs ("as is" and control scenarios). In order to make results consistent, the program normalizes all population counts to the PRB scenario.[9]

3 Generating Results

All results for ambient and personal exposure runs are generated using the TRIMRiskCmd.exe command line executable. The program is accessed either directly from the command line or indirectly via the supplied TrimRunner batch processor executable.

3.1 Using TRIMRiskCmd.exe Directly

When run from the command line, TRIMRiskCmd accepts a single parameter – the name of the configuration file specifying the details of the particular run. It then performs the required calculations and stores the results in the same database that supplies the data supporting the calculations.

[9] For example, the number of children with at least one O_3 exposure in Atlanta in 2002 in the PRB scenario totaled 911,315, whereas that number in the "as is" scenario totaled 911,694. The number of children with at least one lung function response (change in FEV1 $\geq$ 15%) associated with "as is" O_3 concentrations above PRB concentrations was calculated as [A*(911,315/911,694) – B], where A = the number of children with at least one lung function response associated with "as is" O_3 concentrations, and B = the number of children with at least one lung function response associated with PRB O_3 concentrations.

3.1.1 Configuration File Specification

The configuration file, which is essentially a text file, is conceptually similar to Windows Ini files. Parameter assignment is done via *Parameter=Value* assignments on each individual line of the file. There are two types of parameters: general connection parameters and run-specific parameters.

The general connection parameters are:

- server – this parameter is used to specify the MySQL server IP address;
- port – optional, specifies the port to use for server connections;
- username – the MySQL username ;
- password – the MySQL password for the supplied username;
- alternateschema – optional, the name of the schema containing the TRIM.Risk$_{HH-P}$ database tables, either personal exposure or ambient. A default schema named *trim* is assumed.

Run-specific parameters are:[10]

- *ExposureResultScenarioID* – the ID of the scenario that is to be processed for a personal exposure run.
- *ResultScenarioID* – the ID of the scenario that is to be processed for an ambient run.
- *Result* – this parameter is generated by the program upon completion of the run. It either lists the successful completion in the format Result=Process Complete *date time* or lists an error message with some additional information about the type of problem encountered.

3.1.2 Run Examples

To create the tables of results that appear in the TSD, Abt Associates configured (populated) tables in the MySQL database that were input to TRIM.Risk$_{HH-P}$. These configured tables are contained in MySQL database backup files (*.sql files listed in Appendices A and B), which are available from EPA. The descriptions below of how to carry out an ambient run and a personal exposure run assume that the user has access to the configured tables Abt Associates created for EPA's O_3 health risk assessment.

3.1.2.1 A sample ambient run

Suppose we want to do a run to calculate the number of cases of non-accidental and cardiorespiratory mortality associated with short-term exposure to "as is" ambient O_3 concentrations over PRB levels in Philadelphia in 2003. Our ambient run is characterized by the following specifications (see Section 1.3):

[10] For any run, the user specifies only one run-specific parameter – either *ExposureResultScenarioID* (if it's a personal exposure run) or *ResultScenarioID* (if it's an ambient run). The *Result* parameter is generated by TRIM.Risk$_{HH-P}$ upon completion of the run.

- **Location**: Philadelphia
- **Population**: population of Philadelphia
- **Upper bound** defining the change in ambient O_3 concentrations: “as is” levels
- **Lower bound** defining the change in ambient O_3 concentrations: PRB levels
- **Year of air quality data** used for ambient concentrations: 2003
- **Health endpoint(s)** of interest: short-term non-accidental mortality and short-term cardiorespiratory mortality
- **Concentration-response (C-R) function(s)**: all C-R functions, either specific to Philadelphia or multi-city functions, for the two specified health endpoints.
- **Baseline incidence rates**: Baseline incidence rates for the two specified health endpoints.

To initiate this run, we must do the following:

- Using the MySQL Administrator, restore a MySQL database backup file (provided by Abt Associates) that contains the example run – e.g., 2003 AsIs Rollback and 12Hr Max.sql.[11]

- Execute the TRIM.Risk$_{HH-P}$ executable (at the DOS prompt) specifying the appropriate configuration (cfg) file. An example is shown below:
  C:\> TRIMRiskCmd PhiladelphiaAsIsBackground.cfg

The cfg, PhiladelphiaAsIsBackground.cfg, file must contain the following parameter values (These parameters depend on the configuration of MySQL on the user’s computer. However, batch execution via Trimrunner.exe will always assume a local MySQL installation under the IP 127.0.0.1):

```
server=127.0.0.1
user=root
password=trim
resultscenarioid=3
```

The resultscenarioid in the cfg file above refers to the *ResultScenarioID* column in the **ResultScenarios** and **Results** tables. These tables contain IDs that point to the component parts of the ambient run. The user can use the Microsoft Access database provided to view the following tables that make up the run configuration. See Section 4.1 on how to set up the ODBC connection between MySQL and the Access database.

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[11] Note: This MySQL database is one of several database backups (that are available from EPA) that contain the appropriate component parts for this sample run. Lists of MySQL database backup files are given in Appendices A and B.

The important columns in the **ResultScenarios** table are:[12]

- *ResultScenarioID*,
- *ResultScenarioName*,
- *AsIsPollutantScenarioID* and
- *ControlPollutantScenarioID*.

For this example, we've specified *ResultScenarioID*=3; the relevant row in the **ResultScenarios** table looks as follows (not all columns shown):

ResultScenarios Table

ResultScenario ID	ResultScenario Name	Population ScenarioID	AsIsPollutant ScenarioID	ControlPollutant ScenarioID	IncidenceScenario ID
3	Philadelphia	1	89	1	1

The *AsIsPollutantScenarioID* and *ControlPollutantScenarioID* refer to specific rows in the **PollutantScenarios** table. This table contains all the different pollutant scenarios available in this MySQL database. The relevant rows of the **PollutantScenarios** table for this example ambient run are as follows:

PollutantScenarios Table

PollutantScenarioID	PollutantScenarioName	DateAdded
1	Background	2005-08-23 13:35:12
89	2003 AsIs	2006-11-06 10:50:55

Here we see that *PollutantScenarioID* 1 refers to Background (PRB) levels and *PollutantScenarioID* 89 refers to 2003 "as is" levels.

ResultScenarioID 3 in the **ResultScenarios** table appears also in the **Results** table . The rows of the **Results** table for which *ResultScenarioID* = 3 are shown below (not all columns shown).

[12] *PopulationScenarioID and IncidenceScenarioID* will always be 1 in these ambient run databases unless the run is for Greater Boston – Gent result scenarios. The reason for this is that initially all data was imported into the Populationscenario and Incidence scenario with the ID=1. However the Greater Boston – Gent scenarios were added at a later date and were assigned a new ID number.

Results Table

ResultScenarioID	CRFunctionID	LocationID	ResultID
3	1	11	3
3	15	11	4
3	16	11	5
3	24	11	6
3	25	11	7
3	26	11	8
3	27	11	9
3	28	11	10
3	29	11	11

CRFunctionID in the **Results** table refers to rows in the **ConcentrationResponseFunctions** table, the relevant rows of which are shown below. Here we see that nine C-R functions are used, all for the same location. There are many attributes of the **ConcentrationResponseFunctions** table. The Access database provides an easy way to view the full set of attributes of the **ConcentrationResponseFunctions**.

ConcentrationResponseFunctions Table (relevant columns and rows only)

CRFunctionID	EndpointID	StudyAuthor	StudyYear
1	3	Bell et al. -- 95 US Cities	2004
15	4	Huang et al. -- 19 US Cities	2004
16	4	Huang et al.	2004
24	4	Huang et al. -- 19 US Cities	2004
25	4	Huang et al. -- 19 US Cities	2004
26	4	Huang et al. -- 19 US Cities	2004
27	4	Huang et al. -- 19 US Cities	2004
28	3	Moolgavkar et al.	1995
29	3	Moolgavkar et al.	1995

EndpointID in the **ConcentrationResponseFunctions** table refers to rows in the **Endpoints** table, the relevant rows of which are shown below. Here we see that short-term non-accidental mortality and short-term cardiorespiratory mortality are the health endpoints included in this example ambient run.

Endpoints Table (not all rows shown)

EndPointID	EndPointName
3	Mortality, short-term non-accidental
4	Mortality, short-term cardiovascular and respiratory

The *LocationID* in the **Results** table refers to the **Locations** table. As indicated in this table, *LocationID* = 11 is Philadelphia.

Locations Table

LocationID	LocationName
1	Atlanta
2	Boston
3	Chicago
4	Cleveland
5	Detroit
6	Houston
7	Los Angeles
8	Los Angeles greater LA
9	New York
10	New York greater NY
11	Philadelphia
12	Sacramento
13	St Louis
14	Washington
15	Boston greater Boston

The **Results** table also contains the columns *ResultPopulation*, *ResultIncidence* and *Mean*. These columns will be populated with the results of the run. *ResultPopulation* will contain the total population for the run, *ResultIncidence*, the baseline incidence rate for that population and *Mean*, the mean number of cases avoided.

3.1.2.2 A sample personal exposure run

Suppose we want to do a run to calculate the number of all school age children undertaking moderate exertion who experience at least one lung function change associated with personal exposure to "as is" O_3 concentrations over PRB levels in each of the twelve risk assessment locations in 2002. Our personal exposure run is characterized by the following specifications (see Section 1.3):

- **Locations**: all twelve risk assessment locations
- **Population**: all school age children undertaking moderate exertion
- **Upper bound** defining the change in O_3 personal exposures: "as is" levels
- **Lower bound** defining the change in O_3 personal exposures: PRB levels
- **Year of air quality data** used for personal exposures: 2002
- **Health endpoint(s)** of interest: lung function changes (measured as changes in FEV1≥ 10%, 15%, and 20%)

- **Exposure-response function(s)**: the three standard exposure-response functions (for change in FEV1≥ 10%, 15%, and 20%).[13]

To initiate this run, we must do the following:

- Using the MySQL Administrator, restore a MySQL database backup file that contains the example run – e.g., Exposure_March2007_Rerun_2002_2003_2004_4.sql;[14]

- Execute the TRIM.Risk$_{HH-P}$ executable (at the DOS prompt), specifying the appropriate configuration (cfg) file. An example is shown below:
  C:\> TRIMRiskCmd AllChild2002BasetoBackground.cfg

The cfg file AllChild2002BasetoBackground.cfg must contain the following parameter values (again these parameters assume a locally installed version of MySQL):

```
server=127.0.0.1
user=root
password=trim
exposureresultscenarioid=1
```

The exposureresultscenarioid in the cfg file above refers to the *ExposureResultScenarioID* column in the **ExposureResultScenarios** and **ExposureResults** tables. These tables contain IDs that point to the component parts of the personal exposure run. The user can use the Microsoft Access database provided to view the following tables that make up the run configuration. See Section 4.1 on how to set up the ODBC connection between MySQL and the Access database.

The important columns in the **ExposureResultScenarios** table are:
- *ExposureResultScenarioName*,
- *BaselineExposureScenarioID* and
- *ControlExposureScenarioID*.

For this example, we've specified *ExposureResultScenarioID* =1; the relevant row in the **ExposureResultScenarios** table looks as follows (column *DateAdded* not shown):

ExposureResultScenarios Table

ExposureResult ScenarioID	ExposureResultScenarioName	BaselineExposure ScenarioID	ControlExposure ScenarioID
1	2002 All Child Base to PRB	64	67

[13] The standard exposure-response functions available in TRIM.Risk$_{HH-P}$ are the Bayesian-estimated 90% Logistic-10% Linear functions described in Section 3.1.2 of the TSD (Abt Associates, 2007) and shown in Figure 3-2 of the TSD.
[14] Note: This MySQL database is one of several database backups (that are available from EPA) that contain the appropriate component parts for this sample run. Lists of MySQL database backup files are given in Appendices A and B.

The *BaselineExposureScenarioID* and *ControlExposureScenarioID* refer to rows in the **ExposureScenarios** table. This table contains all the different exposure scenarios available in this MySQL database. Rows in this table are added when TRIM.Expo$_{Inh}$ (APEX) data are read into the MySQL database in a process outside the scope of this document. All the different MySQL backup files available from EPA for personal exposure runs contain the TRIM.Expo$_{Inh}$ data already loaded.

The rows of the **ExposureScenarios** table that are relevant to this example personal exposure run look as follows:

ExposureScenarios Table

ExposureScenarioID	ExposureScenarioName	DateAdded
64	Year=2002__Scenario=base	2007-03-15 07:33:52
67	Year=2002__Scenario=PRB	2007-03-15 08:01:28

Here we see that ExposureScenarioID 64 refers to year 2002 base ("as is") exposures and ExposureScenarioID 67 refers to year 2002 PRB exposures – the upper and lower bounds of the change in ozone exposures specified for this example run.

The rows of the **ExposureResults** table for which *ExposureResultScenarioID* = 1 are shown below (not all columns shown).

ExposureResults Table, Rows with *ExposureResultScenarioID* = 1

ExposureResultID	ExposureResult ScenarioID	ExposureResponse FunctionID	LocationID	PopulationCategoryID
1	1	1	27	8
2	1	2	27	8
3	1	3	27	8
4	1	1	28	8
5	1	2	28	8
6	1	3	28	8
7	1	1	29	8
8	1	2	29	8
9	1	3	29	8
10	1	1	30	8
11	1	2	30	8
12	1	3	30	8
13	1	1	31	8
14	1	2	31	8
15	1	3	31	8
16	1	1	32	8
17	1	2	32	8
18	1	3	32	8

ExposureResultID	ExposureResult ScenarioID	ExposureResponse FunctionID	LocationID	PopulationCategoryID
19	1	1	33	8
20	1	2	33	8
21	1	3	33	8
22	1	1	34	8
23	1	2	34	8
24	1	3	34	8
25	1	1	35	8
26	1	2	35	8
27	1	3	35	8
28	1	1	36	8
29	1	2	36	8
30	1	3	36	8
31	1	1	37	8
32	1	2	37	8
33	1	3	37	8
34	1	1	38	8
35	1	2	38	8
36	1	3	38	8

The *PopulationCategoryID* in the **ExposureResults** table refers to rows in the **PopulationCategories** table, shown below. For this run all rows in the **ExposureResults** table have *PopulationCategoryID* = 8, which denotes all (school age) children undertaking moderate exertion. Rows are added to the **PopulationCategories** table when the TRIM.Expo (Apex) data are loaded.

PopulationCategories Table

PopulationCategoryID	PopulationCategoryName
8	CHILD-MOD
9	ASTHMACHILD-MOD

The *ExposureResponseFunctionID* in the **ExposureResults** table refers to the **ExposureResponseFunctions** table. In this particular restored MySQL database there are 9 exposure-response functions that have been loaded. In our example run, only three of these functions are used. Their IDs are 1, 2 and 3 so only these values appear in the *ExposureResponseFunctionID* column of the **ExposureResults** table.[15]

[15] Exposure-response functions 1, 2, and 3 are the standard Bayesian-estimated 90% Logistic-10% Linear functions shown in Figure 3-2 and described in Section 3.1.2 of the TSD (Abt Associates, 2007) for changes in FEV1 ≥ 10%, 15%, and 20%, respectively. These functions were originally estimated from data from only three studies – by Folinsbee, Horstman, and McDonnell – and are denoted in the **ExposureResponseFunctions** table by these original three studies. The most recent versions of these functions were estimated based on data from these and several additional studies – i.e., the name currently in the **ExposureResponseFunctions** table is something of a misnomer and will be revised at a later date.

ExposureResponseFunctions Table

ExposureResponse FunctionID	ExposureResponse FunctionScenarioID	EndpointID	StudyAuthor
1	1	43	Folinsbee, Horstman, McDonnell et al.
2	1	44	Folinsbee, Horstman, McDonnell et al.
3	1	45	Folinsbee, Horstman, McDonnell et al.
4	1	43	Bayesian Estimation 50-50 FEV1 >= 10%
5	1	44	Bayesian Estimation 50-50 FEV1 >= 15%
6	1	45	Bayesian Estimation 50-50 FEV1 >= 20%
7	1	43	Bayesian Estimation 80-20 FEV1 >= 10%
8	1	44	Bayesian Estimation 80-20 FEV1 >= 15%
9	1	45	Bayesian Estimation 80-20 FEV1 >= 20%

The *LocationID* in the **ExposureResults** table refers to the **Locations** table. This run is for all twelve risk assessment locations. The names of the locations corresponding to the ID numbers can be found in the **Locations** table, shown below.

Locations Table

LocationID	LocationName
27	CSA_122_-_Atlanta
28	CSA_148_-_Boston
29	CSA_176_-_Chicago
30	CSA_184_-_Cleveland
31	CSA_220_-_Detroit
32	CSA_288_-_Houston
33	CSA_348_-_LosAngeles
34	CSA_408_-_NewYork
35	CSA_428_-_Philadelphia
36	CSA_472_-_Sacramento
37	CSA_476_-_StLouis
38	CSA_548_-_Washington

Because there are three functions being run, and each one is run for each location, for *ExposureResultScenarioID* = 1 – 2002 base (“as is” levels) to PRB levels – there are 36 rows in the **ExposureResults** table. There is only one population category: all (school age) children engaged in moderate exertion or greater averaged over an 8-hour period.

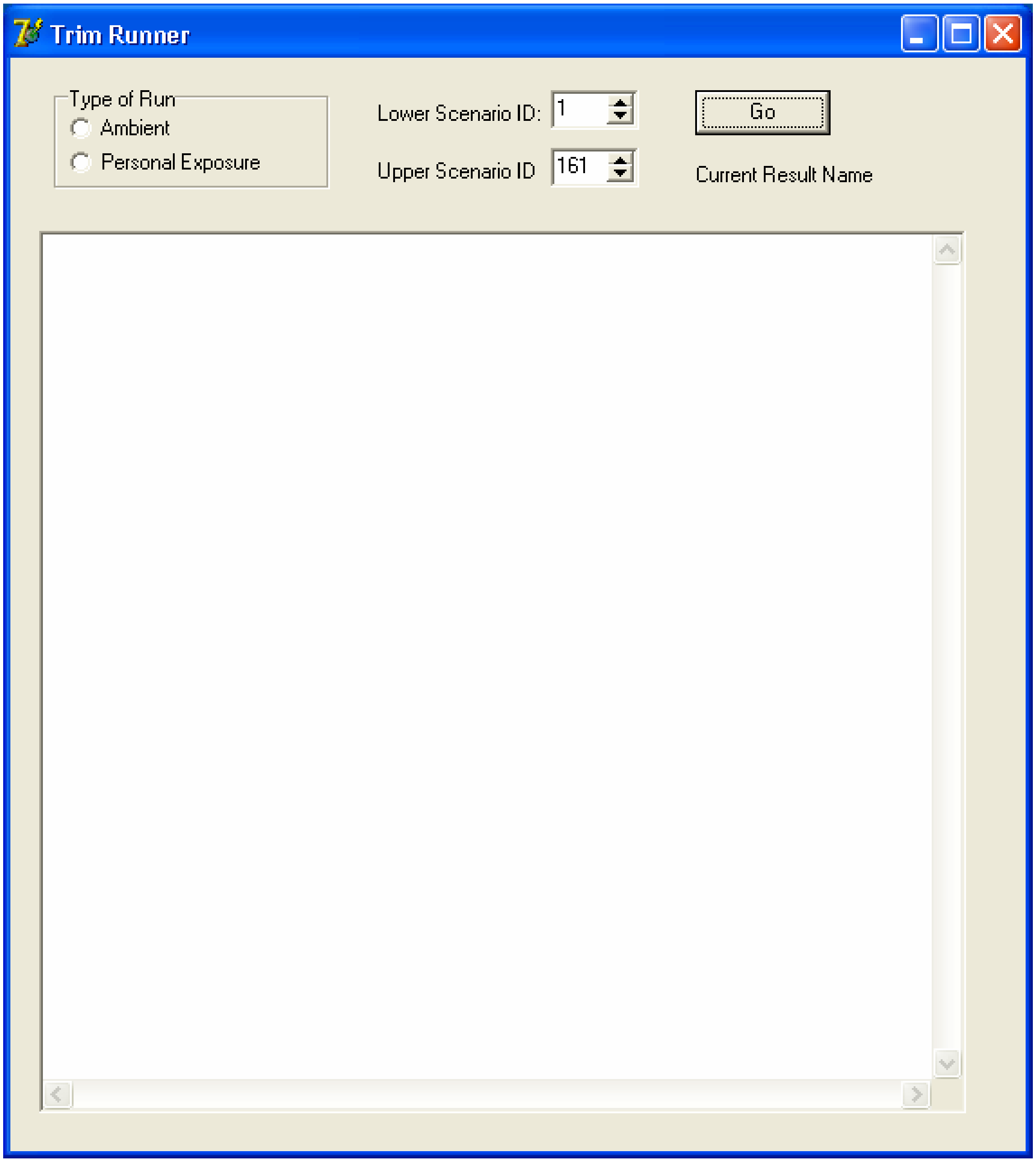
The **ExposureResults** table also contains the columns *PersonTotal* and *PersonDayTotal*. These columns will contain the results of the run. *PersonTotal* is the number of persons (in our case, school age children engaged in moderate or greater exertion) who experience at least one lung function change associated with the specified change in O_3 personal exposures. *PersonDayTotal* is the number of occurrences of the lung function change associated with the specified change in O_3 personal exposures.

3.2 Using TRIMRiskCmd.exe Indirectly via TrimRunner.exe

As described above, for an ambient run the **ResultScenarios** table contains the column *ResultScenarioID*, and the value in this column corresponds to the resultscenarioid parameter in the configuration file. The **ResultScenarios** table in the restored MySQL database contains multiple rows, each with a unique *ResultScenarioID* and each corresponding to a run, as described above. The stand-alone program TrimRunner.exe is provided to allow the user to execute multiple TRIM.Risk$_{HH-P}$ runs in a batch process.

To do this, TrimRunner.exe and TrimRiskCMD.exe must be in the same directory. Reading the first *ResultScenarioID*, TrimRunner will write a configuration file as described above to the current directory and execute TrimRiskCMD with that file as its input parameter. The Server parameter is hard-coded to 127.0.0.1, so TrimRunner must be run on the same machine as the MySQL database. The success or failure of the run will be written to the Log window. TrimRunner will then read the next *ResultScenarioID* and write out a new configuration file. This continues until all the rows in the **ResultScenarios** table have been processed.

To use TrimRunner, double click on TrimRunner.exe in a Windows Explorer window showing the directory where you placed the TrimRunner.exe file. The user interface will look like the following:



In the Type of Run radio button group, select either Ambient or Personal Exposure. Selecting Ambient will indicate that the TRIM.Risk$_{HH-P}$ executable will read the **ResultSenarios** table and perform ambient runs and selecting Personal Exposure will indicate that TRIM.Risk$_{HH-P}$ will read the **ExposureResultScenarios** table and perform personal exposure runs.

Enter the lowest *ResultScenarioID* in the **ResultScenarios** table in the first spin box[16] (Lower Scenario ID) and the highest value in the second (Upper Scenario ID). It does

[16] This is a box with up and down arrows for adjusting a number – see screen shot "Trim Runner" above for example.

not matter if there is not a corresponding row in the **ResultScenarios** table for every value between the lowest and the highest values entered in TrimRunner. The lower value should be the lowest value result scenario you want to run and the upper value the highest value result scenario you want to run. All *ResultscenarioID* values between these values will also be run. Values between the lower and upper bound that have no corresponding row in the **ResultScenarios** table are ignored.

Clicking the Go button will run the TRIM.Risk$_{HH-P}$ model for each *ResultScenarioID* in the **ResultScenarios** table that is between the lower and upper bound entered and populate columns in the **Results** table in the MySQL database with the run results. If there is any indication in the log box that a run has failed, enter its *ResultScenarioID* in the lower and upper spinners and rerun. This will execute only the one run. It will be apparent if a particular result needs to be rerun.[17]

The process is the same for a personal exposure run except the table of runs is **ExposureResultScenarios** and the column is *ExposureResultScenarioID.*

4 Extracting Results

4.1 General Notes

Currently the results are extracted via a Microsoft Access Database (based on the provided schema and process information, it should be possible for the end user to develop alternative extraction methods). In order to use this database it must be properly configured to connect to the MySQL database containing the results of the ambient and exposure runs. In order to achieve this, the following steps must be taken:

1. You must obtain an ODBC driver for MySQL. Such a driver will allow ODBC compliant tools access to the MySQL database. For the current analysis the MySQL ODBC driver version 3.51 was used.
2. In order for the provided Access database to work properly, the user must create a System DSN named "trimrisk". (See the documentation accompanying the ODBC driver and refer to Microsoft's windows documentation on how to accomplish this.)
3. The provided reference database must be copied to a writeable location on your computer.

4.2 Extracting Ambient Results

In order to extract results in a format usable in Excel, Abt has provided two primary access queries. These queries are implemented as a hierarchical chain of subqueries in

[17] An error message will be generated indicating the number(s) of the ResultScenarioID(s) that failed to run correctly.

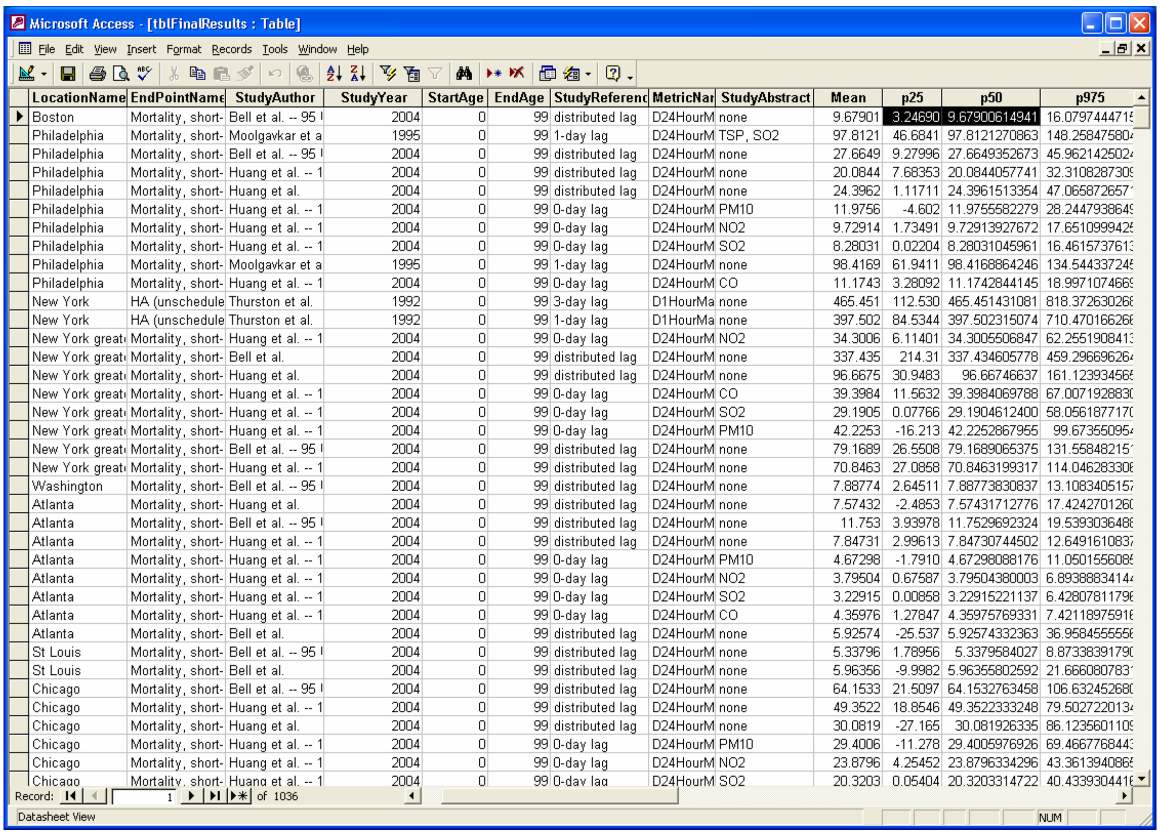
the Access database. However, for the purpose of data extraction we will focus entirely on the two top-level queries.

4.2.1 Estimates of p2.5, p50, p97.5

In the standard analysis performed for all ambient scenarios in the O_3 human health risk assessment (Abt Associates, 2007), estimates of the 2.5th percentile value (p2.5), the 50th percentile value (p50), and the 97.5th percentile value (p97.5) were produced in addition to the mean estimate.

To extract these results, the user must run the query ***make_tblfinal_results_id*** contained in the Access database. This query will generate a table called **tblFinalResults**. The content of this table can then be copied into an Excel spreadsheet for further analysis.

The following screenshot shows an example of **tblFinalResults** in the Access database:



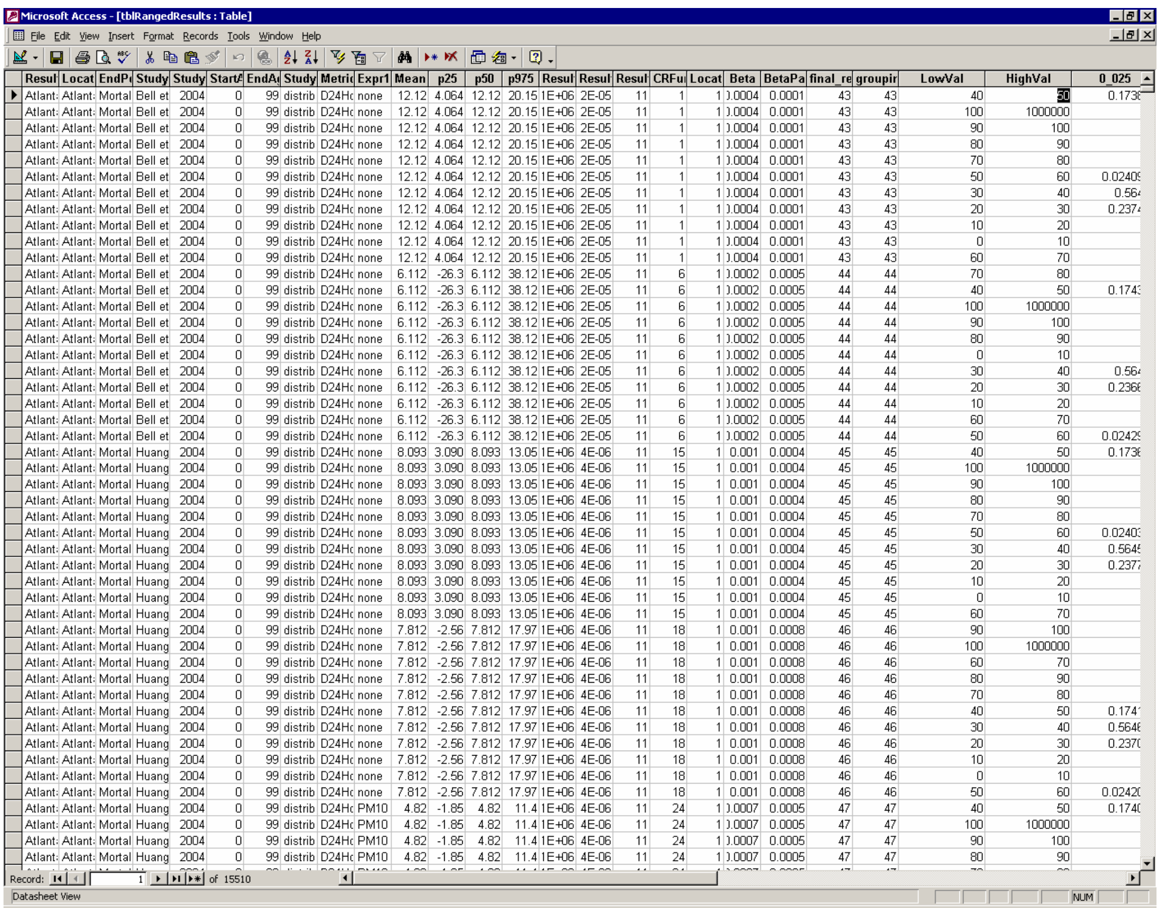
LocationName	EndPointName	StudyAuthor	StudyYear	StartAge	EndAge	StudyReferenc	MetricNar	StudyAbstract	Mean	p25	p50	p975
Boston	Mortality, short-	Bell et al. -- 95	2004	0	99	distributed lag	D24HourM	none	9.67901	3.24690	9.67900614941	16.079744471
Philadelphia	Mortality, short-	Moolgavkar et a	1995	0	99	1-day lag	D24HourM	TSP, SO2	97.8121	46.6841	97.8121270863	148.25847580
Philadelphia	Mortality, short-	Bell et al. -- 95	2004	0	99	distributed lag	D24HourM	none	27.6649	9.27996	27.6649352673	45.962142502
Philadelphia	Mortality, short-	Huang et al. -- 1	2004	0	99	distributed lag	D24HourM	none	20.0844	7.68353	20.0844057741	32.310828730
Philadelphia	Mortality, short-	Huang et al.	2004	0	99	distributed lag	D24HourM	none	24.3962	1.11711	24.3961513354	47.065872657
Philadelphia	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	PM10	11.9756	-4.602	11.9755582279	28.244793864
Philadelphia	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	NO2	9.72914	1.73491	9.72913927672	17.651099942
Philadelphia	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	SO2	8.28031	0.02204	8.28031045961	16.461573761
Philadelphia	Mortality, short-	Moolgavkar et a	1995	0	99	1-day lag	D24HourM	none	98.4169	61.9411	98.4168864246	134.54433724
Philadelphia	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	CO	11.1743	3.28092	11.1742844145	18.997107466
New York	HA (unschedule	Thurston et al.	1992	0	99	3-day lag	D1HourMa	none	465.451	112.530	465.451431081	818.37263026
New York	HA (unschedule	Thurston et al.	1992	0	99	1-day lag	D1HourMa	none	397.502	84.5344	397.502315074	710.47016626
New York great	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	NO2	34.3006	6.11401	34.3005506847	62.255190841
New York great	Mortality, short-	Bell et al.	2004	0	99	distributed lag	D24HourM	none	337.435	214.31	337.434605778	459.29669626
New York great	Mortality, short-	Huang et al.	2004	0	99	distributed lag	D24HourM	none	96.6675	30.9483	96.66746637	161.12393456
New York great	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	CO	39.3984	11.5632	39.3984069788	67.007192883
New York great	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	SO2	29.1905	0.07766	29.1904612400	58.056187717
New York great	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	PM10	42.2253	-16.213	42.2252867955	99.67355095
New York great	Mortality, short-	Bell et al. -- 95	2004	0	99	distributed lag	D24HourM	none	79.1689	26.5508	79.1689065375	131.55848215
New York great	Mortality, short-	Huang et al. -- 1	2004	0	99	distributed lag	D24HourM	none	70.8463	27.0858	70.8463199317	114.04628330
Washington	Mortality, short-	Bell et al. -- 95	2004	0	99	distributed lag	D24HourM	none	7.88774	2.64511	7.88773830837	13.108340515
Atlanta	Mortality, short-	Huang et al.	2004	0	99	distributed lag	D24HourM	none	7.57432	-2.4853	7.57431712776	17.424270126
Atlanta	Mortality, short-	Bell et al. -- 95	2004	0	99	distributed lag	D24HourM	none	11.753	3.93978	11.7529692324	19.539303648
Atlanta	Mortality, short-	Huang et al. -- 1	2004	0	99	distributed lag	D24HourM	none	7.84731	2.99613	7.84730744502	12.649161083
Atlanta	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	PM10	4.67298	-1.7910	4.67298088176	11.050155608
Atlanta	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	NO2	3.79504	0.67587	3.79504380003	6.8938883414
Atlanta	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	SO2	3.22915	0.00858	3.22915221137	6.4280781179
Atlanta	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	CO	4.35976	1.27847	4.35975769331	7.4211897591
Atlanta	Mortality, short-	Bell et al.	2004	0	99	distributed lag	D24HourM	none	5.92574	-25.537	5.92574332363	36.958455555
St Louis	Mortality, short-	Bell et al. -- 95	2004	0	99	distributed lag	D24HourM	none	5.33796	1.78956	5.3379584027	8.8733839179
St Louis	Mortality, short-	Bell et al.	2004	0	99	distributed lag	D24HourM	none	5.96356	-9.9982	5.96355802592	21.666080783
Chicago	Mortality, short-	Bell et al. -- 95	2004	0	99	distributed lag	D24HourM	none	64.1533	21.5097	64.1532763458	106.63245268
Chicago	Mortality, short-	Huang et al. -- 1	2004	0	99	distributed lag	D24HourM	none	49.3522	18.8546	49.3522333248	79.502722013
Chicago	Mortality, short-	Huang et al.	2004	0	99	distributed lag	D24HourM	none	30.0819	-27.165	30.081926335	86.123560110
Chicago	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	PM10	29.4006	-11.278	29.4005976926	69.466776844
Chicago	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	NO2	23.8796	4.25452	23.8796334296	43.361394086
Chicago	Mortality, short-	Huang et al. -- 1	2004	0	99	0-day lag	D24HourM	SO2	20.3203	0.05404	20.3203314722	40.433930441

4.2.2 Estimates of p2.5, p50, p97.5 for Mortality – Attribution to Ozone Within Specified Concentration Ranges

In this variation of the previous analysis, the contribution of the various ozone ranges to the total effect is extracted along with the rest of the results. To extract these results, the user must run the query ***combinedfinal_mktbl***. This query will create a table called **tblRangedResults**. The format of this table is similar to that of **tblFinalResults**. In addition it will contain additional columns specifying the ozone concentration ranges and their relative contributions to the total effect (listed separately for each percentile).

Note that this query is configured to generate results only for mortality. The run time of the query is extremely long (more that 24 hours in some cases) due to the structure and complexity of the underlying queries.

The following screenshot shows an example of **tblRangedResults** in the Access database:

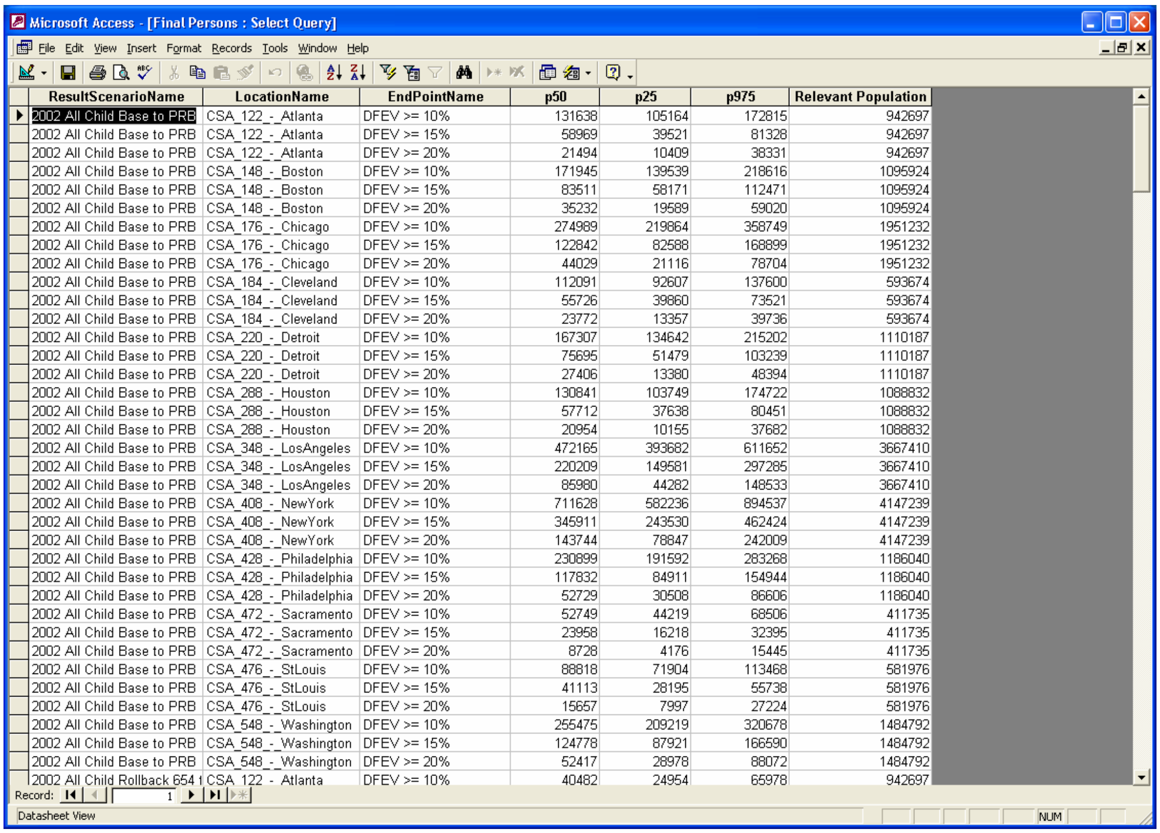


Resul	Locat	EndPt	Study	Study	StartA	EndA	Study	Metric	Expr1	Mean	p25	p50	p975	Resul	Resul	Resul	CRFu	Locat	Beta	BetaPa	final_re	groupir	LowVal	HighVal	0_025
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	40	50	0.1738
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	100	1000000	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	90	100	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	80	90	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	70	80	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	50	60	0.02409
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	30	40	0.564
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	20	30	0.2374
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	10	20	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	0	10	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	12.12	4.064	12.12	20.15	1E+06	2E-05	11	1	1	).0004	0.0001	43	43	60	70	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	70	80	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	40	50	0.1743
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	100	1000000	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	90	100	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	80	90	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	0	10	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	30	40	0.564
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	20	30	0.2368
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	10	20	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	60	70	
Atlant	Atlant	Mortal	Bell et	2004	0	99	distrib	D24Hc	none	6.112	-26.3	6.112	38.12	1E+06	2E-05	11	6	1	).0002	0.0005	44	44	50	60	0.02429
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	40	50	0.1738
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	100	1000000	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	90	100	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	80	90	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	70	80	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	50	60	0.02403
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	30	40	0.5645
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	20	30	0.2377
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	10	20	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	0	10	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	8.093	3.090	8.093	13.05	1E+06	4E-06	11	15	1	0.001	0.0004	45	45	60	70	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	90	100	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	100	1000000	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	60	70	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	80	90	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	70	80	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	40	50	0.1741
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	30	40	0.5646
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	20	30	0.2370
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	10	20	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	0	10	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	none	7.812	-2.56	7.812	17.97	1E+06	4E-06	11	18	1	0.001	0.0008	46	46	50	60	0.02420
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	PM10	4.82	-1.85	4.82	11.4	1E+06	4E-06	11	24	1	).0007	0.0005	47	47	40	50	0.1740
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	PM10	4.82	-1.85	4.82	11.4	1E+06	4E-06	11	24	1	).0007	0.0005	47	47	100	1000000	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	PM10	4.82	-1.85	4.82	11.4	1E+06	4E-06	11	24	1	).0007	0.0005	47	47	90	100	
Atlant	Atlant	Mortal	Huang	2004	0	99	distrib	D24Hc	PM10	4.82	-1.85	4.82	11.4	1E+06	4E-06	11	24	1	).0007	0.0005	47	47	80	90	

4.3 Extracting Personal Exposure Results

The logic for generating appropriate outputs for the exposure-based risk estimates is significantly less complicated. There are two preconfigured queries, *Final Persons* and *Final PersonDays*. These will directly generate result sets for the 2.5th percentile, 50th percentile, and 97.5th percentile values for the number of persons and the number of person-days affected. These can be copied directly into Excel for further processing. Note: The *Relevant Population* field generated by these queries is the total number of persons at the location – or, for person-days, the total number of persons times the total number of days in the ozone season at the location.

Final Persons Example


Microsoft Access - [Final Persons : Select Query]

ResultScenarioName	LocationName	EndPointName	p50	p25	p975	Relevant Population
2002 All Child Base to PRB	CSA_122_-_Atlanta	DFEV >= 10%	131638	105164	172815	942697
2002 All Child Base to PRB	CSA_122_-_Atlanta	DFEV >= 15%	58969	39521	81328	942697
2002 All Child Base to PRB	CSA_122_-_Atlanta	DFEV >= 20%	21494	10409	38331	942697
2002 All Child Base to PRB	CSA_148_-_Boston	DFEV >= 10%	171945	139539	218616	1095924
2002 All Child Base to PRB	CSA_148_-_Boston	DFEV >= 15%	83511	58171	112471	1095924
2002 All Child Base to PRB	CSA_148_-_Boston	DFEV >= 20%	35232	19589	59020	1095924
2002 All Child Base to PRB	CSA_176_-_Chicago	DFEV >= 10%	274989	219864	358749	1951232
2002 All Child Base to PRB	CSA_176_-_Chicago	DFEV >= 15%	122842	82588	168899	1951232
2002 All Child Base to PRB	CSA_176_-_Chicago	DFEV >= 20%	44029	21116	78704	1951232
2002 All Child Base to PRB	CSA_184_-_Cleveland	DFEV >= 10%	112091	92607	137600	593674
2002 All Child Base to PRB	CSA_184_-_Cleveland	DFEV >= 15%	55726	39860	73521	593674
2002 All Child Base to PRB	CSA_184_-_Cleveland	DFEV >= 20%	23772	13357	39736	593674
2002 All Child Base to PRB	CSA_220_-_Detroit	DFEV >= 10%	167307	134642	215202	1110187
2002 All Child Base to PRB	CSA_220_-_Detroit	DFEV >= 15%	75695	51479	103239	1110187
2002 All Child Base to PRB	CSA_220_-_Detroit	DFEV >= 20%	27406	13380	48394	1110187
2002 All Child Base to PRB	CSA_288_-_Houston	DFEV >= 10%	130841	103749	174722	1088832
2002 All Child Base to PRB	CSA_288_-_Houston	DFEV >= 15%	57712	37638	80451	1088832
2002 All Child Base to PRB	CSA_288_-_Houston	DFEV >= 20%	20954	10155	37682	1088832
2002 All Child Base to PRB	CSA_348_-_LosAngeles	DFEV >= 10%	472165	393682	611652	3667410
2002 All Child Base to PRB	CSA_348_-_LosAngeles	DFEV >= 15%	220209	149581	297285	3667410
2002 All Child Base to PRB	CSA_348_-_LosAngeles	DFEV >= 20%	85980	44282	148533	3667410
2002 All Child Base to PRB	CSA_408_-_NewYork	DFEV >= 10%	711628	582236	894537	4147239
2002 All Child Base to PRB	CSA_408_-_NewYork	DFEV >= 15%	345911	243530	462424	4147239
2002 All Child Base to PRB	CSA_408_-_NewYork	DFEV >= 20%	143744	78847	242009	4147239
2002 All Child Base to PRB	CSA_428_-_Philadelphia	DFEV >= 10%	230899	191592	283268	1186040
2002 All Child Base to PRB	CSA_428_-_Philadelphia	DFEV >= 15%	117832	84911	154944	1186040
2002 All Child Base to PRB	CSA_428_-_Philadelphia	DFEV >= 20%	52729	30508	86606	1186040
2002 All Child Base to PRB	CSA_472_-_Sacramento	DFEV >= 10%	52749	44219	68506	411735
2002 All Child Base to PRB	CSA_472_-_Sacramento	DFEV >= 15%	23958	16218	32395	411735
2002 All Child Base to PRB	CSA_472_-_Sacramento	DFEV >= 20%	8728	4176	15445	411735
2002 All Child Base to PRB	CSA_476_-_StLouis	DFEV >= 10%	88818	71904	113468	581976
2002 All Child Base to PRB	CSA_476_-_StLouis	DFEV >= 15%	41113	28195	55738	581976
2002 All Child Base to PRB	CSA_476_-_StLouis	DFEV >= 20%	15657	7997	27224	581976
2002 All Child Base to PRB	CSA_548_-_Washington	DFEV >= 10%	255475	209219	320678	1484792
2002 All Child Base to PRB	CSA_548_-_Washington	DFEV >= 15%	124778	87921	166590	1484792
2002 All Child Base to PRB	CSA_548_-_Washington	DFEV >= 20%	52417	28978	88072	1484792
2002 All Child Rollback 654 t	CSA_122_-_Atlanta	DFEV >= 10%	40482	24954	65978	942697

Record: 1

Datasheet View

5 References

Abt Associates Inc., 2007. "Ozone Health Risk Assessment for Selected Urban Areas," prepared for the Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency under Contract No. 68-D-03-002. July 2007. Available online at: http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_td.html

U.S. Environmental Protection Agency (1999). Total Risk Integrated Methodology. Available online at: http://www.epa.gov/ttn/fera/trim_fate.html#1999historical

U.S. Environmental Protection Agency (2007). "Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information." OAQPS Staff Paper. EPA-452/R-07-007. July 2007. Available online at: http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_sp.html

Appendix A: List of MySQL Database Backup Files for Ambient Runs

2004 trimrisk ranges for all studiescities except Boston Gent 20060731 1027.sql
2002 trimrisk ranges for all.sql
2004 trimrisk ranges for all Boston Gent 20060731 1027.sql
2002 trimrisk ranges for all new backgrounds loaded.sql
2002 Prbconcsm5 done.sql
2002 Prbconcsp10 done.sql
2002 Prbconcsp5 done.sql
2004 except Boston Gent PrbConc_X loaded .sql
2004 except Boston Gent PrbConcsm5 done .sql
2004 except Boston Gent PrbConcsp10 done .sql
2004 except Boston Gent PrbConcsp5 done .sql
2002 PrbconcZero done.sql
2004 PrbconcZero done.sql
2004 Boston Gent PrbconcZero done.sql
2003 AsIs Rollback and 12Hr Max.sql
2002 AsIs Rollback and 12Hr Max.sql
2002 Prbconcsm10 done.sql

Appendix B: List of MySQL Database Backup Files for Personal Exposure Runs

Exposure_March2007_Rerun_2002_2004_done.sql
Exposure_March2007_Rerun_2003_done.sql
Exposure_March2007_Rerun_2002_2003_2004_5050_done.sql
Exposure_March2007_Rerun_2002_2003_2004_8020_done.sql
Exposure_March2007_Rerun_2003_corrected_seed_done.sql
Exposure_March2007_Rerun_2002_2004_Sensitivity_done.sql
Exposure_March2007_Rerun_2002_03_04_5050_done_rerun.sql
Exposure_March2007_Rerun_2002_03_04_8020_done_rerun.sql
Exposure_March2007_Rerun_2002_2004_done_rerun.sql