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User's Manual for RSEI Version 2.3.0 [1996 - 2007 TRI Data]

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Economics, Exposure, and Technology Division
Office of Pollution Prevention and Toxics
United States Environmental Protection Agency

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WELCOME TO EPA'S RISK-SCREENING ENVIRONMENTAL INDICATORS CD-ROM

EPA's Risk-Screening Environmental Indicators (RSEI) is a fast and effective tool that uses risk concepts to quickly and easily screen large amounts of Toxics Release Inventory (TRI) data, saving time and resources. RSEI users can perform, ususally in a matter of minutes, a variety of screening-level analyses. Previously, such activities would have taken days, weeks, or even months to organize the relevant information, evaluate that information, and perform the complex and sophisticated analyses that are necessary to provide a risk-related perspective. RSEI is particularly useful for examining trends to measure change, ranking and prioritizing chemicals and industry sectors for strategic planning, conducting risk-related targeting, and supporting community-based projects. Considerable resources can be saved by conducting preliminary analyses with the model to identify risk-related situations of high potential concern, which warrant further evaluation.

RSEI permits full risk-related modeling for air (on-site stack and fugitive and off-site incineration) releases and surface water (direct from TRI reporting facilities and POTWs) releases only. However, all releases and transfers reported to TRI can be viewed from pounds-only and hazard-based (pounds weighted by toxicity) perspectives. This Manual provides instructions specific to the use of the current version of the model, and also describes some additional functions that are not implemented in the current air- and surface water-only model.

In addition to caveats listed throughout this Manual, there are several things to consider when running the current version of the model:

- When installing the RSEI model, please make sure that you sign off of your computer network (e.g., the Novell network), so that the model will be properly installed onto your computer's hard drive. Furthermore, the user must have administration rights on the local computer.
- Because the current version of the model is restricted to the air and surface water modeling results, the full risk-related model results are available only for on-site fugitive and stack air releases and direct surface water releases; risk-related results based on releases to other media (e.g., releases to groundwater) are not available. However, you are able to look at TRI pounds, modeled pounds, hazard ranking, and other subcomponents of the full risk-related model results, for all media.
- Please be aware that the application uses significant computer resources. It may be difficult to use other computer applications at the same time as RSEI.
- The model contains TRI release and transfer information for the time period from reporting years 1996 to 2007. Information from the reporting years 1988 through 1995 is available upon request.
- Information presented in this User's Manual is also available in the model's online help.
- New users are advised to begin with the Tutorials provided in Chapter 4 of the User's Manual, which are a helpful introduction to the RSEI model.

FOR MORE INFORMATION

Supporting analyses for the RSEI model are available in PDF format on the model website at http://www.epa.gov/oppt/rsei. The RSEI Methodology document, which describes in detail the data and algorithms used in the model, is also posted on the website. Since the RSEI model is continuously being updated and revised, check the website for updates, additional analyses, and help with using the model.

Several technical appendices are provided with the installation program. These appendices provide detailed information on toxicity data, physicochemical data, exposure assumptions, locating facilities, stack parameter data, and the differences between the data used by TRI's Public Data Release and RSEI. The technical appendices, an Adobe Acrobat (PDF) version of the User's Manual, and a spreadsheet containing the toxicity data used in the model, can all be found on the RSEI Installation Disk, in the Supporting Information folder.

We would appreciate your comments and suggestions on how this User's Manual may be improved upon to aid you, the user. Thank You.

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CHAPTER 1
Introduction

EPA's Risk-Screening Environmental Indicators (RSEI) model is a screening-level tool that assesses the potential impact of industrial chemical releases from pounds-based, hazard-based, and risk-related perspectives. RSEI uses risk concepts to quickly and easily screen large amounts of data, saving time and resources. RSEI is particularly useful for examining trends to measure change, ranking and prioritizing chemicals and industry sectors for strategic planning, conducting risk-related targeting, and supporting community-based projects.

Using estimates of pounds of chemical releases to investigate potential health and environmental impact is limited by the assumptions that all chemicals are equally toxic and all people are equally exposed. Formal risk assessments are more accurate, but are complicated and time-consuming to prepare, requiring detailed data which are not always available, and the results are often limited in scope and geographic area. The RSEI approach augments estimates of pounds released with toxicity and exposure considerations, but does not address all of the potential factors that a full risk assessment would include.

RSEI considers the following information: the amount of chemical released, the toxicity of the chemical, its fate and transport through the environment, the route and extent of human exposure, and the number of people affected. This information is used to create numerical values that can be added and compared in limitless ways to assess the relative risk of chemicals, facilities, regions, industries, or many other factors. The values are for comparative purposes and only meaningful when compared to other values produced by RSEI. It should be emphasized that the result is not a detailed or quantitative risk assessment, but offers a screening-level, risk-related perspective for relative comparisons of chemical releases.

The RSEI approach is very flexible and can be implemented in various ways. The use of the model is not limited to TRI chemicals; in principle, the adaptable method can model any chemical if toxicity characteristics, physicochemical properties, release levels, and release location are known or can be estimated. The current version of the model addresses chronic human health effects and chronic exposures, and uses estimates of annual releases from EPA's Toxics Release Inventory (TRI).

As an indication of improvements in environmental quality over time, RSEI provides a valuable tool to measure general trends based upon relative risk-related impacts of TRI chemicals. Although the model results do not capture all environmental releases of concern, they do relate changes in releases to relative changes in chronic human health impacts from a large number of toxic chemicals of concern to the Agency. The model also can analyze the relative contribution of chemicals and industrial sectors to environmental impacts, and serves as an analytical basis for further risk analysis, setting priorities for pollution prevention, regulatory initiatives, enforcement targeting, and chemical testing.

The following sections of this chapter describe the RSEI method and the types of questions that can be explored using the model. Chapter 3 describes the main features of Version 2.

Chapter 4 provides three tutorials that will help the new user get started with commonly-used functions. Chapters 5 through 9 describe in detail the operations of the model. Chapter 10 provides information that may be useful when querying the database, including SIC and NAICS codes, score category codes, FIPS codes, and a glossary. Technical Appendices can also be found on the RSEI Installation Disk in a folder called 'Supporting Information.' The appendices present additional information on the following topics: toxicity (Appendix A) and physicochemical data (Appendix B) for TRI chemicals, exposure assumptions used in the model (Appendix C), locational data for on-site and off-site facilities (Appendix D), derived stack parameter data (Appendix E), and data differences between TRI and the RSEI model (Appendix F). A spreadsheet detailing the calculation of the chemical toxicity weights used in the model is also provided on the Installation Disk.

Model Description

The RSEI Chronic Human Health model calculates values that reflect the risk-related impacts on chronic human health of modeled TRI chemical releases and transfers. These values do not provide absolute measures of risk and can only be interpreted as relative measures to be compared with other such values (reflecting the direction and the general magnitude of changes at different points in time when analyzing trends, or identifying the relative contribution of variables in a comparative analysis).

The model uses the reported quantities of TRI releases and transfers of chemicals to estimate the risk-related impacts associated with each type of air or water release or transfer by every TRI facility. The risk-related impacts potentially posed by a chemical are a function of chemical toxicity, the fate and transport of the chemical in the environment after it is released, the pathway of human exposure, and the number of people exposed. RSEI only analyzes the impacts on general populations; individuals, particularly highly exposed individuals, are not the focus of the model.

The RSEI model starts with TRI releases. For each exposure pathway from each chemical release, the model generates an 'Indicator Element'. For instance, a release of the chemical benzene to air via a stack from the 'ABC' Facility in 1999 is an 'Indicator Element'. Each Indicator Element is associated with a set of results, including pounds-based, hazard-based, and risk-related results, also called scores. The risk-related score is a unitless value proportional to the potential risk-related impact of each element.

Each Indicator Element can be combined and compared with other Indicator Elements. There are countless ways that Indicator Elements can be summed together to assess chronic human health impacts. For example, all of the RSEI results can be aggregated for each year to allow an assessment of trends in estimated impacts, or Indicator Elements can be summed to allow users to compare results for facilities, regions, chemicals, and any combinations of these and other variables. RSEI does not perform a detailed or quantitative risk assessment, but offers a screening-level, risk-related perspective for relative comparisons of chemical releases. The model does not estimate actual risk to individuals. RSEI results are only meaningful when compared to other results produced by RSEI.

The current version of the model calculates risk-related results for the air and surface water

pathways only. For other pathways, and in instances where information needed to model a release is not available, only pounds-based and hazard-based perspectives are available. In cases where toxicity weights are not available, only pounds-based results can be viewed.

In addition, RSEI allows users to look at pounds- and hazard-based results using the same kinds of combinations and comparisons. For a detailed description of the RSEI model and components of the model, refer to EPA's Risk-Screening Environmental Indicators Methodology (available on the RSEI website at http://www.epa.gov/oppt/rsei), which represents the most recent full documentation of the model.

Geographic Basis of the Model

The RSEI model relies on the ability to locate facilities and people geographically, and to attribute physical characteristics, such as meteorology, to the facilities once they are located. To locate the facilities and the attribute data to those facilities, the RSEI model describes the United States and its territories (Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the Northern Mariana Islands) as a 810-m by 810-m grid system. For each cell in the grid, a location address in terms of (X,Y) coordinates is assigned based on latitude and longitude (lat/long).

RSEI uses a standard Albers Equal-Area projection to create each of the grids that is used in the model. The grid system is split into six individual grids which cover the continental U.S., Alaska, Hawaii, and the territories. Each unique cell address is composed of (1) the grid number, and (2) the (x,y) address of the cell in that grid. The Methodology document provides the grid number (used in the model to identify each grid), the grid characteristics that can be used to recreate the grid in a GIS-based system, and the bounding coordinates for each.

Once the grid system for the U.S. is established, facilities can be located in it. The ability of the RSEI model to accurately locate a facility depends on the accuracy of the lat/long coordinates describing its location. RSEI uses the best set of coordinates for each facility from EPA's Locational Reference Tables (LRT). Facilities are projected onto each grid using GIS software and the (*x,y*) coordinates of the cell where the facility is mapped are assigned to the facility. Once a grid cell's (*x,y*) coordinates are assigned, the facility is assumed to be at the cell's center, for ease of modeling. For a complete description of the method used to select lat/long coordinates for both reporting facilities and off-site facilities, see Technical Appendix D.

In order to estimate potential exposure, the U.S. population must also be geographically located on the model grid. The RSEI model uses U.S. Decennial Census data for 1990 and 2000 at the block level (Census data provided by GeoLytics, Inc., East Brunswick, NJ). In previous versions of the model, U.S. Census race categories were available for viewing on the map (not for calculating results). However, due to complications arising from changes in race categorization for the 2000 Census, race categories are not available for viewing in the current version of the model. The following sections describe how the U.S. Census data were used to generate annual population estimates for age and sex, and how the unit of analysis for the U.S. Census (the block) is translated into the unit of analysis for the model (the grid cell).

Population data. U.S. Census block-level data are used to estimate the number of people in

each grid cell, as well as their demographic characteristics. Census blocks are the smallest geographic area for which decennial census data are collected. Blocks are of varying size, formed by streets, roads, railroads, streams and other bodies of water, other visible physical and cultural features, and the legal boundaries shown on Census Bureau maps. In 1990, there were approximately 7 million census blocks. Due to boundary changes and increased resolution for highly populated areas, there were approximately 9 million blocks in the 2000 Census.

Block-level information from the 1990 Census and the 2000 Census are used to create detailed age-sex variables for each of the census blocks in the US for 1990 and for 2000. (For 1990, not all of the variables were available at the block level. For those variables that were only available at the block group level, block group ratios were calculated and applied to the data at the block level. For 2000, all of the required data were available at the block level.) The following variables are available in the RSEI model:

- Males Aged 0 through 9 years
- Males Aged 10 through 17 years
- Males Aged 18 through 44 years
- Males Aged 45 through 64 years (Results for this subpopulation are not displayed separately in the model)
- Males Aged 65 years and Older
- Females Aged 0 through 9 years
- Females Aged 10 through 17 years
- Females Aged 18 through 44 years
- Females Aged 45 through 64 years (Results for this subpopulation are not displayed separately in the model)
- Females Aged 65 years and Older

Because the Census block boundaries have changed between 1990 and 2000, the block level data are first transferred to the RSEI model grid, which is unchanging, using the method described below in **Mapping block populations to grid cells**. Once on the grid, a straight-line interpolation is performed for each grid cell between 1990 to 2000 to create annual estimates of the population for each grid cell for each year. The straight line is also extended to estimate population for 1988 and 1989, and for 2001 and 2002.

Puerto Rico and Territories. For Puerto Rico, mapping limitations dictated the use of block group data rather than block level data for 1990 (shapefiles were not available at the lower level of resolution). However, block level data were used for 2000. For the U.S. Virgin Islands, American Samoa, Guam, and the Northern Mariana Islands, mapping was limited to whole-island areas or county equivalents, so the population data are also at this level of detail. The population is assumed to be distributed evenly through each whole-island area or county equivalent. Detailed demographic data were not available, so Census Bureau estimates of age and sex ratios for 2000 were used instead, and applied to actual 1990 and 2000 Census totals.

Mapping block populations to grid cells. Once annual detailed demographic data sets are created, the model translates the data from Census blocks to the model's 810-m by 810-m grid cells. The Census provides the geometry for each block in the Topologically Integrated Geographic Encoding and Referencing (TIGER) geographic database. The boundaries and area for each block were derived from the TIGER database. The location of each grid cell is defined by its four corner points, calculated from its (*x,y*) coordinates. The RSEI model uses the derived block boundary files to map each block to its corresponding cells in the grid according to the portion of the block's total area that falls within each cell. The area of a block that falls within a grid cell is divided by the total area for that block, then that fraction is multiplied by the block's population and subpopulations to determine its contribution to the grid cell's population. The population is assumed to be distributed evenly throughout the block. If more than one block overlays a grid cell, then the populations contributed by the multiple blocks are summed.

Components of the Model

Once facilities and people are located on the model's grid, three main components are used to compute risk-related impacts in the RSEI model. These components are:

- the quantity of chemicals released or transferred,
- adjustments for chronic human health toxicity,
- adjustments for exposure potential and population size

These components and the method used to combine them are described in the following sections.

Chemical Releases and Transfers

The model uses information on facilities' chemical releases and transfers from these facilities to off-site facilities (such as sewage treatment plants and incinerators) to model risk-related impacts. These releases are reported by facilities to the Toxics Release Inventory (TRI), as mandated by the Emergency Planning and Community Right-to-Know Act (EPCRA). As of the 2007 reporting year, there are 611 TRI chemicals and chemical categories listed. Users can view pounds of chemicals released per year (pounds-based results) for any combination of variables included in the model.

Adjustments for Chronic Human Health Toxicity

The model is based on current EPA methodologies for assessing toxicity. The method EPA has chosen for assigning toxicity weights to chemicals is clear and reproducible, based upon easily accessible and publicly available information, and uses expert EPA-wide judgments to the greatest extent possible. RSEI reflects the toxicities of chemicals relative to one another using a continuous system of numerical weights. Toxicity weights for chemicals increase as the toxicological potential to cause chronic human health effects increases. Toxicity-adjusted releases are called "hazard-based results" and provide an alternative perspective to pounds-based or full risk-related results, and are especially valuable when necessary data for risk-related modeling are not available.

Toxicity Data

Values developed by EPA experts are used to differentiate the degrees and types of toxicity of chemicals and rank them in a consistent manner. Values called Oral Slope Factors and Inhalation Unit Risks provide information pertaining to toxicity for chemicals that may cause cancer. Reference Doses (RfDs) and Reference Concentrations (RfCs) provide toxicity information related to noncancer effects. Where these values are not available from EPA, other data sources may be used.

See Glossary for Definitions

The following data sources are used, in the order of preference:

- EPA's Integrated Risk Information System (IRIS);
- EPA Office of Pesticide Programs' Toxicity Tracking Reports (OPP) and Pesticide Reregistration Elegibility Documents (REDs);
- Agency for Toxic Substances and Disease Registry final, published chronic MRLs (ATSDR);
- California Environmental Protection Agency's Office of Environmental Health Hazard Assessment final, published toxicity values (Cal/EPA);
- EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), which include toxicity values that have been developed by EPA's Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC);
- EPA's Health Effects Assessment Summary Tables (HEAST); and
- Final Derived/Interim Derived Toxicity Weights (Derived) estimated by EPA's Office of Pollution Prevention and Toxics.

The data sources are used in a tiered fashion. The first tier consists of IRIS and OPP. The most recent data for each chemical's chronic human health endpoint is used. If the dates are comparable, preference is given to IRIS. The second tier consists of ATSDR and Cal/EPA. Again, the most recent source of the two is used for any chemical's chronic human health endpoint not found in the first tier. In the absence of data from first or second tier sources for an individual chronic health endpoint, the following data sources are used, in the order of preference: PPRTVs, HEAST, Final/Interim Derived, and IRIS values previously used in toxicity weighting, but withdrawn pending revision.

For chemicals with carcinogenicity risk values, Weight of Evidence (WOE) values were obtained using the same data source hierarchy. Therefore, preference was given to WOE's from IRIS or OPP. As a general rule, chemicals with cancer potency factors from IRIS or OPP will also have WOEs. CalEPA, however, references either EPA or IARC for WOE designations. Therefore, in the absence of an EPA consensus WOE, WOE's were obtained from the International Agency for Research on Cancer (IARC). However, due to the differences in WOE definition, it is not always possible to translate IARC WOE's into EPA WOE's without examining the toxicity data. WOE's were matched in the following way:

- IARC Group 1 = EPA Group A (Human Carcinogen)
- IARC Group 2A = EPA Group B (Probable Human Carcinogen)
- IARC Group 2B = EPA Group B or EPA Group C (Possible Carcinogen)
- IARC Group 3 = EPA Group D (Not Classifiable as to Human Carcinogenicity)
- IARC Group 4 = EPA Group E (Evidence of Non-Carcinogenicity)

The IARC 2B designation is not easily translated to the EPA designation, and spans EPA Groups B and C. This is a particularly important distinction because the use of a B2 or C designation will affect the calculation of the toxicity weight (see below). Therefore, for the chemicals with IARC 2B designations, summaries of the toxicity data used to generate the oral slope factor or inhalation unit risk were evaluated to derive WOEs. Since these are primarily chemicals with data from CalEPA, the CalEPA "Technical Support Document for Describing Available Cancer Potency Factors" was used for the background information.

Calculating Toxicity Weights

The RSEI toxicity scoring method evaluates inhalation and oral exposure routes for both cancer and noncancer effects. For each exposure route, chemicals are scored based on their single most sensitive adverse effect. For the various noncancer health endpoints, the toxicity weighting methodology does not distinguish between chemicals based on type or target of effect (e.g., neurotoxicity vs. developmental toxicity), nor does it address multiple effects which may be exhibited by a chemical. When values are available for only one route of exposure, the same toxicity weight is applied to reflect the potential for both inhalation and oral toxicity, provided there is no evidence the effects are route-specific or limited to the portal of entry into the body. Specifically, in limited instances, toxicity studies are available to show a given chemical causes no health effects by one exposure route. In these instances, a toxicity weight is assigned only to the route that results in chronic human health effects. In the RSEI methodology, the algorithms shown below are used to assign toxicity weights.

Table 1. Algorithms for Assigning Toxicity Weights

	Oral Pathway	Inhalation Pathway
Non-Carcinogens:	1 / RfD (mg/kg-day)	3.5 / RfC (mg/m3)
Carcinogens (WOE categories A and B):	Oral Slope Factor (risk per mg/kg-day)/ 1.0 x 10-6	Inhalation Unit Risk (risk per mg/m3)/ 2.8 x 10-7
Carcinogens (WOE category C):	Oral Slope Factor (risk per mg/kg-day)/ (1.0 x 10-6 * 10)	Inhalation Unit Risk (risk per mg/m3)/ (2.8 x 10-7 * 10)

The distribution of toxicity values for TRI chemicals corresponds to a range of toxicity weights of approximately 0.02 to 500,000,000. However, toxicity weights are not bounded. Toxicity weights are expressed as values with two significant figures.

There are 611 chemicals and chemical categories on the 2007 TRI Chemical List. Toxicity weights are available for 433 of these chemicals and chemical categories. The 433 chemicals with toxicity weights account for over 99% of the reported pounds for all on-site releases in 2007. Beginning with version 2.1.5, each metal compounds category is combined with its elemental form in RSEI, unlike in TRI where they are reported separately. This is done to reflect the uncertainty of the chemical identity of the substance released. For example, TRI has separate reporting for 'nickel' and 'nickel compounds'. Both reflect the pounds of the parent metal nickel that is released and, in some cases, the two can be combined as a single report for nickel compounds. RSEI combines the pounds into one entry listed as 'nickel and nickel compounds'.

More information on the toxicity data used in the model can be found in Technical Appendix A. A complete discussion of the methods used in these evaluations, as well as the chemical-by-chemical data summaries and score assignments, are provided the Toxicity Weighting Methodology document, which can be found on the RSEI website (www.epa.gov/oppt/rsei).

Adjustments for Exposure Potential

Quantitatively, exposure potential is estimated using a surrogate dose. To estimate the surrogate dose, a separate exposure evaluation is conducted for each pathway-specific chemical emission. The exposure evaluations use models that incorporate data on media- and pathway-specific chemical releases and transfers, physicochemical properties and, where available, site characteristics, to estimate the ambient chemical concentration in the medium into which the chemical is released or transferred. The ambient concentrations are combined with human exposure assumptions and estimates of exposed population size specific to age and sex. Specific exposure factors are discussed in each section below.

The algorithms for calculating surrogate doses rely on the ability to locate facilities and people geographically on the 810-m by 810-m grid cell system described earlier. While this method uses the EPA exposure assessment paradigm to evaluate exposure potential, the results should not be construed as an actual numerical estimate of dose resulting from TRI releases, because limited facility-specific data and the use of models that rely on default values for many parameters prevent the calculation of an actual dose. Instead, the purpose of the methodology is to generate as accurate a surrogate dose as possible without conducting an in-depth risk assessment. The estimates of surrogate doses from releases of TRI chemicals are relative to the surrogate doses resulting from other releases included in the model.

The sections below discuss each of the exposure pathways included in the model. Please note that not all pathways are currently modeled in the RSEI model. For pathways that are not modeled, risk-related results are not available, but users can examine results from pounds-based and hazard-based perspectives.

Stack and Fugitive Air Releases

This method uses algorithms from EPA's AERMOD model, developed by the Office of Air Quality Planning and Standards (OAQPS). AERMOD is a steady-state plume model used to

estimate long-term pollutant concentrations downwind of a stack or area source. The concentration is a function of facility-specific parameters (such as stack height and diameter), meteorology, and chemical-specific, first-order air decay rates. The air decay rates are based on either photooxidation or, in rare cases, hydrolysis in air.

AERMOD then uses meteorological and chemical-specific decay rates to estimate the air concentrations at small intervals in a circle with radius 49km surrounding the grid cell containing the facility. Air concentrations are calculated at 5 km increments from 5 km to 49 km away from the facility. Each concentration is calculated at the midpoint of the edge closest to the source in the center cell. For the center cell in which the facility is located, the RSEI model splits the center cell into 401 sub-cells (each sub-cell is 50 m by 50 m), and assigns the average concentration of these sub-cells to the 810-m by 810-m center cell.

Stack height data were obtained from the National Emissions Inventory (NEI), the AIRS Facility Subsystem (AFS) within the Aerometric Information Retrieval System (AIRS), the National Emission Trends (NET) Database, and databases from three individual states (California, New York, and Wisconsin). For each TRI facility that had stack height data in one or more of these sources, the median height of all stacks at the facility is used in the RSEI model. For the TRI facilities which had no stack height data in these sources, a Standard Industrial Classification (SIC) code-based median stack height is assigned to the facility. The SIC code-based stack height is estimated from data in AFS and the NET Database for facilities in the appropriate 3-digit SIC code or in the 2-digit SIC code if the 3-digit SIC code is unavailable (based on the TRI facility's primary SIC Code). If no 2-digit SIC code is available, the median of all stack heights with TRI-reportable SIC codes is used.

For both stack diameter and exit gas velocity, the RSEI model uses the same data sources, criteria, and statistical methods described above for stack height data. Specifically, the model uses either the median value of all stacks for TRI facilities with this information or a SIC code-based median value for facilities without the appropriate stack data. Exit gas velocity data are obtained from NEI, AFS, NET, and state-specific databases. Stack diameter data are obtained from NEI, AFS and NET.

An additional data source was used for some of the new industries added in Reporting Year 1998. The Electric Power Research Institute (EPRI) provided EPA with two databases of site-specific data for electric utilities, including stack height, stack diameter, and stack velocity. Approximately 600 TRI facilities report one of the three electric utility SIC codes (4911- Electric Services; 4931- Electric and Other Services Combined; or 4939- Combination Utilities, not elsewhere classified). Where possible, TRI facilities were matched to facilities in the EPRI data, and the EPRI stack parameters were used. For the facilities that could not be matched, the median parameters from the EPRI data were used.

Analyses have been conducted that show that the concentrations predicted by the RSEI model using a combination of generic and site-specific data closely match concentrations estimated by using more complete site-specific data. For complete details on the derivation of stack parameter data, see Technical Appendix E.

For air releases, chemical concentrations are calculated at increments inside a circle with radius of 49 km surrounding the facility. The concentration is multiplied by age-sex specific

inhalation rates, as shown in Table 2 below. This calculates the surrogate dose for each of the ten age-sex categories included in the model. The population assigned to each grid cell is assumed to be exposed to the concentration calculated for that grid cell.

Table 2. Exposure Factors for Air Releases

Age-Sex Category	Inhalation Rate (m^3/kg/day)
Male 0 to 9	0.341
Male 10 to 17	0.341
Male 18 to 44	0.209
Male 45 to 64	0.194
Male 65 and up	0.174
Female 0 to 9	0.31
Female 10 to 17	0.31
Female 18 to 44	0.186
Female 45 to 64	0.165
Female 65 and up	0.153

Source: U.S. EPA, 1997. Environmental Factors Handbook.

Direct Surface Water Releases

Chemicals released directly to surface waters are modeled using a simple first-order decay equation, along with estimates of river discharge and velocity. Chemical concentrations are estimated for distances up to 300 km downstream from the chemical release to take into account drinking water intakes up to 300 km downstream. The chemical-specific decay coefficient is predominantly based on either abiotic hydrolysis or microbial biodegradation, but it may also be based on photooxidation.

This method considers two chronic human health exposure pathways from surface water releases. First, exposures from drinking water are calculated. Chemical releases from on-site or off-site facilities into water are assumed to be discharged into the stream reach nearest the facility, unless a specific discharge reach has been determined from EPA data sources. As the chemical travels downstream, concentrations at public drinking water intakes are estimated. The number of people served by the water system supplied by the intake is assumed to be the population exposed to the chemical concentration. However, because only the number of people served, not their geographic location, is known, the model uses the demographic breakdown of all the people in a 80 km radius around each intake as a surrogate for the actual number of people in each age-sex subgroup served by the drinking water intake. Drinking water

ingestion rates are shown in Table 2 below. If a stream reach contains no drinking water intake, the exposed population is zero. The concentrations at the drinking water intake for chemicals for which EPA has established Maximum Contaminant Levels (MCLs) are assumed to not exceed the relevant MCLs that were in effect for the year of the release (some information prior to 1991 is not available, see **'MCL'** in Chapter 5 for details).

A second potential exposure pathway is from consumption of contaminated fish. Each segment of the affected surface water reach may contain contaminated fish which could be caught and eaten by recreational and subsistence fishers. As described above, the model tracks the concentration of the chemical as it travels downstream. In each stream reach, the estimated concentration in fish is derived by multiplying the chemical concentration in the water by a factor to account for bioconcentration of the chemical from water into fish. County- and state-specific fishing license data are used to estimate the percentage of people in each county who fish. This number is multiplied by an estimate of average household size to obtain the portion of each county's total population that eats fish. Since most fishers travel a maximum of 50 miles (80 km) to fish, the population within 50 miles (according to Census data) of a reach modeled as having a nonzero chemical concentration is multiplied by the county-specific fish-eating percentage to obtain the total exposed population. Recreational fishers and their families are assumed to comprise 95 percent of this exposed population. Subsistence fishers and families make up the remaining 5 percent. Subsistence fishers are also assumed to eat substantially greater amounts of fish than recreational fishers, as shown in Table 3 below.

Table 3. Exposure Factors for Water Releases

Age-Sex Category	Drinking Water Ingestion Rate (L/kg/day)	Recreational Fish Ingestion Rate (g/kg/day)	Subsistence Fish Ingestion Rate (g/kg/day)
Male 0 to 9	0.0298	0.0756	2.83
Male 10 to 17	0.0298	0.0756	2.83
Male 18 to 44	0.0184	0.199	1.92
Male 45 to 64	0.022	0.407	2.08
Male 65 and up	0.0219	0.434	2.22
Female 0 to 9	0.0298	0.0372	2.05
Female 10 to 17	0.0298	0.0372	2.05
Female 18 to 44	0.0184	0.114	1.71
Female 45 to 64	0.022	0.262	1.6
Female 65 and up	0.0219	0.267	1.63

Source: U.S. EPA, 1997. Environmental Factors Handbook; U.S. EPA, 2000. Estimated Per Capita Fish Consumption in the United States: Based on Data Collected by the United States Department of Agriculture's 1994-1996 Continuing Survey of Food Intake by Individuals.

Land Releases

On- and off-site land releases include releases to landfills, surface impoundments, land treatment units and underground injection wells. For these releases, two major exposure pathways are of interest: volatilization to air or leaching into groundwater. Volatilization of chemicals from on-site land releases is reported to TRI under the fugitive emission estimate for the facility, and is handled as a fugitive air release. For more information on RSEI modeling of fugitive air releases, see **Air Releases** above. The current version of RSEI does not provide risk modeling for reported land releases. However, RSEI does provide the capability for users to examine the pounds of releases to land that are reported to TRI, as well as viewing these releases from a hazard-based perspective.

The potential for groundwater contamination from land releases depends on the regulatory status of the unit in which the chemical is released. For example, chemicals could be deposited in an on-site RCRA-regulated, subtitle C hazardous waste unit, or in an on-site nonhazardous solid waste management unit. RCRA standards for hazardous waste units are, by regulation, designed to include technical controls to prevent release of contaminants into groundwater. If chemicals are placed in such regulated units, EPA assumes that releases to groundwater are negligible so RSEI would assign a zero value to the risk-related scores for such releases. If chemicals are placed in nonhazardous land disposal units (landfills, etc.), there is a potential for exposure. This exposure pathway and volatilization from off-site landfills are currently under review for inclusion in a future version of RSEI.

On- and off-site land releases to underground injection are not modeled for exposure by RSEI. The hydrogeological, spatial, and temporal considerations that are associated with exposures to toxic chemicals in underground injection wells are situation- and site-specific, so RSEI is only able to provide pounds-based and hazard-based perspectives for this type of land release. Note, however, that under well-managed conditions, Class I wells (there are five classes of wells) are specifically designed to pose minimal risk to human health or the environment.

Releases to POTWs

On-site facilities can also transfer chemicals to Publicly-Owned Treatment Works (POTWs). Modeling exposure from TRI-reported transfers to POTWs requires several pieces of information: (1) location of the POTW to which the chemicals are discharged, (2) consideration of overall removal efficiencies of POTWs and resulting effluent discharges from POTWs, (3) consideration of residuals management at POTWs, and (4) identification of the receiving stream reach.

Locating the POTW. As with all off-site facilities, POTW names and addresses are reported to TRI by the facility transferring its waste. Latitude and longitude are not reported. In order to derive coordinates, the reported street addresses were geocoded (coordinates were assigned based on street address) by Thomas Computing Services, a commercial firm. Facilities with insufficient or incorrect street addresses are matched, if possible, with facilities with better locational data. If no matches can be found, the facility is assumed to be located at the center of its reported zip code. Once latitude and longitude for a facility are determined, the data are used

to map the facility to a given grid cell, using the equations described in Chapter 3 of the Methodology document. Substantial data processing was necessary to prepare the set of off-site facilities for use in the model; see Technical Appendix D for details on the steps that were taken.

Overall POTW Removal Rate. POTWs cannot completely remove all of the chemicals that are transferred to the plant. Some of the chemical loading in the influent will be discharged as effluent to surface waters. To calculate the fraction of transferred chemical removed by the POTW, the typical contaminant-specific removal rate is applied to the volume transferred to the POTW from the TRI facility.

Partitioning within the POTW. Chemical loadings may be removed by the POTW treatment processes through biodegradation, volatilization, and adsorption to sludge. The amount of the chemical that is removed by each of these processes is modeled using average chemical-specific partitioning rates. Chemical-specific partition rates are provided in Technical Appendix B.

Once the fates of chemicals entering the POTW are estimated, exposures associated with chemical loadings to each compartment are estimated. Chemicals discharged in the POTW effluent are modeled using the surface water evaluation methods described above. Chemicals that biodegrade are assumed to degrade to chemicals that do not pose risk. POTW volatilization releases are treated like area-source air releases, as described above.

For chemicals that partition to sludge, the model used to estimate exposure should ideally depend on the sludge disposal method employed by the POTW. However, sludge disposal practices at a POTW receiving a TRI transfer cannot be determined from the TRI database. Therefore, the RSEI algorithm currently assumes all POTW sludge to be landfilled at the POTW, a common method of sludge disposal. Landfilling of sludge is not currently modeled in RSEI. POTWs may in reality use other methods of sludge disposal, such as incineration. If sludge were incinerated by a POTW, for example, this would result in different exposure levels (and a different, larger exposed population).

Locating the receiving stream reach. In the same method as for TRI reporting facilities, POTWs are assumed to discharge to the nearest stream reach. However, some POTW-specific information from EPA data sources was used where it was available.

Off-site Transfers

This category includes any transfers to waste brokers, non-POTW treatment facilities or recycling facilities, and includes such offsite activities as storage, recycling and recovery, treatment, incineration, underground injection, landfill, and land treatment (i.e., those TRI media codes beginning with ‘M’). TRI reporters are required to supply the name and address of the facility that receives wastes for storage or disposal. From these data, EPA determines whether wastes are sent to a hazardous or nonhazardous waste management facility. As with underground injection wells, transfers to RCRA hazardous waste facilities are not modeled. If chemicals are placed in such regulated units, it is assumed that releases to groundwater are negligible.

The determination of locational data for off-site facilities is conducted in the same manner as for POTWs.

The RSEI methodology then requires information on the treatment and disposal technologies used by the facility. If the treatment method is incineration, then destruction and removal efficiencies (DREs) are applied to the transfer amount, and the releases are modeled using ISCLT, as described above in the discussion of stack and fugitive air releases.

For off-site landfills, two major exposure pathways are considered: groundwater and volatilization. These pathways are currently not modeled; however, users can examine pounds- and hazard-based perspectives for these pathways.

RSEI Results

Because of the multi-functional nature of the model, a variety of results can be created. All RSEI results start with an Indicator Element, which is a unique combination of chemical, facility, exposure pathway, and year. Some Indicator Elements may be associated with certain release and exposure pathways (e.g., direct water releases may be associated with exposure from drinking water intakes, as well as fish ingestion from recreational fishing and from subsistence fishing). Each Indicator Element has a set of associated results:

Risk-related results	Surrogate Dose x Toxicity Weight x Population
Hazard-based results	Pounds x Toxicity Weight
Pounds-based results	TRI Pounds released

Risk-related results. The toxicity, surrogate dose, and population components are multiplied to obtain a risk score for the Indicator Element. The surrogate dose is determined through pathway-specific modeling of the fate and transport of the chemical through the environment, combined with subpopulation-specific exposure factors. The score is a unitless measure that is not independently meaningful, but is a risk-related estimate that can be compared to other estimates calculated using the same methods. If the Indicator Element cannot be modeled, because of the lack of data needed for modeling or because the exposure pathway is not currently modeled, then the risk-related score is zero. The model calculates risk-related results for the entire population and also for the following subpopulations: children under 10, children aged 10 to 17, males aged 18 to 44, females aged 18 to 44, and adults aged 65 and over. In addition the model also calculates 'Modeled Pounds,' which is simply the number of pounds that can be modeled for risk-related scores. Modeled pounds are the pounds to which fate and transport modeling and exposure assumptions have been applied.

Hazard-based results. Each Indicator Element is also associated with a hazard-based result, calculated by multiplying the pounds released by the chemical-specific toxicity weight for the exposure route (oral or inhalation) associated with the release. For these results, no exposure modeling or population estimates are involved. If there is no toxicity weight available for the chemical, then the hazard score is zero.

The model also calculates 'Modeled Hazard,' which is the chemical-specific toxicity weights multiplied by the Modeled Pounds (as described above), and 'Modeled Hazard * Pop,' which multiplies modeled hazard by the exposed population, but without the fate and transport modeling that would be found in risk-related results.

Pounds-based results. These results include only the pounds of releases reported to TRI, and are available for all Indicator Elements. The model also provides TRI pounds with toxicity weights, which just sums the pounds for the chemicals that have toxicity weights in the RSEI model.

Once results are calculated for each Indicator Element, they can be combined in many different ways. All of the results are additive, so a result for a specific set of variables is calculated by summing all the relevant individual Indicator Element results, as follows:

$$R = \sum\sum\sum IE_{c,f,p}$$

where:

R	=	RSEI result, and
$IE_{c,f,p}$	=	chemical-facility-pathway-specific Indicator Element result.

This method is very flexible, allowing for countless variation in the creation of results. For example, results can be calculated for various subsets of variables (e.g., chemical, facility, exposure pathway) and compared to each other to assess the relative contribution of each subset to the total potential impact. Or, results for the same subset of variables for different years can be calculated, to assess the general trend in pounds-based, hazard-based, or risk-related impacts over time.

It must be reiterated that while changes in results over the years would imply that there have been changes in hazard- or risk-related environmental impacts, the actual magnitude of any specific change or the reason for the change may not be obvious. Although the value itself may be useful in identifying facilities or chemicals with the highest potential for hazard or risk, the weight does not represent a quantitative estimate or provide an exact indication of the magnitude of individual hazard or risk associated with that facility or chemical.

Analyses That Can be Performed Using the RSEI Model

Users of the model can perform a variety of screening-level analyses, usually in a matter of minutes. Previously, such activities would have taken days, weeks, or even months to organize the relevant information, evaluate that information, and perform the complex and sophisticated analyses that are necessary to provide a risk-related perspective. Results can be used for screening-level ranking and prioritization for strategic planning purposes, risk-related targeting, and trends analyses. Considerable resources can be saved by conducting preliminary analyses with the model to identify risk-related situations of high potential concern that warrant further evaluation.

As noted above, users can evaluate releases using a number of variables, such as chemical, medium, geographic area or industry. For instance, the following types of questions can be investigated:

- How do industry sectors compare to one another from a risk-related perspective?
- What is the relative contribution of chemicals within a given industry sector?
- What release pathway for a particular chemical poses the greatest risk-related impacts?

Users can view pounds-based, hazard-based, and other results, to investigate the relative influence of toxicity and population components on the risk-related results, which also incorporate exposure modeling.

Information regarding the RSEI project is available on the RSEI website. Complete documentation, frequently asked questions, and contact information are all posted on the site. Periodic updates and troubleshooting information are also available for users.

Important Caveats Regarding the RSEI Chronic Human Health Model

The RSEI model is a screening tool that provides a risk-related perspective in assessing the relative impacts of releases of toxic chemicals. Risk-related results are available for releases and transfers to air and water, and pounds- and hazard-based results are available for all media. RSEI combines estimates of toxicity, exposure level, and the exposed population to provide risk-related comparisons. It does not provide a detailed or quantitative assessment of risk, and is not designed as a substitute for more comprehensive, site-specific risk assessments. There are a number of important considerations associated with each component of the model, as described in the following sections.

Release Component

The following caveat should be considered regarding the release component of the model:

• RSEI uses facility-reported TRI data which is known to contain some reporting errors. Since facility management must certify reports to be accurate, the TRI program does not change any reported data until the reporting facility submits an official correction. Therefore, there are some releases in the TRI data that are thought to be erroneous but are still included because facilities have not submitted corrected reporting forms by the time of the annual public data release that RSEI uses. Some of these releases are associated with large risk-related impacts. One erroneous release warrants special note: a 2002 fugitive air release of 184,770 pounds of nickel in Johnstown, PA probably overstates the release amount and may be assigned to the wrong media.

Toxicity Component

The following caveats should be considered regarding the toxicity component of the model:

• Toxicity weights are not designed to (and may not) correlate with statutory criteria used for

listing and delisting chemicals in TRI. RSEI risk-related model results account for estimated exposure and may not correlate with listing/de-listing decisions.

• RSEI only addresses chronic human toxicity (cancer and noncancer effects, such as developmental toxicity, reproductive toxicity, neurotoxicity, etc.) associated with long-term exposure and does not address concerns for either acute human toxicity or environmental toxicity.

• Toxicity weights are based upon the single, most sensitive chronic human health endpoint for inhalation or oral exposure pathways, and do not reflect severity of effects or multiple health effects.

• Estimated Reference Doses and Reference Concentrations for noncancer effects incorporate uncertainty factors which are reflected in toxicity weights that are based upon these values.

• Toxicity weights for chemicals that are reported to TRI as groups are based on the toxicity for the most toxic member of the group. One exception to this is polycyclic aromatic compounds (PACs), the toxicity for which is assumed to be 18% of the toxicity for benzo(a)pyrene, its most toxic member. This is based on speciation information and follows the method used by EPA's National-Scale Air Toxics Assessment (NATA) evaluation for polycyclic organic matter.

• Several significant assumptions are made regarding metals and metal compounds, because important data regarding these chemicals are not subject to TRI reporting. Metals and metal compounds are assumed to have the same toxicity weight, although the chronic toxicity of some metal compounds may be higher. Metals and metal compounds are assumed to be released in the valence (or oxidation state) associated with the highest chronic toxicity. The only exception is chromium and chromium compounds, for which it is assumed that facilities may release some combination of hexavalent chromium and trivalent chromium. SIC-code specific estimates from the 2002 National Emissions Inventory are used to estimate the fraction of each type (available from http://www.epa.gov/ttn/chief/net/2002inventory.html). As trivalent chromium has a very low toxicity, only the hexavalent fraction is modeled, using a toxicity weight specifically for that valence state.

• While the physical form of released metals or metal compounds can affect toxicity, a reasonable assumption is made regarding the likely form of most releases (e.g., the non-cancer toxicity weight for chromic acid mists and dissolved hexavalent chromium aerosols is much higher than for hexavalent chromium particulates, but releases of these chemicals as acid aerosols are not expected to be typical so the toxicity weight for cancer based on the inhalation of particulates is used). Analysts need to consider these assumptions, and whether the gathering of additional data is warranted, when examining model results for metals and metal compounds.

Exposure Component

The following caveats should be considered regarding the exposure component of the model:

• Like other exposure models, RSEI estimates exposure levels. It does not yield actual

exposures. The model provides estimated air concentrations in each grid cell.

• The model uses some generic assumptions, e.g., default median stack heights, diameters, and exit gas velocities related to 2- or 3-digit Standard Industrial Classification (SIC) codes, or a nationwide median, where facility-specific median stack height, diameter, and exit gas velocity data are unavailable. For large facilities with multiple stacks, the median height for all stacks is used as the stack height for the entire facility.

• In the current version of the model, only air and direct surface water exposures are fully modeled.

• The model does not account for population activity patterns.

• The model has greater uncertainty when examining disaggregated results at the local or facility level. The model does not account for indirect exposure, air deposition of pollutants to other media, or absorption of pollutants through the skin.

Population Component

The following caveats should be considered regarding the population component of the model.

• Population values for non-decennial years are estimated based on linear interpolations at the block level between the 1990 and 2000 U.S. Census dates, and on extrapolations back to 1988 and forward to 2007.

• Drinking water populations are estimated by using the total drinking water populations associated with individual downstream drinking water intakes. Estimated populations for the fish ingestion pathway are based upon U.S. Fish and Wildlife Service surveys.

• Because RSEI results reflect changing population size at the local level, a facility's relative contribution could increase or decrease even without changes in its releases over time. While the model is designed to reflect the overall risk-related impacts on the local population, such population changes should be considered when examining a facility's environmental management practices.

Strengths and Limitations of the Chronic Human Health Model

Strengths

The following are strengths of the model:

• The model provides important hazard-based and risk-related perspectives regarding the impacts of TRI releases on chronic human health.

• The model quickly organizes and evaluates complex data. For example, the air exposure model is combined with U.S. Census data to directly estimate the size of exposed populations and subpopulations and the magnitude of their exposure, rather than assuming that all

individuals surrounding a facility are equally exposed.

• The model allows for greatly increased speed in performing screening analyses, thereby conserving resources for conducting more precise, site-specific risk evaluations. In addition, its use as a priority-setting tool allows resources to be focused in areas that will provide the greatest potential risk reduction.

• The model can perform single- and multi-media analyses.

• Custom-designed selections can be based upon a wide range of variables.

• This adaptable method can model any chemical if toxicity characteristics, appropriate physicochemical properties, release levels and release location are known or can be estimated.

• The model considers both cancer and non-cancer chronic human health endpoints.

• The RSEI method has been subject to repeated expert peer review.

• The model's methodology and assumptions are transparent. Complete and detailed documentation of the RSEI model is available.

Limitations

The following are limitations of the model:

• RSEI results do not provide users with quantitative risk estimates (e.g., excess cases of cancer).

• RSEI results do not evaluate individual risk.

• The model does not account for all sources of TRI chemicals; it only accounts for those sources that are required to report to TRI. It also does not provide scores for all TRI chemicals, although chemicals without toxicity weights account for a very small percentage of total releases and of total risk-related impacts.

• TRI does not account for all toxic chemicals.

• The model assumes that air concentrations of TRI chemicals are the same for indoor and outdoor exposures, and that populations are continuously exposed.

• Dermal and food ingestion pathways (other than fish consumption), and some other indirect exposure pathways are not evaluated.

• Acute health effects associated with short-term, periodic exposures to higher levels of these same chemicals are not addressed.

• Ecological effects are not addressed.

CHAPTER 2
Installation Instructions for CD-ROM

System Requirements

To install and run the RSEI model requires approximately 2 gigabytes of free hard disk space. At least 512 megabytes of RAM is recommended. Users must also have Internet Explorer Versions 3.0 or later installed on their computer to use the RSEI Help feature. Administration rights are required for correct installation.

It is important to remove any previous versions of the model from your hard drive before you install this version. Instructions on uninstalling the program are in the **Uninstalling RSEI** section below.

These instructions assume you are using Windows 95, 98, NT4, 2000, or XP. It has not been tested with Windows Vista. This version of the model will not work on earlier operating systems, such as Windows 3.1. To install under Windows 2000 or Windows XP, you must have administrator privileges. If you do not have administrator privileges, contact your computer support personnel.

Early versions of the RSEI model could be run from a CD without an installation on the user's hard drive. Beginning with Version 2.1, extensive data enhancements have increased the size of the databases so that running from a CD is no longer possible, and all users must perform the full hard drive installation. For Version 2.3.0, the installation program only contains data starting with Reporting Year 1996. Previous years are available for interested users. The installation program can be downloaded from the RSEI website at www.epa.gov/oppt/rsei. The installation program is also available upon request from EPA.

Installing RSEI Using the Downloadable Installation Package

1. Download the RSEI Version 2.3.0 Installation Package from http://www.epa.gov/oppt/rsei/pubs/get_rsei.html.
2. Unzip the files onto your computer's hardrive.
3. Double-click on the "setup.exe" file. This will begin the RSEI installation. Follow the prompts. The RSEI model will install first, and then the database driver (Borland's Database Engine, or BDE). You may get an error during the BDE installation that says there is not enough disk space- this is due to an underestimation of disk space and does not indicate a problem. Click to continue the installation and it will finish normally. Depending on the speed of your computer, installation may take up to 15 minutes.

Installing RSEI Using the Installation DVD

1. Put the RSEI Installation Disk in your computer's DVD drive.

2. The Installation Disk should begin the installation automatically. If it does not, click on the **Start** button at the bottom left of your screen, then **Run**. In the space after 'Open:' type in 'D:\setup.exe.' Substitute the appropriate letter if your DVD drive is labeled other than 'D.' Click **OK**.

3. Follow the prompts in the installation process. The RSEI model will install first, and then the database driver (Borland's Database Engine, or BDE). You may get an error during the BDE installation that says there is not enough disk space- this is due to an underestimation of disk space and does not indicate a problem. Click to continue the installation and it will finish normally. Depending on the speed of your computer, installation may take up to 15 minutes.

Launching RSEI

When the installation is complete, the install wizard will ask if you want to launch the program. Click **Yes** and the RSEI interface will launch. Once RSEI is installed, the DVD is not required to run the program.

A good introduction to the many functions in RSEI is the set of three RSEI Tutorials, which can be found in Chapter 4, or by clicking on the **Tutorials** button on the first screen of the model. Once you are comfortable with the basic functions of the model, you can use RSEI to customize your data output using maps, crosstab tables, sorted tables, filters, and graphs. You can look at national-level results or the results for a single facility or chemical. Extensive help is available by clicking the **Help** button at any point in the model, or in Chapters 5 through 9.

Note that the way the RSEI model appears on your screen will depend on your Windows settings, including your screen resolution. If some of the displays appear truncated, click on the Windows **Start** button, then 'Settings,' then 'Control Panel,' then 'Display,' then 'Settings.' In the right-hand side of the screen, slide the levers under 'Display area' to the right one or two notches.

Uninstalling RSEI

RSEI comes with its own **Uninstall** program that removes the entire program, ancillary files (*. dll's), and accompanying databases.

However, it will not remove the 'user' directory (so that any tables you have created will not be automatically lost) and the Borland Database Engine with its associated RSEI settings. You can delete these manually if desired.

You do not need the CD-ROM to uninstall RSEI. Click on **Start**->Programs->RSEI->Uninstall RSEI and follow the prompts.

The RSEI model can also be uninstalled using the Windows function under 'Settings.' You may need to manually delete the C:\Program Files\RSEI folder and its subdirectories. Do this by using Windows Explorer, opening the view of the C: drive, and dragging the C:\Program Files\RSEI folder into the Recycle Bin. The disk space will not be freed up until you empty the Recycle Bin.

CHAPTER 3
Highlights of RSEI Version 2

Version 2 of the RSEI model is a powerful and flexible tool. It allows for many different kinds of analyses and many ways to customize your results.

Detailed Data

RSEI contains detailed data sets, several of which have been created or quality-assured specifically for the model. Population data are taken from the two most recent decennial Censuses at the block level, and translated onto the model grid geographically for greater accuracy. Off-site facilities have been assigned to their actual locations where possible, and locations for TRI reporting facilities are taken from EPA's centralized Locational Reference Tables (LRT). Extensive physicochemical and toxicity data for reported chemicals have been collected and frequently updated, and detailed (age- and sex-specific, where possible) exposure factors are used.

Extended Air Modeling

RSEI's air modeling methodology has been revised to more accurately represent concentrations very close to the facility. In addition, previous versions only modeled concentrations out to 10 km from the facility; the current version models out to 50 km to better reflect the extended plumes associated with very tall stacks.

Flexible Query Options

Selections can be performed based on any variables included in the model. Boolean-type logic allows you to exclude and include different sets in the same selection. The query builder is powerful and flexible, now allowing for any conceivable combination of criteria.

Custom and Preformatted Display Options

The Crosstab tables option allows you to tabulate your selection using any model variables you choose, and includes sophisticated options like filters, sorted tables, and graphs, and the ability to collapse and expand rows and columns, and switch row and column variables. You can create multiple crosstab tables based on the same selection and save and reload different tables. For quick results, the model provides preformatted displays like a list of facilities and releases in your selection, time trend graphs, ranked tables, and annual maps.

Enhanced Export Options

You can export tables and lists to many different formats, including Microsoft Excel, Lotus 1-2-3, and dBase files.

Fast Processing

Depending on the size of the resulting set and the speed of your PC, selections and custom tables may take just a few minutes (or even seconds) to create.

Results for Subpopulations

You can examine total pounds, and hazard-weighted and risk-related modeling scores for children 0-9 years of age, children 10-17 years of age, women 18-44 years of age, men 18-44 years of age, and adults 65 years and over separately from the general population.

Tribal Land Identifier

You can select and examine facilities that are on tribal lands.

Changes in Version 2.3.0

Includes TRI Reporting Years 1996-2007.

Toxicity weights have been updated. The equivalence between cancer and noncancer toxicity weights has been changed from 2.5×10^{-4} to 1.0×10^{-6}. This has the effect of increasing the relative weight given to cancer endpoints.

Information on speciation has been used for the chemical category polycyclic aromatic compounds (PACs). The overall toxicity for the chemical group is now assumed to be 18% of the toxicity for benzo(a)pyrene.

The network of streams used to model water discharges from TRI facilities and Publicly-Owned Treatment Works (POTWs) has been updated from EPA's Enhanced Reach File 1 (E-RF1) to the more detailed National Hydrography Dataset (NHD).

The grid that underlies the model has increased detail (the grid cell is now 810 m square rather than 1 km square) and now uses a standard GIS projection, to make use with GIS systems easier.

CHAPTER 4
Quick Start Tutorials

RSEI tutorials are designed to give you a quick introduction to how the model works, and how to quickly find basic information that most users are interested in. There are three tutorials currently available in this chapter to help acquaint you with various aspects of the model.

Remember that while you are working in the RSEI model, you can always refer to **Help** for information on model features.

Tutorial 1

An important use of the RSEI model is to identify areas that have potentially high risk-related impacts. This exercise will walk you through several different ways of doing this. First, you will perform a national-level selection for the year 2004. You will look at the results by media and state, and examine the data using several different preformatted functions included in the RSEI model.

Step 1.1 Perform a National-Level Selection

The first step in any analysis using the RSEI model is to determine the set of elements you wish to select. This is done by performing a selection. Open up the model to display the RSEI **Welcome** screen. Click on the **Select** button at the top left of the menu panel. This brings up the **Select elements...** screen. Here, you can select elements based on any variables included in the model, including chemical characteristics, geographic location of the facility, year, and many more. You do this by creating a set of selection statements. For this exercise, we will create a very simple selection statement.

> An **element** is the building block of the RSEI model, and is generated for each exposure pathway for each chemical release. For instance, a release of the chemical benzene to air via a stack from the 'ABC' Facility in 1999 is an 'Indicator Element.'

Note that if you have done any selections since installing the RSEI model, your last selection statement will appear on the **Select elements...** screen. Click on the **Clear** button to remove previous selection statements. You will see a line of text on the screen, 'Choose records where all of the following apply'. This is a bracket statement that tells the model what to do with the information that comes next. You can change the bracket statement from 'all' to 'any', 'none', or 'not all' by clicking on the 'all' and selecting an option from the drop down menu. But for now let it remain 'all'. Click on the circle to the left of the text, and select 'Add condition'.

> Selection statements tell the model what releases you wish to select. Selection statements are comprised of bracket statements that tell the model to select records where all, any, none, or not all of the conditions apply and condition statements, that specify exactly what your conditions are.

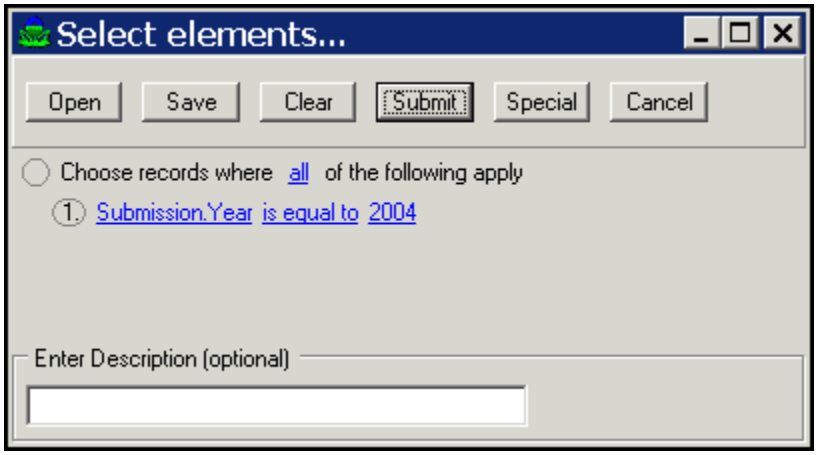
The condition statement contains the criteria you use to select your releases.

You will see the following text line:

1. Chemical Flags.Year Chemical Added is equal to __

Click on the first part of the text line, and a drop-down menu will appear. This menu contains all of the variables contained in the model that you can use in your selection statements. They are grouped according to the type of variable. Click on the group 'Submission'. To the right you will see another menu with all of the variables in this group. Click on 'Year'.

The text line will change to 1. Submission.Year is equal to __ . Click on the blank at the end of the line, and select '2004' from the list.



Select Elements... Screen

This will now select all TRI-reported releases that occurred in 2004. Click on the **Submit** button at the top of the **Select elements...** screen to submit the selection. The model may take a few minutes to complete the task.

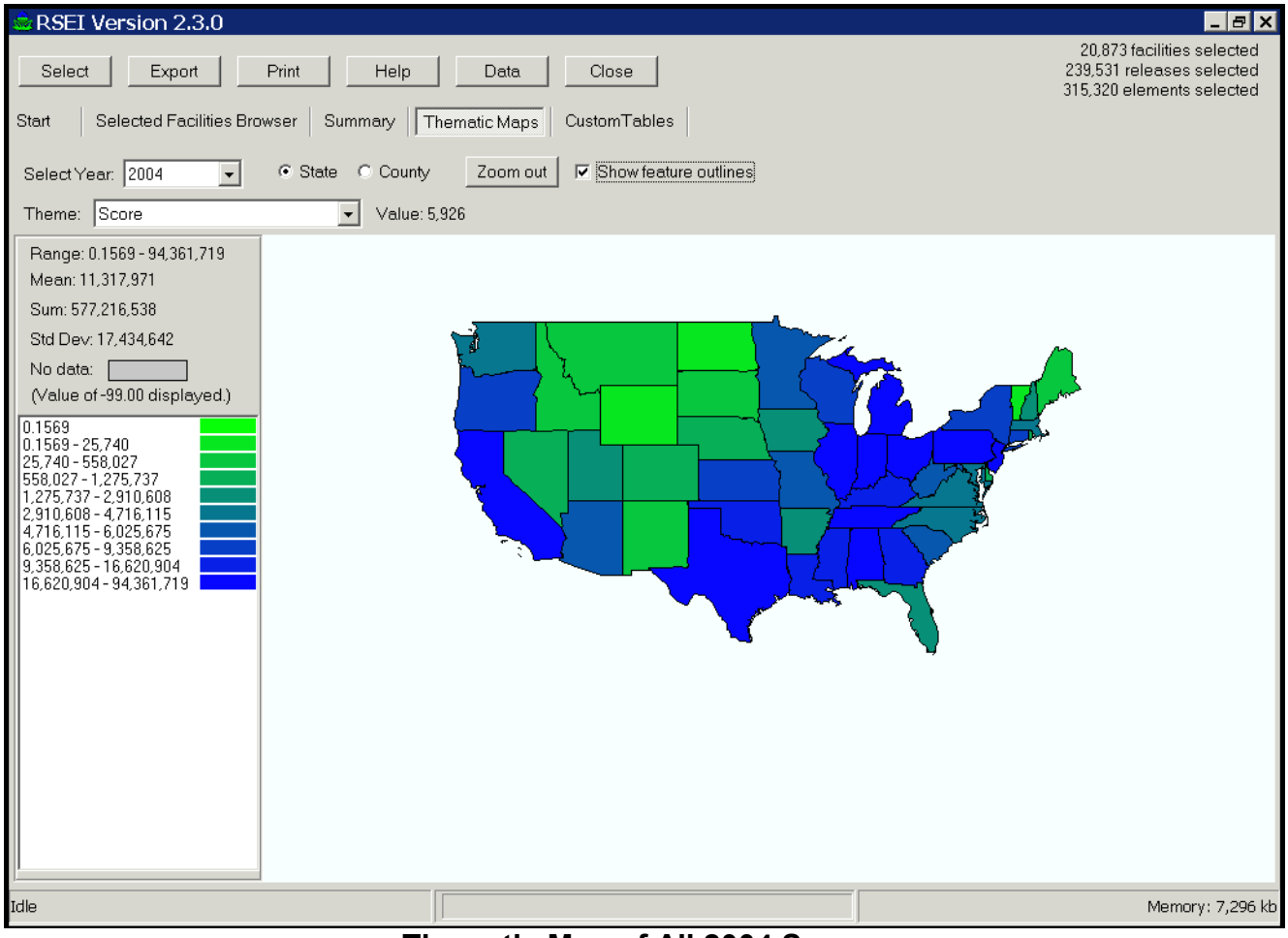
> If you accidentally submit an incomplete or inaccurate selection statement, you cannot stop the submission or go back to the statement until the model has processed your submission completely. Once the model is done, click on the **Select** button again to reopen the **Select Elements...** screen, correct the selection statement, and resubmit it.

When the model is done with the selection, the **Select elements...** screen will disappear. The

number of facilities, chemical releases, and elements that are selected in your set will be displayed in the top right corner of the screen.

Now that you have your selected set of scores, you can analyze them in different ways. To get a quick summary of the differences in risk-related impacts between states, click on **Thematic Maps** at the top of the screen.

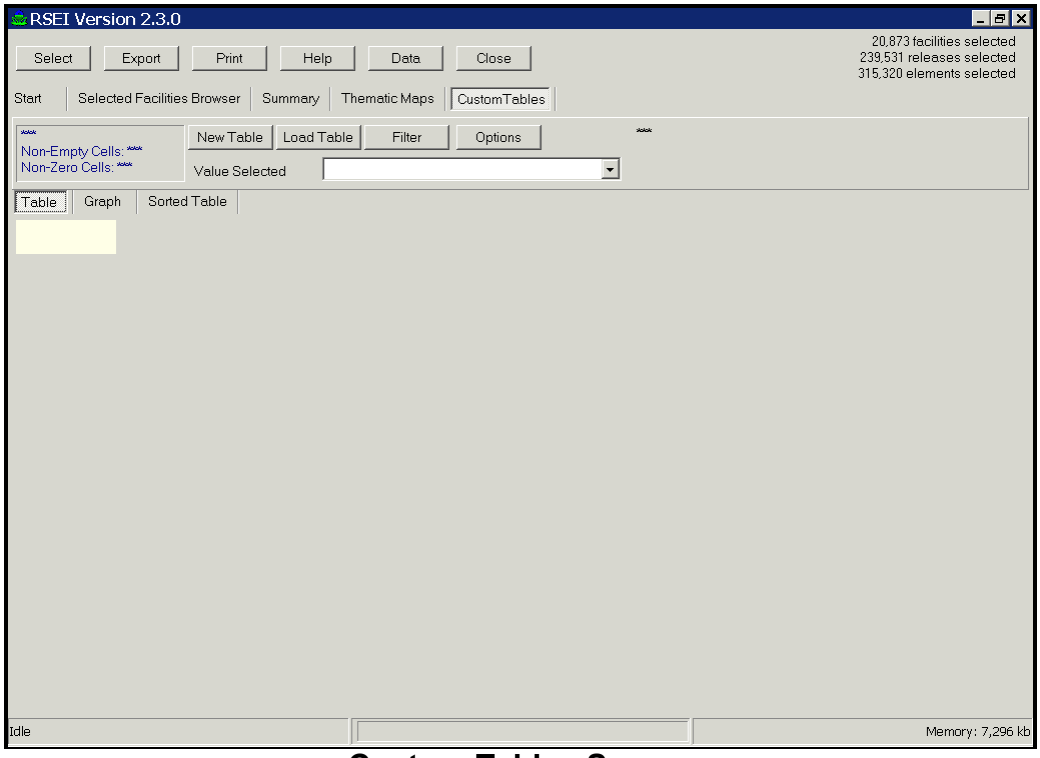
The model will display a U.S. map, where variations in color represent differing levels in impacts. Your map may show Alaska and Hawaii; if you want to see only the continental U.S., click and drag the map to the left until Hawaii and Alaska no longer show. The legend at the left side of the screen shows the values that correspond to the colors on the map. The map will currently show all gray because the map is set to 2007 as the default data year. To switch to 2004, select from the drop-down menu next to **Select Year**. Also, make sure that the **Theme** box shows 'Score'. If you want to increase the size of the map, draw the outline of a box around the area you want to enlarge with the cursor while holding down the right mouse button. To outline the states, click on the **Show feature outlines** box.



Thematic Map of All 2004 Scores

Step 1.2 Results by State

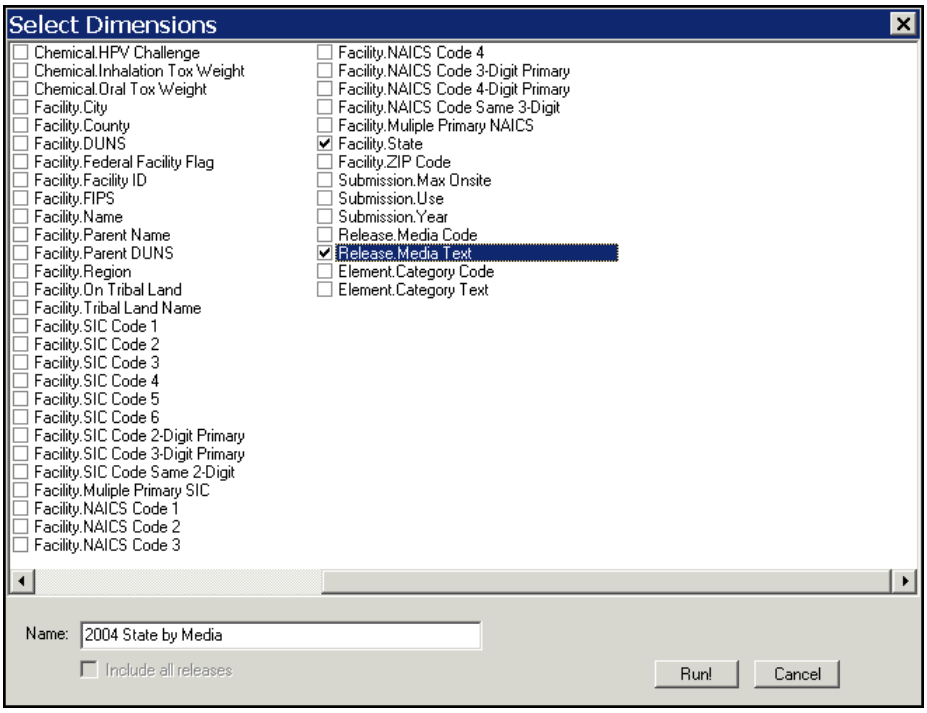
To get a more detailed look at 2004 scores, you can break down your national-level selection by state. Click on the **Custom Tables** button at the end of the second row of menu buttons at the top of the screen, and the screen shown below will appear.



Custom Tables Screen

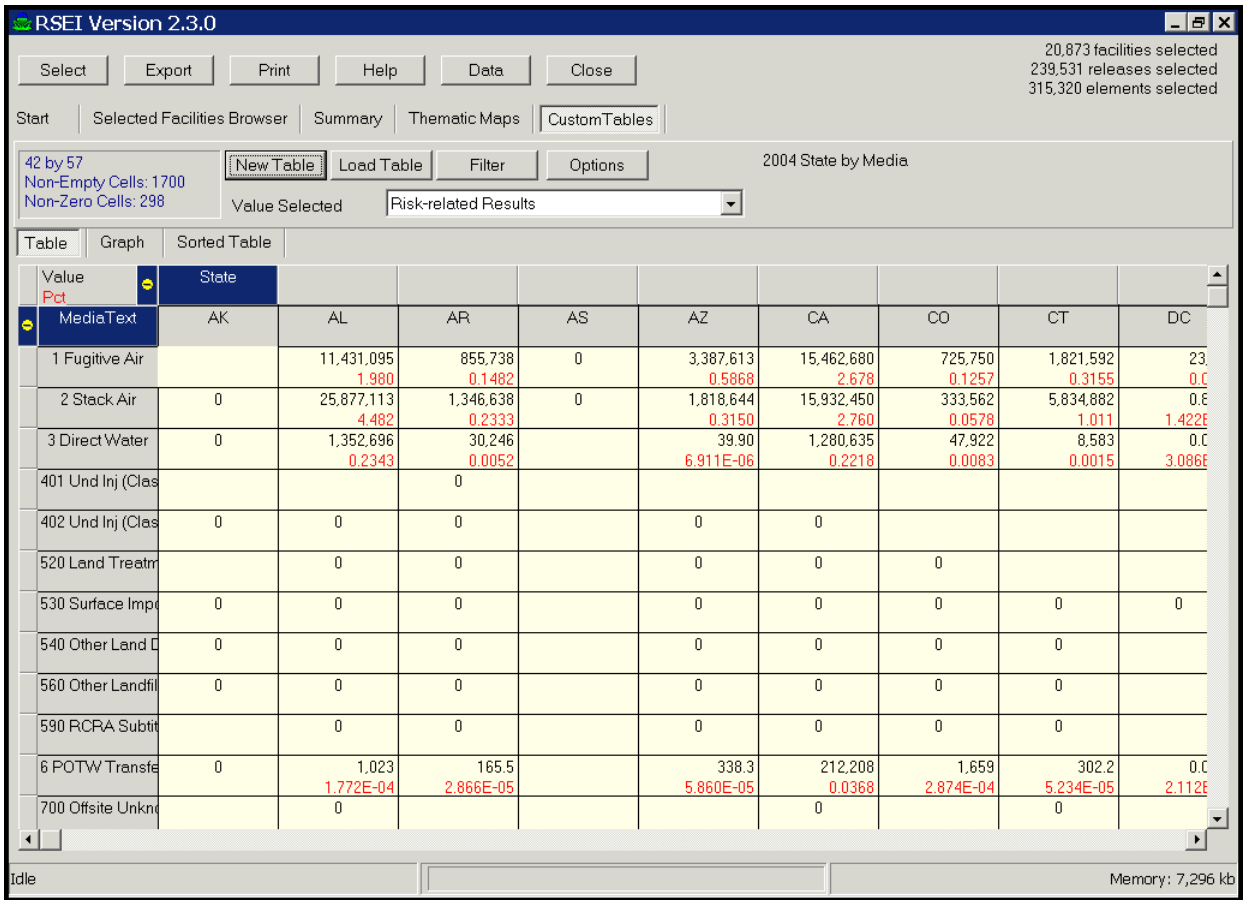
In this screen you can create and customize crosstab tables, based on any combination of variables you choose. To create a new crosstab table, click on the **New Table** button. The **Select Dimensions** screen will appear. This screen lists all the variables included in the RSEI model. The variables are listed in the form 'Data table.variable name', where the data table is similar to the variable group used in the **Select elements...** screen. A complete listing of all variables is provided in Chapter 5.

Select the rows and columns that you want to appear in the crosstab table. You may select any number of variables, but selecting more than two or three will greatly increase the time needed to generate the table and the complexity of reading the table. Note that the various RSEI outputs (e.g. pounds, hazard score, risk-related score, etc.) will be the contents of the cells of the crosstab. You do not need to specify RSEI outputs at this point.



Select Dimensions Dialog

We want to look at state-level results, so select 'Facility.State'. It is often informative to break down results by media, in order to assess what exposure routes are associated with the highest risk-related impacts. So select 'Release.Media Text', which will provide the text description of the medium into which each chemical is released. In the box to the right of 'Name' at the bottom of the screen, type in a name for this table you are creating, such as '2004 State by Media'. All of the tables you create in the RSEI model are saved on your hard drive in the C:\Program Files\RSEI\User directory for later use. Hit **Run!** and the model will create your crosstab table. It may take a few minutes to generate. When the model is finished, you will see the new crosstab table, as shown below.

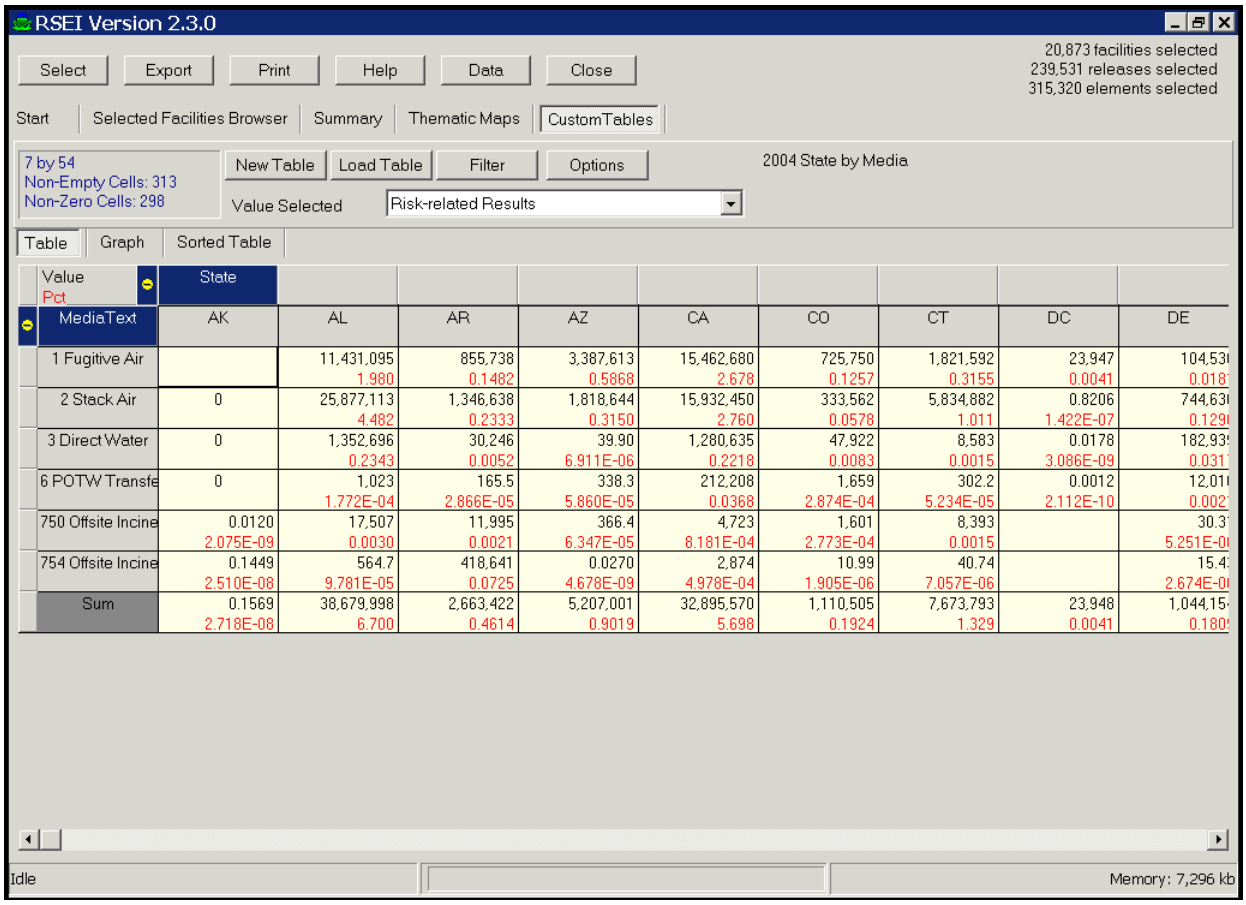


Crosstab Table, State by Media

This table shows, for each state, the risk-related score for each medium. This is the top number, in black, in each cell. For cells with non-zero values, the number in red beneath the score is the cell's percentage of the total score of all the cells in the table (the total can be found in the lower right corner). The values below the top number in black in each cell can be changed by clicking **Options**, then **Cell Display**. The default (the value shown in red in the table) is the 'Total Pct'. To turn it off, simply click on the text so that the check mark is removed.

The box at the top of the screen, where 'Risk-related Results' is displayed, controls what numbers are shown in black in the cells of the table. Explanations for each type of number can be found in the **Options** section at the end of Chapter 9. 'Risk-related Results' refers to the full model score: the risk-related, unitless number that takes into account the chemical release, its toxicity, environmental fate and transport, exposure assumptions, and the number of exposed people.

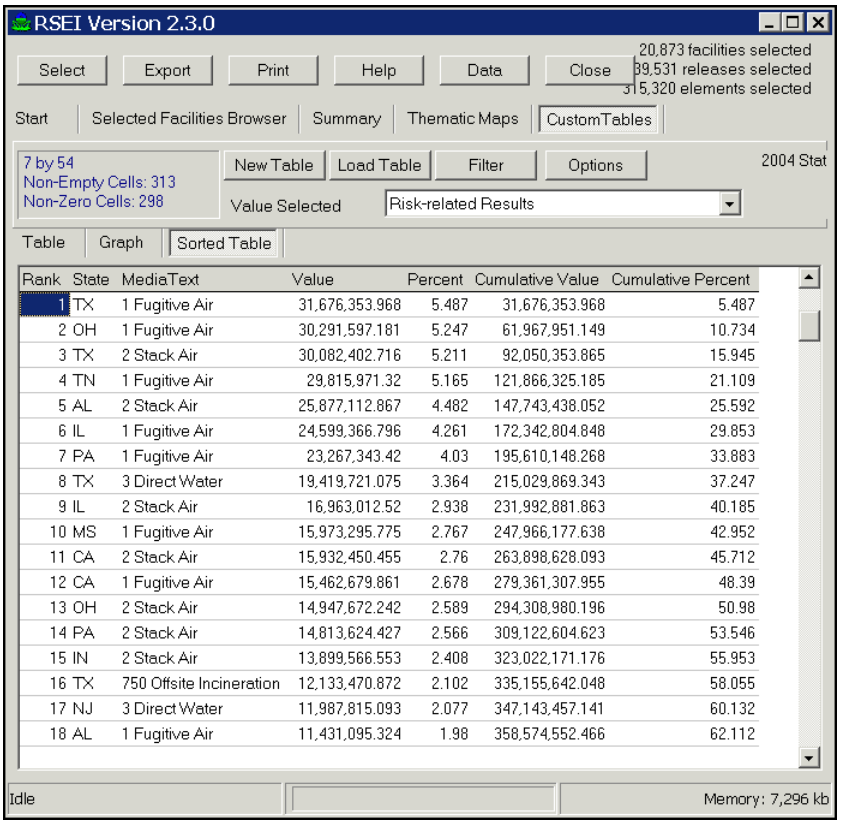
Note that there are many media that have only zeros for entries. To get rid of all zero-only entries, click on the minus sign to the left of the row header 'Media Text'. This collapses the rows, and the minus sign is replaced with a plus sign. Click on the plus sign to expand the row again; now, however, the zero-only rows will not be displayed.



Crosstab Table, Zero-Only Rows Removed

> Any time you change the 'Value Selected', you should collapse and expand the rows and columns to refresh the table. Otherwise, rows or columns that were not shown originally because all of the values were zero may not show when the summary is changed, even if in the new summary their values are non-zero.

Because the crosstab table displays so much information at one time, sometimes it is useful to quickly summarize the information in the table. The **Sorted Table** function works from the crosstab table's current display and shows each cell in descending order. Click on the **Sorted Table** button and the screen shown below will appear.

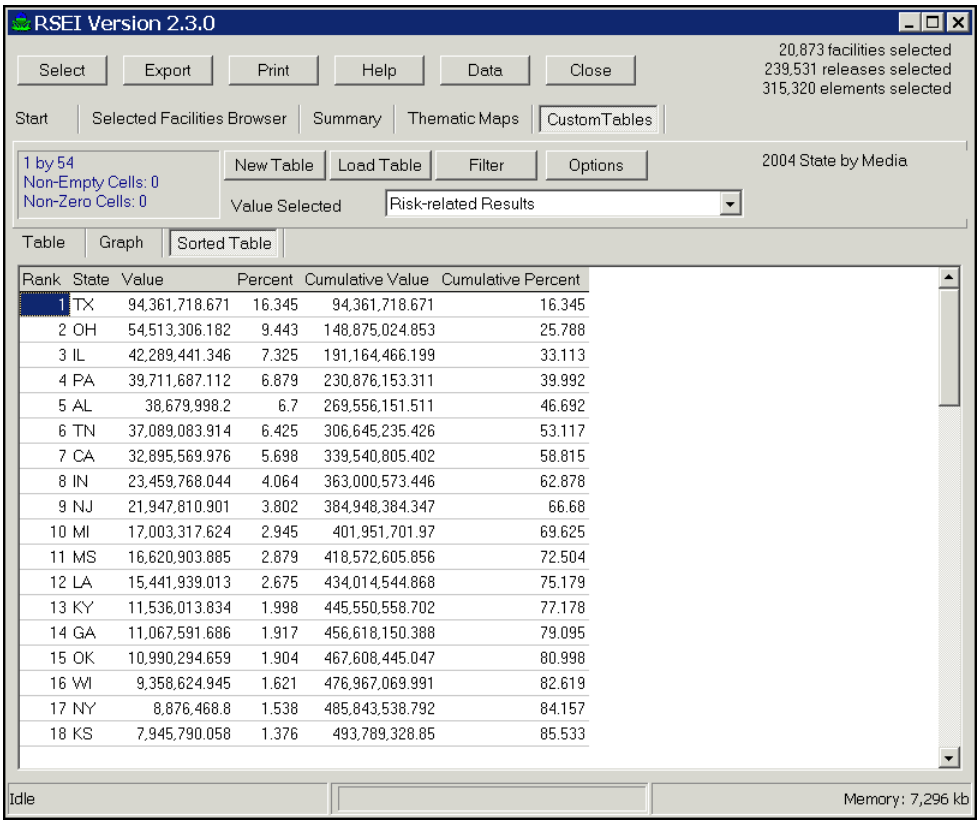


Rank	State	MediaText	Value	Percent	Cumulative Value	Cumulative Percent
1	TX	1 Fugitive Air	31,676,353.968	5.487	31,676,353.968	5.487
2	OH	1 Fugitive Air	30,291,597.181	5.247	61,967,951.149	10.734
3	TX	2 Stack Air	30,082,402.716	5.211	92,050,353.865	15.945
4	TN	1 Fugitive Air	29,815,971.32	5.165	121,866,325.185	21.109
5	AL	2 Stack Air	25,877,112.867	4.482	147,743,438.052	25.592
6	IL	1 Fugitive Air	24,599,366.796	4.261	172,342,804.848	29.853
7	PA	1 Fugitive Air	23,267,343.42	4.03	195,610,148.268	33.883
8	TX	3 Direct Water	19,419,721.075	3.364	215,029,869.343	37.247
9	IL	2 Stack Air	16,963,012.52	2.938	231,992,881.863	40.185
10	MS	1 Fugitive Air	15,973,295.775	2.767	247,966,177.638	42.952
11	CA	2 Stack Air	15,932,450.455	2.76	263,898,628.093	45.712
12	CA	1 Fugitive Air	15,462,679.861	2.678	279,361,307.955	48.39
13	OH	2 Stack Air	14,947,672.242	2.589	294,308,980.196	50.98
14	PA	2 Stack Air	14,813,624.427	2.566	309,122,604.623	53.546
15	IN	2 Stack Air	13,899,566.553	2.408	323,022,171.176	55.953
16	TX	750 Offsite Incineration	12,133,470.872	2.102	335,155,642.048	58.055
17	NJ	3 Direct Water	11,987,815.093	2.077	347,143,457.141	60.132
18	AL	1 Fugitive Air	11,431,095.324	1.98	358,574,552.466	62.112

Sorted Table, State by Media

This table shows each state-medium combination, listed in descending order of risk-related impact. The sixth column, 'Cumulative Value', shows the total value of the score for each entry and all of those above it. The 'Cumulative Percent' column functions in a similar way. You can see that fugitive air releases in Texas account for slightly more than five percent of the total risk-related impact in the country.

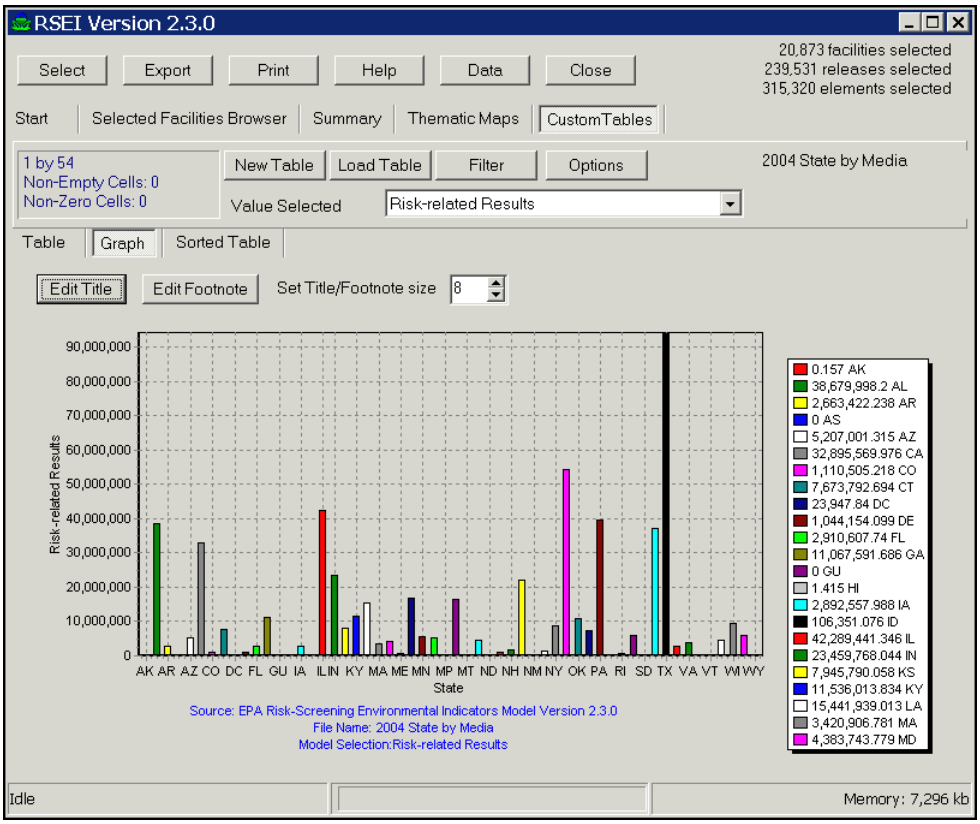
To do a more direct comparison of states, go back to the custom table by clicking on the **Table** button. Collapse the rows by clicking on the minus sign to the left of the 'Media Text' row header. Then click on the **Sorted Table** button again. This time, instead of showing state-media combinations, the table only shows the state rankings. You can see that Texas is the state with the highest calculated risk-related impact, accounting for approximately 16 percent of the nation's total.



Rank	State	Value	Percent	Cumulative Value	Cumulative Percent
1	TX	94,361,718.671	16.345	94,361,718.671	16.345
2	OH	54,513,306.182	9.443	148,875,024.853	25.788
3	IL	42,289,441.346	7.325	191,164,466.199	33.113
4	PA	39,711,687.112	6.879	230,876,153.311	39.992
5	AL	38,679,998.2	6.7	269,556,151.511	46.692
6	TN	37,089,083.914	6.425	306,645,235.426	53.117
7	CA	32,895,569.976	5.698	339,540,805.402	58.815
8	IN	23,459,768.044	4.064	363,000,573.446	62.878
9	NJ	21,947,810.901	3.802	384,948,384.347	66.68
10	MI	17,003,317.624	2.945	401,951,701.97	69.625
11	MS	16,620,903.885	2.879	418,572,605.856	72.504
12	LA	15,441,939.013	2.675	434,014,544.868	75.179
13	KY	11,536,013.834	1.998	445,550,558.702	77.178
14	GA	11,067,591.686	1.917	456,618,150.388	79.095
15	OK	10,990,294.659	1.904	467,608,445.047	80.998
16	WI	9,358,624.945	1.621	476,967,069.991	82.619
17	NY	8,876,468.8	1.538	485,843,538.792	84.157
18	KS	7,945,790.058	1.376	493,789,328.85	85.533

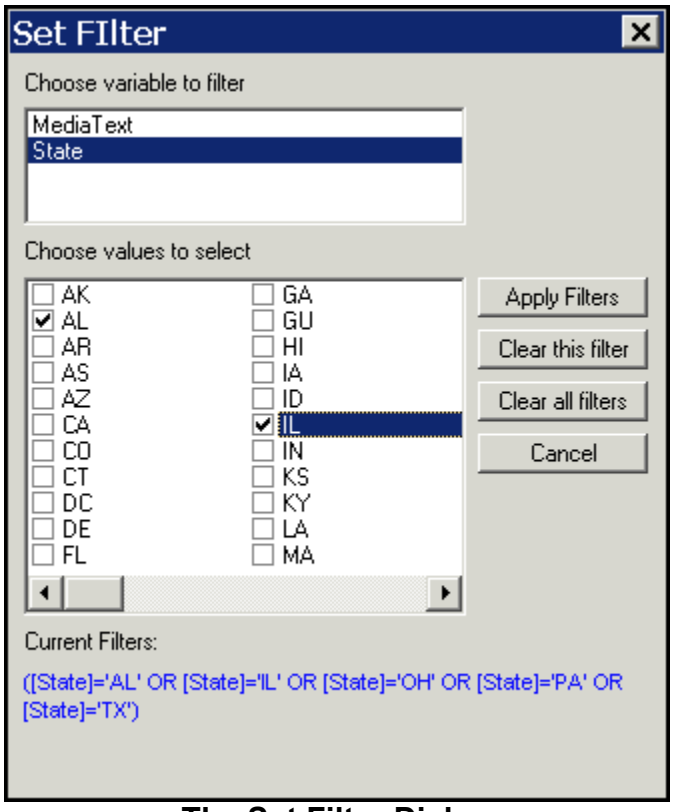
Sorted Table, by State Only

You can also look at the results graphically. Click on the **Graph** button above the table, and the following screen will appear:



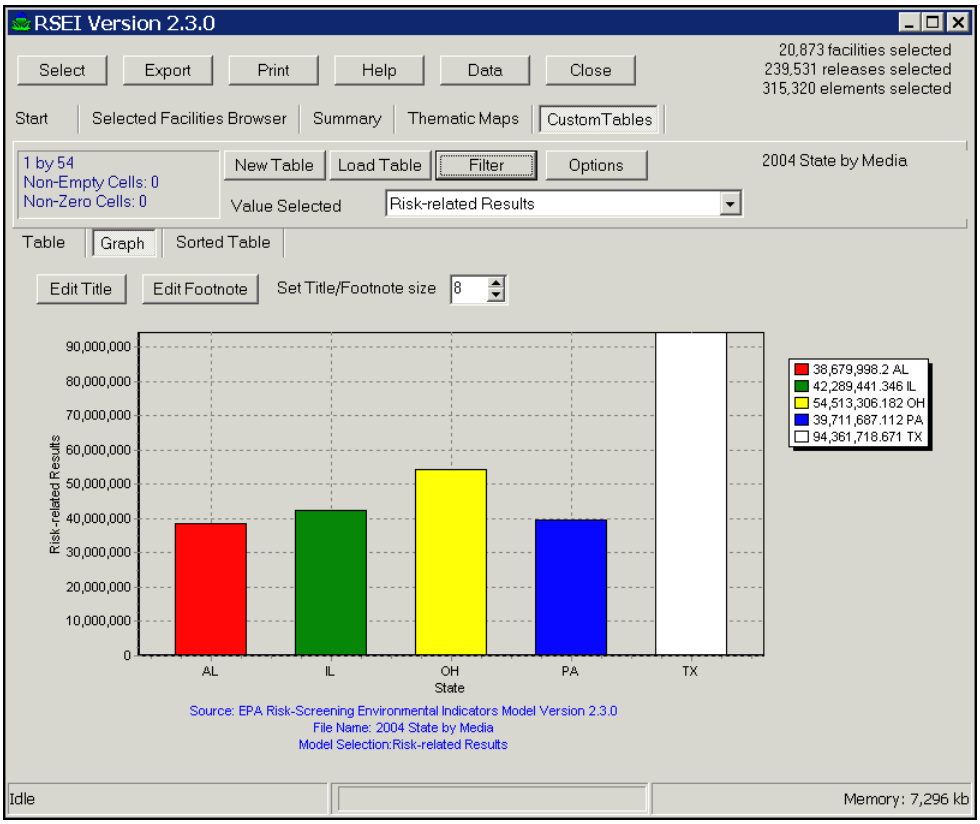
Custom Graph, Total for All Media for All States

This graph is hard to interpret, due to the number of states shown. To limit the number of states, perhaps to just those in the top five of the sorted table, click the **Filter** button at the top of the screen, and the **Set Filter** screen will appear.



The Set Filter Dialog

Click on **State**, then click on the boxes next to the top five states: TX, OH, IL, PA, AL. Click **Apply Filters** and the graph will then display only those states with checked boxes, resulting in a more easily intelligible graph.



Custom Graph, Total for Top 5 States by Risk-Related Results

This tutorial began with a national-level analysis, then narrowed in on the five states with the highest risk-related results. The next tutorial will narrow the analysis even further, looking more closely at one state.

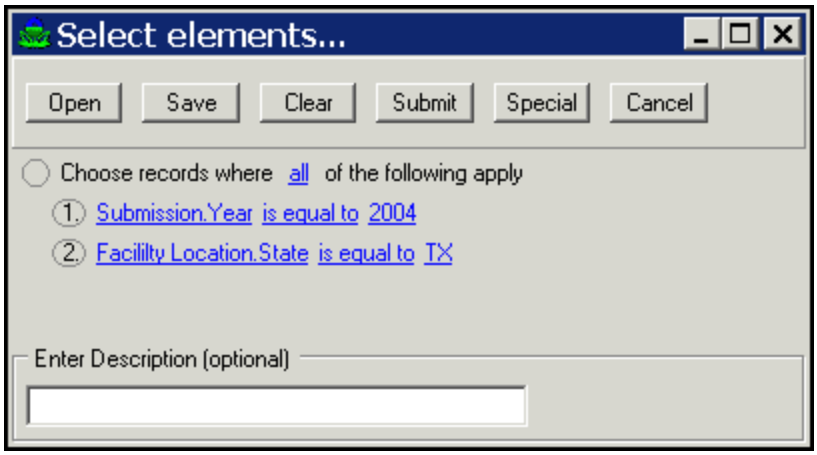
Tutorial 2

Now you can take a closer look at an individual state, and what comprises its score. Let's look at Texas, the highest ranking state in risk-related impacts. We know from looking at the first sorted table in **Tutorial 1** that fugitive air releases are responsible for the highest risk-related impacts in Texas. But what chemicals are mostly responsible for these impacts?

Step 2.1 Perform a State-Level Selection for Texas

First, limit your selected set to releases from facilities located in Texas by performing a new selection. Click on the **Select** button. The screen should display your last selection, which was 'Submission.Year is equal to 2004'. To add another condition statement, click on the '1' to the left of 'Submission', then click **Add Condition**. A new line of text will appear. Click on the line, 'Chemical Flags.Year Chemical Added', then click on 'Facility Location', then 'State'. In the blank at the end of the line, type in the abbreviation for Texas, 'TX'. Remember that fields for which you must type the selection criteria are case sensitive. Click somewhere else in the

window aside from the box you just typed in, to enter your change (all of the text in the line will then turn blue). Your selection statement should look like the one below. Click **Submit**. The model may take a few minutes to complete the task.

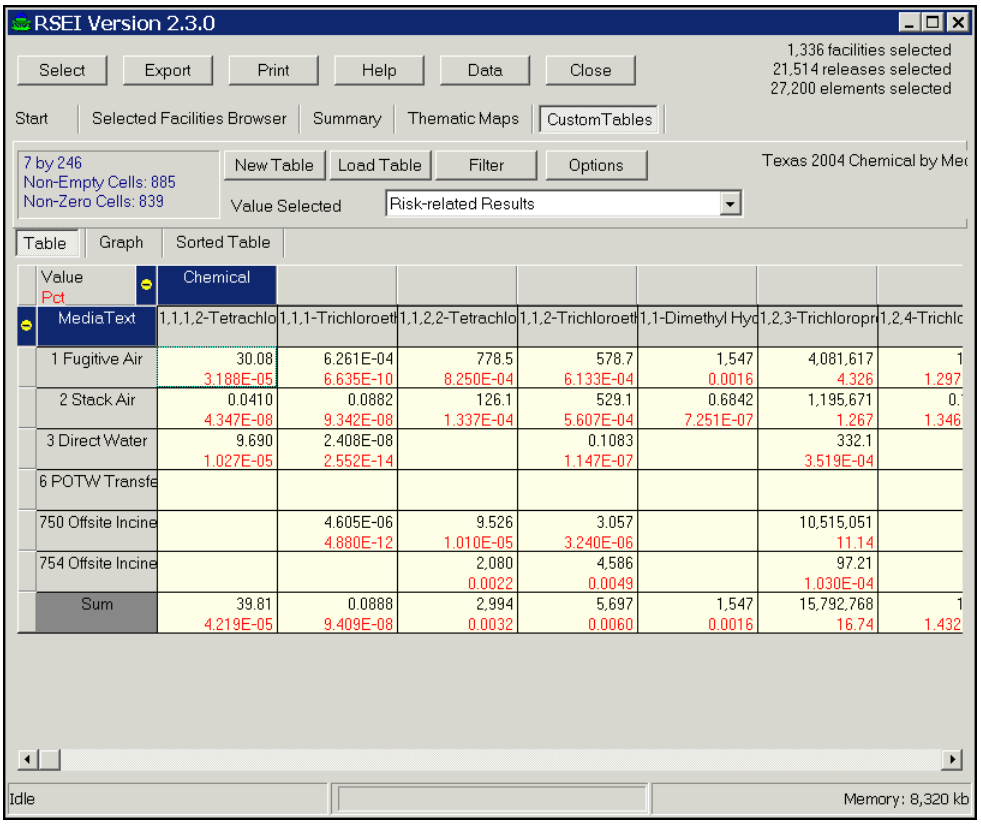


The Select Elements... Screen

When the model is done with the selection, the **Select elements...** screen will disappear. The number of facilities, chemical releases, and elements that are selected in your set will be displayed in the top right corner of the screen.

Step 2.2 Results for Texas, Chemical by Media

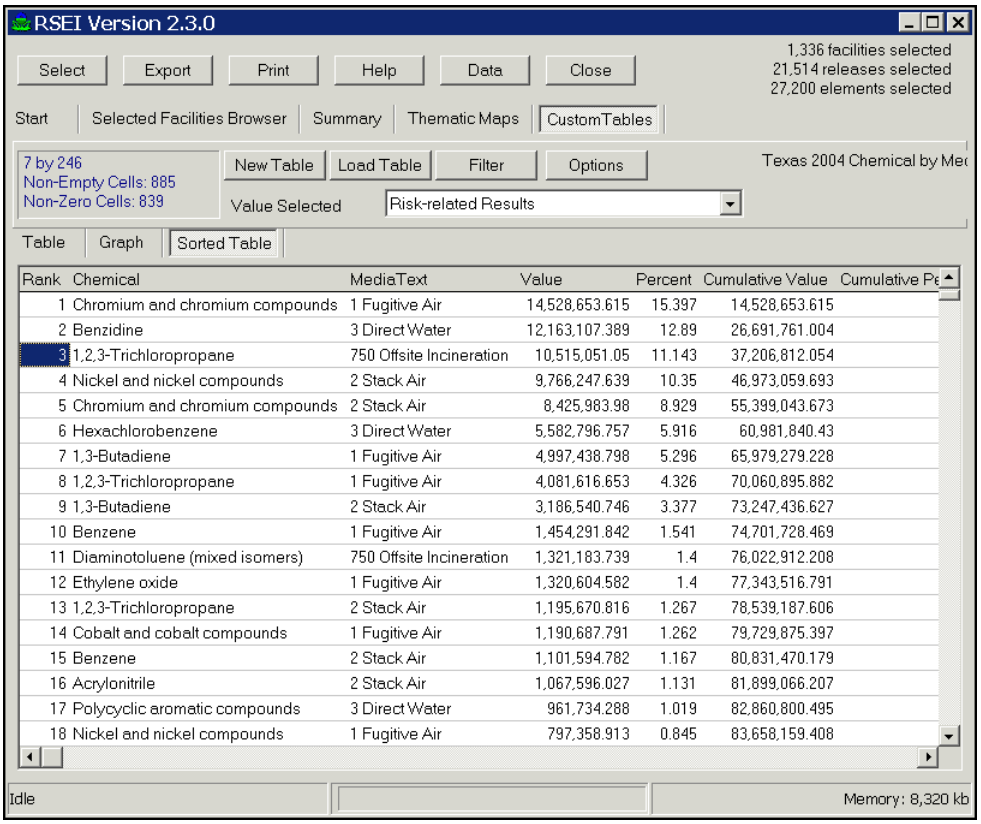
Click on the **Custom Tables** button at the end of the second row of menu buttons at the top of the screen. Now we will look at what chemicals are being released by facilities in Texas, and the media into which they are released. Click **New Table**, and select 'Chemical.Chemical', and 'Release.Media Text'. The selections for your previous table will still be displayed, so make sure to deselect them. Similarly, the name of the previous table will be displayed in the 'Name' box at the bottom of the screen. Delete that name, and type in a new name for this table, for instance, 'Texas 2004 Chemical by Media'. Hit **Run!** and the model will create your new table. The table may take a few minutes to generate; when it does you will see the following screen (if the graph is still displaying, click on the **Table** button):



Crosstab Table, Chemical by Media for Texas, 2004

If you do not see the rows, click on the plus sign in the leftmost cell to expand the row dimension. Each cell of this table shows the risk-related score for each chemical-medium combination in Texas.

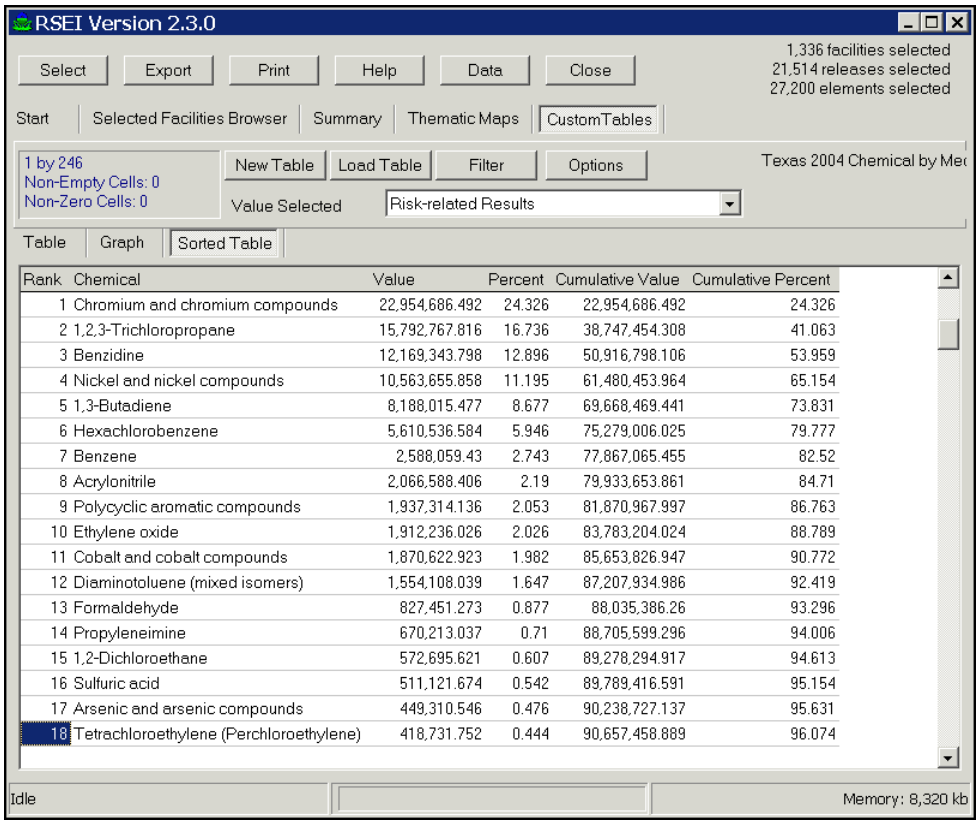
To get an idea of the relative contribution of each combination, click on **Sorted Table**. This table shows the individual and cumulative contribution of each chemical-medium combination to the total impact in Texas in 2004, in descending order.



Rank	Chemical	MediaText	Value	Percent	Cumulative Value	Cumulative Pe
1	Chromium and chromium compounds	1 Fugitive Air	14,528,653.615	15.397	14,528,653.615	
2	Benzidine	3 Direct Water	12,163,107.389	12.89	26,691,761.004	
3	1,2,3-Trichloropropane	750 Offsite Incineration	10,515,051.05	11.143	37,206,812.054	
4	Nickel and nickel compounds	2 Stack Air	9,766,247.639	10.35	46,973,059.693	
5	Chromium and chromium compounds	2 Stack Air	8,425,983.98	8.929	55,399,043.673	
6	Hexachlorobenzene	3 Direct Water	5,582,796.757	5.916	60,981,840.43	
7	1,3-Butadiene	1 Fugitive Air	4,997,438.798	5.296	65,979,279.228	
8	1,2,3-Trichloropropane	1 Fugitive Air	4,081,616.653	4.326	70,060,895.882	
9	1,3-Butadiene	2 Stack Air	3,186,540.746	3.377	73,247,436.627	
10	Benzene	1 Fugitive Air	1,454,291.842	1.541	74,701,728.469	
11	Diaminotoluene (mixed isomers)	750 Offsite Incineration	1,321,183.739	1.4	76,022,912.208	
12	Ethylene oxide	1 Fugitive Air	1,320,604.582	1.4	77,343,516.791	
13	1,2,3-Trichloropropane	2 Stack Air	1,195,670.816	1.267	78,539,187.606	
14	Cobalt and cobalt compounds	1 Fugitive Air	1,190,687.791	1.262	79,729,875.397	
15	Benzene	2 Stack Air	1,101,594.782	1.167	80,831,470.179	
16	Acrylonitrile	2 Stack Air	1,067,596.027	1.131	81,899,066.207	
17	Polycyclic aromatic compounds	3 Direct Water	961,734.288	1.019	82,860,800.495	
18	Nickel and nickel compounds	1 Fugitive Air	797,358.913	0.845	83,658,159.408	

Sorted Table, Chemical by Media for Texas, 2004

You can see from this table that over 15 percent of the calculated score in Texas for 2004 is due to fugitive air releases of Chromium and chromium compounds (the single category that comprises both TRI reporting categories, 'Chromium' and 'Chromium compounds'). To look at the rankings only by chemical, go back to the **Table** screen and collapse the rows by clicking on the minus sign to the left of 'Media Text', and then click again on the **Sorted Table** button, as we did in Tutorial 1. The table is shown below. You can see that, when releases to all media are considered, Chromium and chromium compounds has the highest risk-related results, and 1,2,3-Trichloropropane has the second-ranked highest risk-related results.



Rank	Chemical	Value	Percent	Cumulative Value	Cumulative Percent
1	Chromium and chromium compounds	22,954,686.492	24.326	22,954,686.492	24.326
2	1,2,3-Trichloropropane	15,792,767.816	16.736	38,747,454.308	41.063
3	Benzidine	12,169,343.798	12.896	50,916,798.106	53.959
4	Nickel and nickel compounds	10,563,655.858	11.195	61,480,453.964	65.154
5	1,3-Butadiene	8,188,015.477	8.677	69,668,469.441	73.831
6	Hexachlorobenzene	5,610,536.584	5.946	75,279,006.025	79.777
7	Benzene	2,588,059.43	2.743	77,867,065.455	82.52
8	Acrylonitrile	2,066,588.406	2.19	79,933,653.861	84.71
9	Polycyclic aromatic compounds	1,937,314.136	2.053	81,870,967.997	86.763
10	Ethylene oxide	1,912,236.026	2.026	83,783,204.024	88.789
11	Cobalt and cobalt compounds	1,870,622.923	1.982	85,653,826.947	90.772
12	Diaminotoluene (mixed isomers)	1,554,108.039	1.647	87,207,934.986	92.419
13	Formaldehyde	827,451.273	0.877	88,035,386.26	93.296
14	Propyleneimine	670,213.037	0.71	88,705,599.296	94.006
15	1,2-Dichloroethane	572,695.621	0.607	89,278,294.917	94.613
16	Sulfuric acid	511,121.674	0.542	89,789,416.591	95.154
17	Arsenic and arsenic compounds	449,310.546	0.476	90,238,727.137	95.631
18	Tetrachloroethylene (Perchloroethylene)	418,731.752	0.444	90,657,458.889	96.074

Sorted Table, Chemical Only for Texas, 2004

While in the **Sorted Table**, you can change the selection in the 'Value Selected' drop-down box, and see the rankings of chemicals by TRI Pounds, Hazard, or other model results. You will notice that the rankings can change quite dramatically. The change can be for a number of reasons. One very common reason is illustrated by the releases for Zinc and zinc compounds, which ranks first in **TRI Pounds**, but 117th in the **Risk-related Results** perspective. For this chemical, the higher toxicity weight (of the two inhalation and oral weights) is 100, compared to that for the highest-ranking chemical by risk-related results (Chromium and chromium compounds), which is 43 billion. Another thing to keep in mind is that approximately 38.7 million pounds (99 percent of the 39 million total pounds) of the Zinc and zinc compounds releases are transferred to off-site recycling or disposal facilities or landfilled. The RSEI model does not consider the risk (if any) that may result from these pathways, so these releases are not reflected in the ranking by **Risk-related Results**.

When analyzing RSEI results, another factor to keep in mind is that while RSEI uses the best available data, inevitably some data sets will contain errors, and some assumptions are made in the absence of sufficient data. For instance, in this selection, the top chemical-medium combination by risk-related impact is fugitive air releases of Chromium and chromium compounds. This could simply reflect releases that are resulting in high risk-related impact. However, the results could also be affected by some of the data used or the assumptions that are

made in modeling the air pathway, such as average weather patterns, population placement, etc. The 25th-highest combination is POTW releases of Acrylonitrile, which may be affected by the assumptions used in modeling the water pathway, such as the locations of various points used in the exposure modeling: the facility effluent pipe, drinking water intakes, or the number of people exposed through drinking water or fishing. RSEI results are screening level only, and should be followed up with further analysis.

Step 2.3 Time Trend Analysis for High-Ranking Chemicals

You might want to see the trend in the releases of Texas's high-ranking chemicals over several years, to see if releases and scores are increasing or decreasing. To do this, begin by modifying the last selection statement to limit the selected set to releases of these chemicals only. Click on the **Select** button to return to the **Select elements...** screen. The two statements used in the previous selection will still be showing:

1. Submission.Year is equal to 2004
2. Facility Location.State is equal to TX

Click on the circle to left of the first statement, and then click on 'Add Bracket'. The line of text, 'all of the following apply' will appear. This is a bracket statement telling the model how to interpret the list of conditions that will follow. We are going to add a list of five chemicals, and we want releases for any of them to be selected, so click on 'all' and then click on 'any' in the drop down list. The text line should now say 'any of the following apply'.

You will now add your list of chemicals. Click on the text, 'Chemical Flags.Year Chemical Added', and then click on 'Chemical Identifiers', then 'Chemical'.'Chemical Identifiers. Chemical' will show in the text line. Click on the blank at the end of the text line, and a screen will pop up that lists all of the chemicals included in the RSEI model. Scroll through the list until you come to the first chemical to select, 'Chromium and chromium compounds'. Click on that chemical, and it will appear in the text line in your selection statement. Click on the '3.1' at the beginning of the line, and click 'Add Condition'. Repeat these steps to select '1,2,3-Trichloropropane', 'Benzidine', and 'Nickel and nickel compounds,'and '1,3-Butadiene.'

In order to look at time trends, you need to make another modification to your selection statement. In the first condition statement, which says 'Submission.Year is equal to 2004', click on the 'is equal to'. Click on 'is between' in the drop down menu. The text line should now say 'Submission.Year is between 2004 and __ '. Click on '2004', and select '1996' from the list. Then click on the last blank and select '2007' from the list. The model will now select any releases of the five chemicals in Texas in the years 1996 through 2007. Note that the 'is between' operator is inclusive.

Because you are doing a time trend, it is important not to inadvertently introduce other factors into your analysis. For Reporting Year 1998, TRI added a number of new industries that had not previously been required to report to TRI. If these facilities are not accounted for in the time trend analysis, the results for 1998 and after will look much higher than those for previous years, simply because more facilities are included. If you exclude the new reporters, you will be working with the same set of facilities for all years, and so will get a more accurate sense of the

trend over time.

To exclude these facilities, create a new bracket statement by clicking on the first empty circle, and clicking on 'Add Bracket'. In the new line that appears, change the 'all' to 'none'. Click on the first part of the new condition statement, and select 'Facility Industry', then 'SIC Code 1'. Click on the blank space at the end of the line, and in the window that appears, select the first code, 1021 [Copper Ores]. Then add a new condition by clicking on the '4.1' at the beginning of the line, and click on 'Add Condition'. Then repeat the same steps, but instead selecting 1031 in the SIC code window. Do this for each of the following SIC codes: 1041, 1044, 1061, 1099, 1221, 1222, 1231, 4911, 4931, 4939, 4953, 5169, 5171, and 7389. In order to view the entire selection statement, you will need to maximize the 'Select elements...' window. Your selection statement should look like the one below.

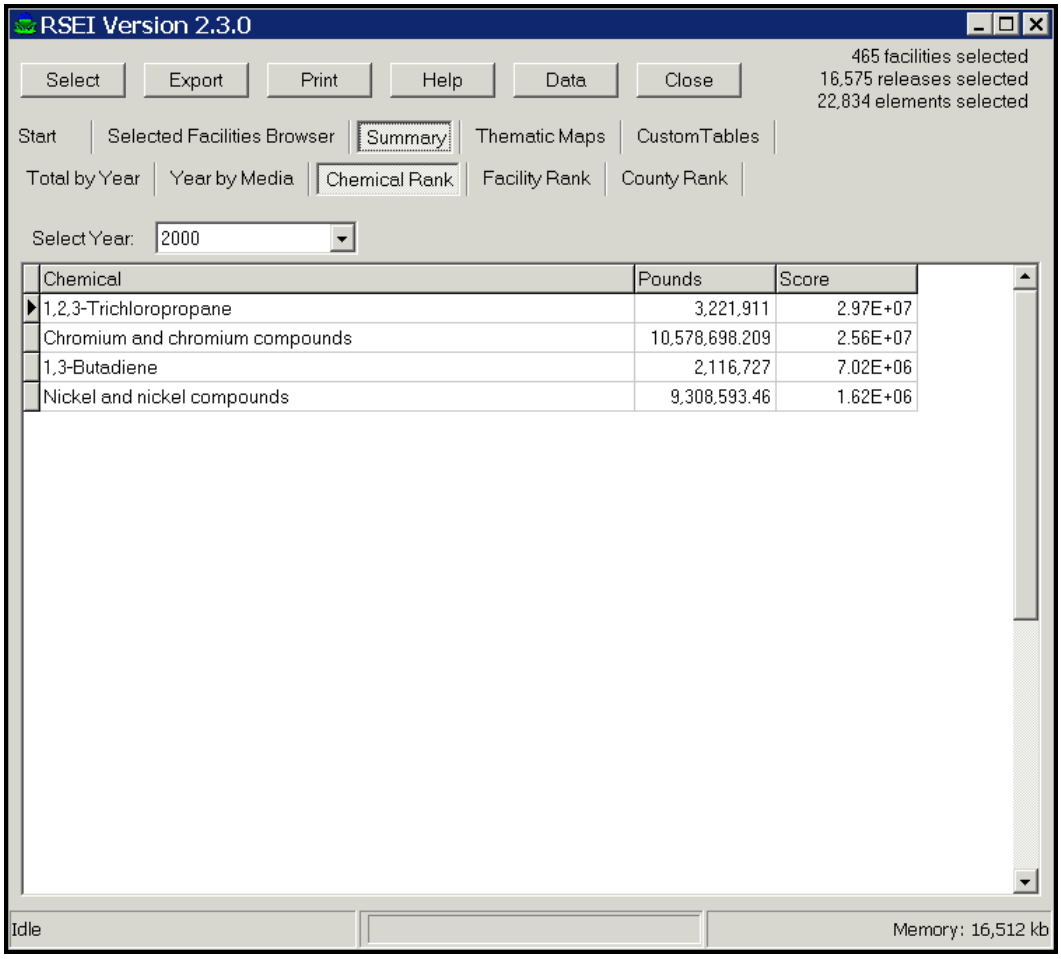
o Choose records where all of the following apply
    1. Submission.Year is between 1996 and 2007
    2. Facility.Location.State is equal to TX
    3. any of the following apply
        3.1 Chemical Identifiers.Chemical is equal to Chromium and chromium compounds
        3.2 Chemical Identifiers.Chemical is equal to 1,2,3-Trichlorpropane
        3.3 Chemical Identifiers.Chemical is equal to Benzidine
        3.4 Chemical Identifiers.Chemical is equal to Nickel and nickel compounds
        3.5 Chemical Identifiers.Chemical is equal to 1,3-Butadiene
    4. none of the following apply
        4.1 Facility Industry.SIC Code 1 is equal to 1021
        4.2 Facility Industry.SIC Code 1 is equal to 1031
        4.3 Facility Industry.SIC Code 1 is equal to 1041
        4.4 Facility Industry.SIC Code 1 is equal to 1044
        4.5 Facility Industry.SIC Code 1 is equal to 1061
        4.6 Facility Industry.SIC Code 1 is equal to 1099
        4.7 Facility Industry.SIC Code 1 is equal to 1221
        4.8 Facility Industry.SIC Code 1 is equal to 1222
        4.9 Facility Industry.SIC Code 1 is equal to 1231
        4.10 Facility Industry.SIC Code 1 is equal to 4911
        4.11 Facility Industry.SIC Code 1 is equal to 4931
        4.12 Facility Industry.SIC Code 1 is equal to 4939
        4.13 Facility Industry.SIC Code 1 is equal to 4953
        4.14 Facility Industry.SIC Code 1 is equal to 5169
        4.15 Facility Industry.SIC Code 1 is equal to 5171
        4.16 Facility Industry.SIC Code 1 is equal to 7389

Because this is an intricate and useful query, it is a good idea to save it for later use. Type in a description, such as 'Texas, 1996-2007 top 5 chemicals excluding new reporters', in the white box at the bottom of the window. This is a text description that will be saved with your query. Click on **Save** at the top of the window, and enter a shorter name for your query, such as 'Texas top 5 96-07 exc new'. The model will automatically add a '.qry' extension to your selection

name. In the future you can load this query and either resubmit it, or use it as the basis for building new selection statements.

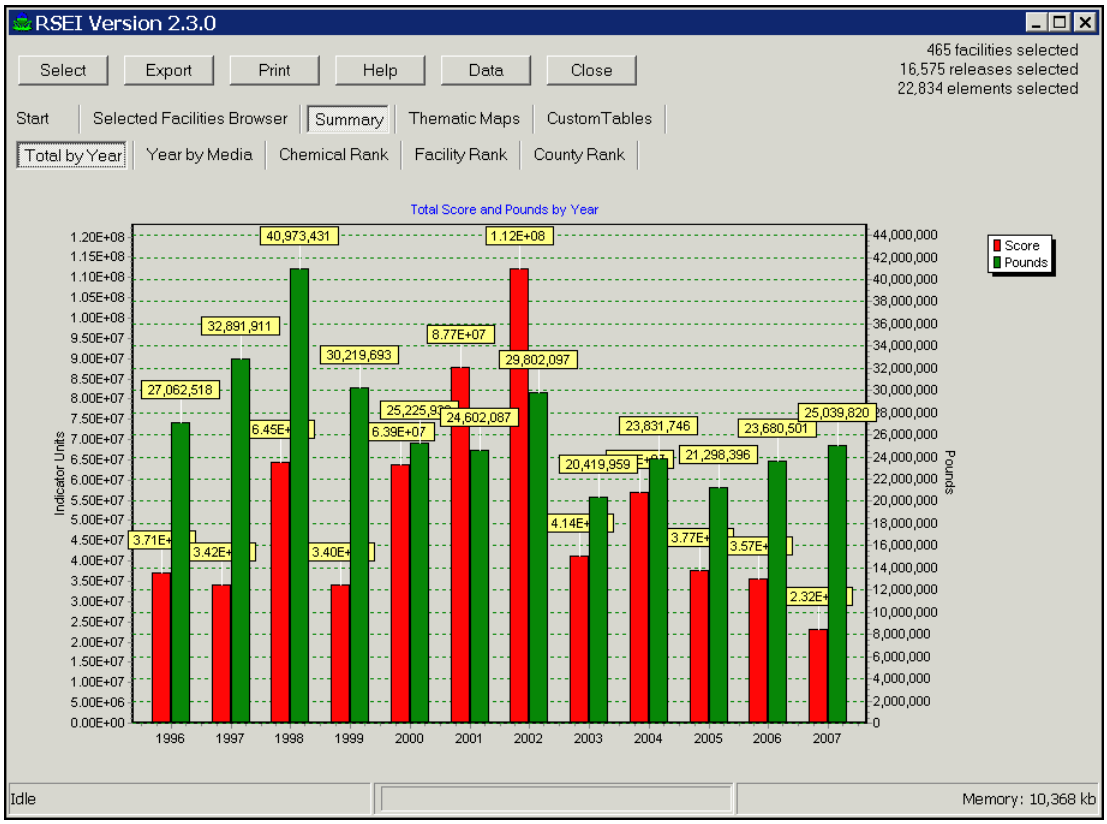
Click **Submit**, and the model will perform the selection. The model may take a few minutes to complete the task. When the model is done with the selection, the **Select elements...** screen will disappear. The number of facilities, chemical releases, and elements that are selected in your set will be displayed in the top right corner of the screen.

One of the quickest ways to look at a trend over time is to use the preformatted graphs provided. Click on the **Summary** button in the second row of menu buttons, then **Chemical Rank**. Notice here that of the five chemicals that were selected, only four are showing up in 2000. That means that Benzidine was not released or transferred off-site during 2000 by any facilities in the original TRI-reporting industries. In fact, Benzidine was only released or transferred by two facilities during the period 1996-2007, both of which are in SIC code 4953 (one of the newly-added industries), so it will not show up in this set.



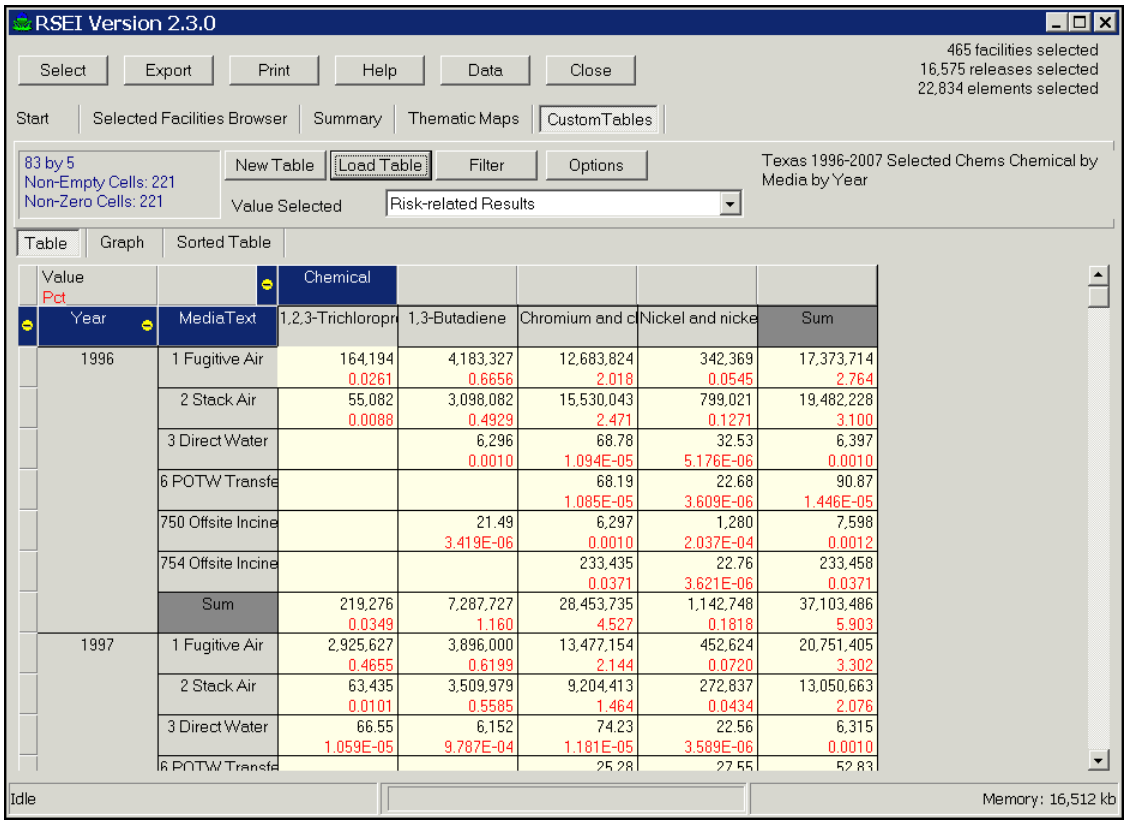
Summary Table, Chemical Rank

You can also click on the **Total by Year** button under the **Summary** menu. This graph adds together all of the pounds and the scores of all of the chemical releases in the selected set and presents them separately for each year in the set. In this case, it would be all of the chemical releases of Chromium and chromium compounds, 1,2,3-Trichlorpropane, Nickel and nickel compounds, and 1,3-Butadiene in Texas, excluding the new reporters. The graph is shown below. Pounds (as reported in TRI) are shown in green, and correspond to the axis on the right side of the graph; the total score is shown in red and corresponds to the axis on the left side of the graph. You can see that both pounds and score have fluctuated over time. The score was at its highest point in 2002, and has been substantially lower since that year.



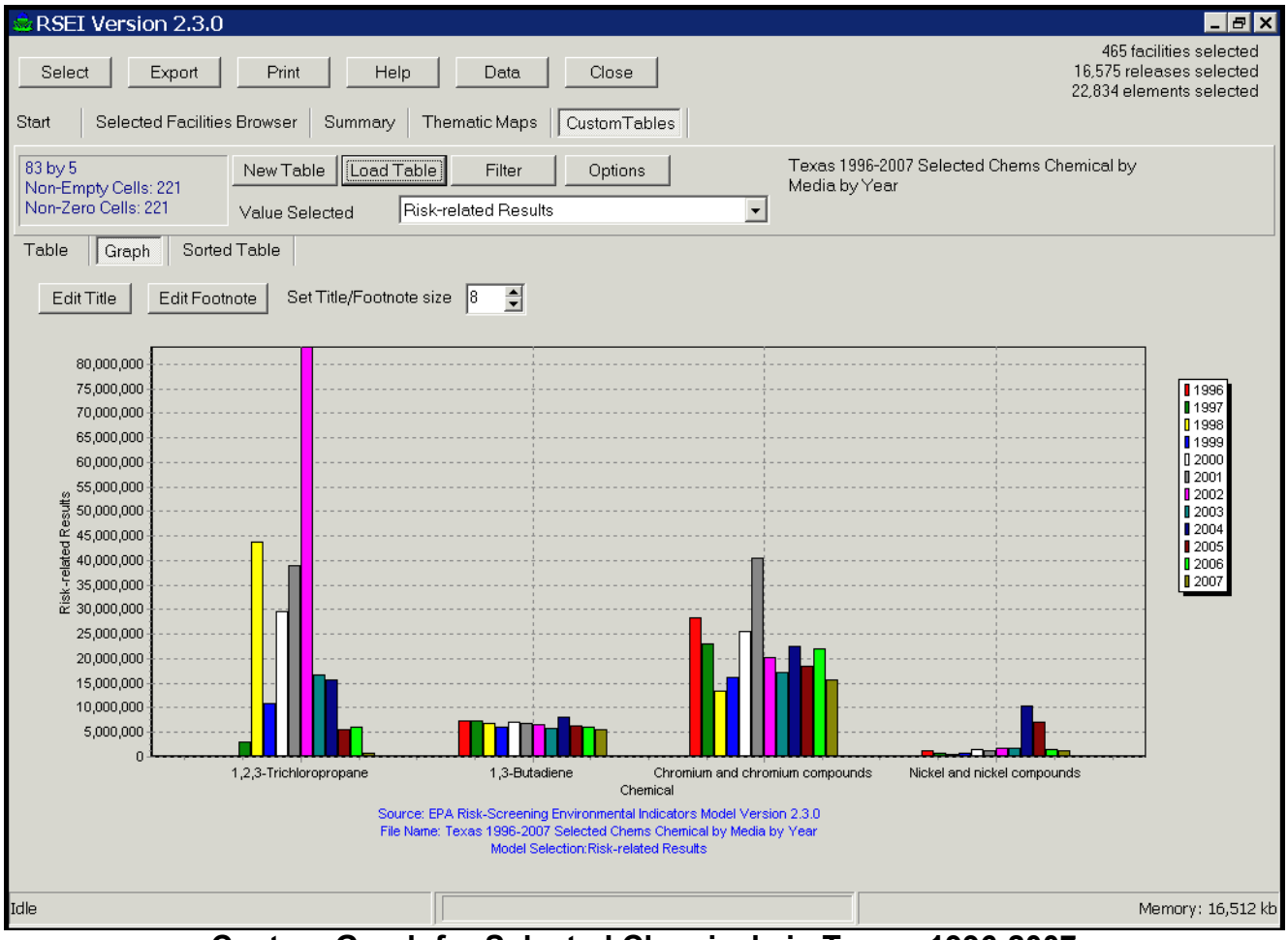
Total by Year Graph for Selected Chemicals in Texas, 1996-2007

To try to identify the reason for the high score in 2002, you can create a new custom table by chemical by media by year. Click on the **Custom Tables** button, and then **New Table**. In the list of dimensions, select 'Chemical.Chemical', 'Submission.Year', and 'Release.Media Text'. Make sure to deselect any selections from previous runs. In the 'Name' box, type 'Texas 1996-2007 Selected Chems Chemical by Media by Year'. Click **Run!** and your table will generate (this may take a few minutes). Once the query is finished, click on **Table**. The table should look like the one shown below. If you do not see one of the variables you selected listed, click on the row or column showing a plus sign, and all dimensions will be expanded.



Value Pct		Chemical				
Year	MediaText	1,2,3-Trichloropr	1,3-Butadiene	Chromium and cl	Nickel and nicke	Sum
1996	1 Fugitive Air	164,194 0.0261	4,183,327 0.6656	12,683,824 2.018	342,369 0.0545	17,373,714 2.764
	2 Stack Air	55,082 0.0088	3,098,082 0.4929	15,530,043 2.471	799,021 0.1271	19,482,228 3.100
	3 Direct Water		6,296 0.0010	68.78 1.094E-05	32.53 5.176E-06	6,397 0.0010
	6 POTW Transfe			68.19 1.085E-05	22.68 3.609E-06	90.87 1.446E-05
	750 Offsite Incine		21.49 3.419E-06	6,297 0.0010	1,280 2.037E-04	7,598 0.0012
	754 Offsite Incine			233,435 0.0371	22.76 3.621E-06	233,458 0.0371
	Sum	219,276 0.0349	7,287,727 1.160	28,453,735 4.527	1,142,748 0.1818	37,103,486 5.903
1997	1 Fugitive Air	2,925,627 0.4655	3,896,000 0.6199	13,477,154 2.144	452,624 0.0720	20,751,405 3.302
	2 Stack Air	63,435 0.0101	3,509,979 0.5585	9,204,413 1.464	272,837 0.0434	13,050,663 2.076
	3 Direct Water	66.55 1.059E-05	6,152 9.787E-04	74.23 1.181E-05	22.56 3.589E-06	6,315 0.0010
	6 POTW Transfe			25.28	27.55	52.83

Crosstab Table, Chemical by Media by Year for Top 5 Chemicals in Texas, 1996-2007



Custom Graph for Selected Chemicals in Texas, 1996-2007

This graph clearly shows that the increase in 2002 is being driven by 1,2,3-Trichloropropane. If you click on **Sorted Table**, you can see that stack air releases of 1,2,3-Trichloropropane account for eight percent of the total risk-related results in this set.

You can also export the table, in order to do calculations in a spreadsheet, for example. While viewing your table, simply click on **Export** in the top row of menu buttons, and select the type of file you would like your table to be exported to. Click on the folder icon to the right of the 'Export to File' box at the bottom of the window, and select the directory in which you would like to store your exported file. The default directory for stored files is "C:\Program Files\RSEI \User," but you can export the file anywhere. Enter a name at the bottom of the screen and click Save. In the **Setup** of the data export screen, click **OK**, and the model will export your table. You can then open up the file in whatever program you selected. Your exported table will contain all of the results fields (TRI Pounds, Hazard, Risk-related Results, etc.) in one table.

> The **Table**, **Graph** and **Sorted Table** functions will always display results based on the last crosstab table that was generated. Even if you perform a new selection using the **Select** button, these functions will not change until you create a new table based on your new selection.

Step 2.4 Further Analyses

If you wish to determine what facilities had stack air releases of 1,2,3-Trichloropropane in 2002, you could go back to the **Select elements...** screen and add a condition statement by clicking on the first empty circle. Modify the condition to read, 'Release.Media Code equal to 2'. This will change your selection to only stack (media=2) air releases. You could also modify the first statement to be 'Submission.Year is equal to 2002', and delete the other chemical selection statements by clicking on the row number and selecting 'Delete Current Row.' Then you could create a new **Custom Table** showing 'Facility Name' by 'Year'. This would show you which facilities released 1,2,3-Trichloropropane in 2002.

Tutorial 3

This tutorial will explain some of the facility-specific features in the RSEI model.

Step 3.1 Select a Group of Facilities

In this step, you will make a selection based on the county where the releasing facilities are located.

Click on the **Select** button at the top left of the menu panel. This brings up the **Select elements...** screen, where you can specify what TRI releases you want to select. Note that if you have performed any selections since installing the RSEI model, your last selection statement will appear on the **Select elements...** screen. To remove it, simply click on the **Clear** button. You will see a line of text on the screen, 'Choose records where all of the following apply'. This is a bracket statement that tells the model what to do with the information that comes next. You can change the bracket statement from 'all' to 'any', 'none', or 'not all'. But for now let it remain 'all'. Click on the circle to the left of the text, and select 'Add condition'. The condition statement contains the criteria you use to select your releases.

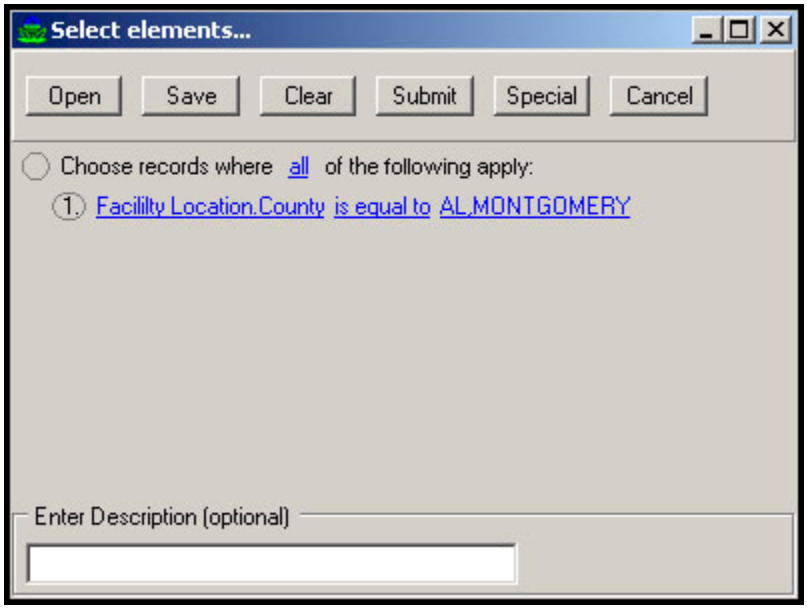
You will see the following text line:

1. Chemical Flags.Year Chemical Added is equal to __

Click on the first part of the text line, and a drop-down menu will appear. This menu contains all of the variables contained in the model that you can use in your selections. They are grouped according to the type of variable. Because we are selecting releases for facilities in a certain place, click on the variable group 'Facility Location'. To the right you will see another menu with all of the variables in this group. Click on 'County'.

The text line will change to '1. Facility Location.County is equal to __ '. Click on the blank at

the end of the statement. In the window that appears, select the county (they are grouped alphabetically by state abbreviation). For this exercise, scroll down and click on 'AL, Montgomery,' which is Montgomery County in Alabama. This is your completed selection statement, as shown below.

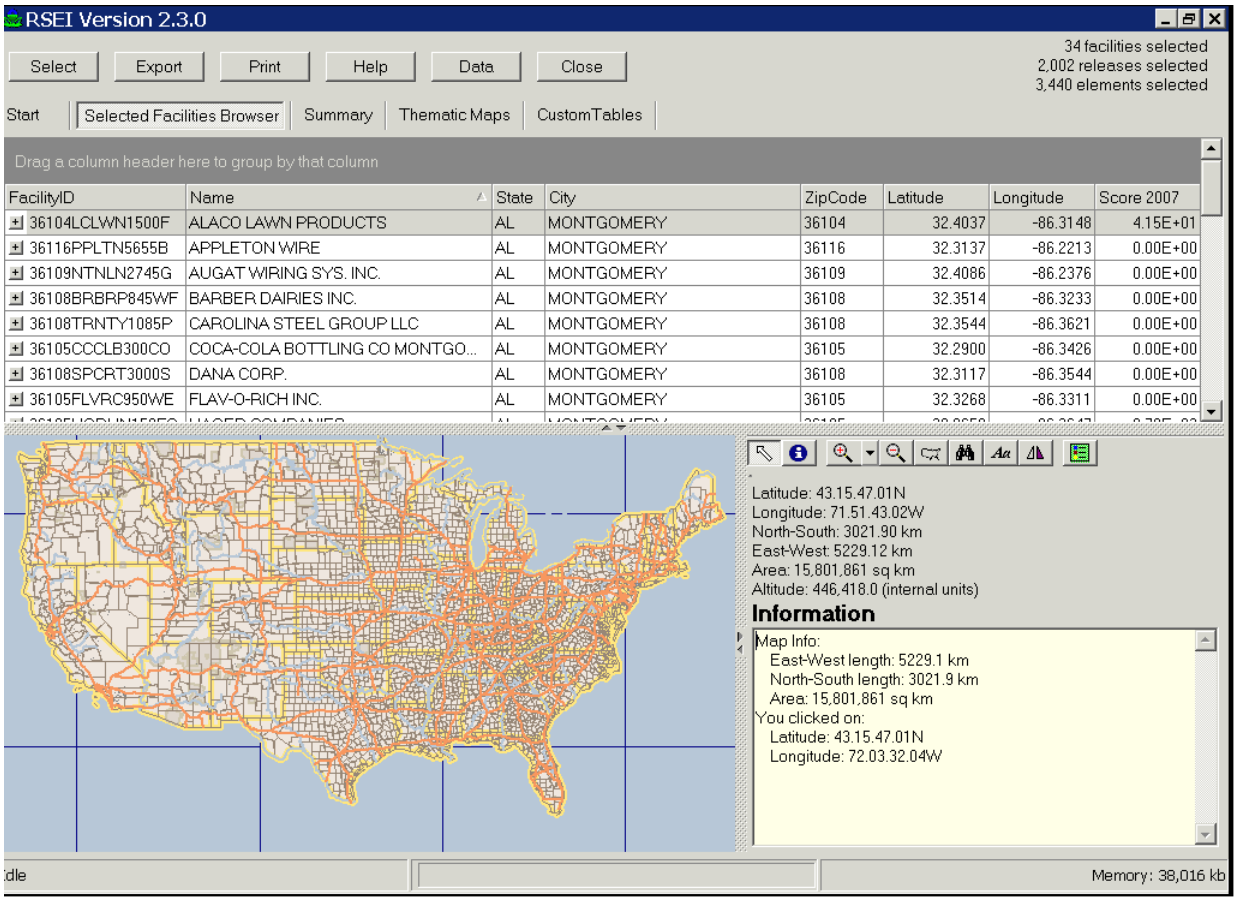


The Select Elements... Screen

Click **Submit** at the top of the **Select elements...** screen, and the model will perform the selection. This may take a few minutes to finish.

When the model is done with the selection, the **Select elements...** screen will disappear. The number of facilities, chemical releases, and elements that are selected in your set will be displayed in the top right corner of the screen. These numbers will remain displayed until you select a new set of scores. If you forget what your selection statement was, click on these numbers, and a window will appear with your original statement.

Now we can look at all of the facilities whose scores you have just selected. Click on the **Selected Facilities Browser** button in the second line of the menu panel. You will see a screen with three parts. The parts work together to provide detailed information on the facilities you have selected. The top part of the screen lists all the facilities whose scores have been selected. The bottom left is a U.S. map you can use to display your selected facilities and other options. The bottom right of the screen displays information about the current map display and provides the buttons used to navigate the map and control its functions.



The Selected Facilities Browser

Step 3.2 Getting Information About a Facility

Facility Information, Submissions, Releases and Scores

Double-click on the first facility name in the selected facilities list. You will see two options, 'Submissions' and 'Full Facility Record'. The latter option provides all of the information included in the model about this facility – its address, stack parameters, public contacts, etc. Double-click on 'Full Facility Record' or click on the plus sign to the left of the text to see all of the information. Then click on the minus sign at the far left to collapse it again. Expanding the 'Submission' option shows each chemical release that this facility has submitted to TRI. Double-click on a chemical name highlighted in green, then expand the 'Releases' option, and the model will show you the releases of that chemical – that is, the media that the chemical is being released to, as well as the total pounds released, and the total score. Double-click on the name of the media, and then on 'Scores' and the model will show you the score (the **Risk-related Results** of the model) for that chemical release to that media. To hide any of these records, simply click on the small minus sign at the beginning of the row. The list works like a directory tree that you can expand and collapse to see different levels.

Facility Location

You can also see where on the map your facility is located. With the facility name, or any part of the facility's submission record highlighted, click on the facility location icon in the lower right portion of your screen. The map will zoom into the state where your facility is located, and show you its exact location with concentric circles.

Facility Names

Click on the **Show/Hide Facility Names** icon to display the names of all facilities. If your map is zoomed out too far, the names will appear printed over each other and will be illegible. This function is only useful when you are zoomed in to a handful of facilities. To remove the facility names, simply click on the button again.

Step 3.3 Further Analyses

The steps outlined above should give you a good idea about one particular facility. However, the model contains much more information that can show you how that facility has been performing over time, or how it ranks in comparison to all facilities in the country, or facilities in similar geographic areas, or in similar industries.

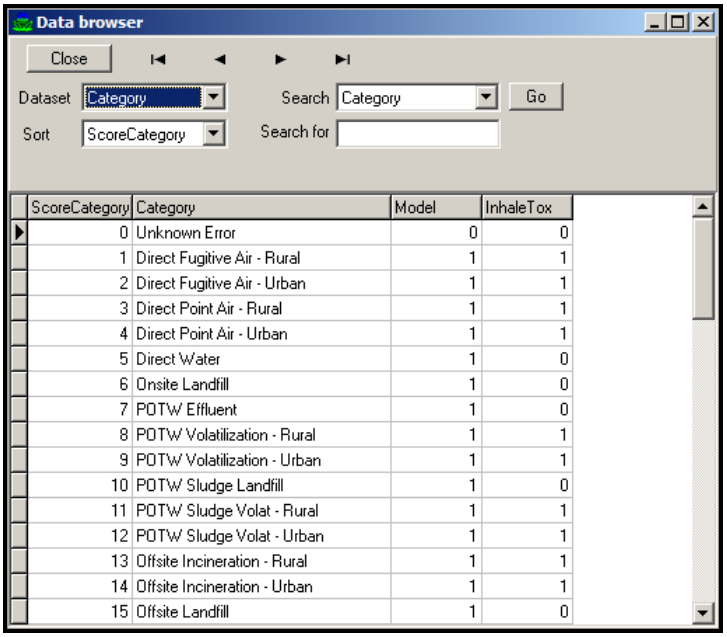
To do a time trend analysis to see if a facility's risk-related score is getting better or worse over time, first do a selection based just on that facility. The easiest way is to simply use the Facility ID, the first column in the **Selected Facilities Browser**, then go back to the **Select elements...** screen, and create a new selection statement with a condition that says 'Facility Identifier. Facility ID is equal to X', where X is the Facility ID from the Selected Facilities Browser (you can copy the Facility ID from the **Selected Facilities Browser** by right-clicking on the ID, then typing Control-C to copy the ID to the Windows clipboard. You can then paste the ID in the selection statement, or in any other Windows program by typing Control-V). When the model is done with the selection, you can click on the **Summary** button in the second line of the menu panel, and see preformatted graphs that show total score and pounds by year, and total pounds and total score by media by year.

To see how your facility ranks in relation to other facilities, first select a set that includes your facility and all of the facilities to which you want to compare it, for instance, all facilities nationwide in 2005. Your selection statement in the **Select elements...** screen would say Submission.Year is equal to 2005. This selects all releases from all facilities in 2005. When the model is done with your selection, click on the **Custom Tables** button. Follow the directions under that heading in **Creating a New Table** in Chapter 9 to make a crosstab table of your results. If you make a table using 'Facility Name' and 'SIC code' as row and column variables, then you can click on the **Sorted Table** button to see a ranking of all the facilities in order of highest score (or pounds, depending on what **Value** you have selected) to lowest score. If you want to look at the facilities that are in the same industry as your facility, then apply the filter to 'SIC Code 1', and select just your facility's SIC Code. Then click back to the **Sorted Table**, to see a ranking of all the facilities just in that SIC code.

CHAPTER 5
Viewing Data

Most of the data used by the RSEI model can be viewed by clicking on the **Data** button at the top of the screen (a small portion of the data is formatted in such a way that it cannot be viewed by users). This opens up the **Data browser** screen.

This screen groups the data by data set. Each data set is a 'Paradox' table in the 'Database' directory on your hard drive. The data set name is displayed at the top left of the screen; click on the arrow and scroll through the list to change data sets. In the boxes to the right, you can search fields for specific values. Simply select the desired field in the 'Search' box, and then enter the value in the 'Search for' box, and click **Go**. Each data set is ordered by its own unique internal ID number. Some tables can be sorted by more than one field. Other sorting possibilities will be displayed in the 'Sort' box. Click on any options in the box to change how the table is sorted in the display.



ScoreCategory	Category	Model	InhaleTox
0	Unknown Error	0	0
1	Direct Fugitive Air - Rural	1	1
2	Direct Fugitive Air - Urban	1	1
3	Direct Point Air - Rural	1	1
4	Direct Point Air - Urban	1	1
5	Direct Water	1	0
6	Onsite Landfill	1	0
7	POTW Effluent	1	0
8	POTW Volatilization - Rural	1	1
9	POTW Volatilization - Urban	1	1
10	POTW Sludge Landfill	1	0
11	POTW Sludge Volat - Rural	1	1
12	POTW Sludge Volat - Urban	1	1
13	Offsite Incineration - Rural	1	1
14	Offsite Incineration - Urban	1	1
15	Offsite Landfill	1	0

The Data Browser

You can move through the records in each data set using the arrows at the top of the screen, or by using your keyboard arrow keys. These data tables cannot be exported through the program, but can be accessed in the directory **C:\Program Files\RSEI\database**. The data tables are in Paradox format, which can be read by most database programs (such as dBase and MS Access).

The following sections describe each data set, its variables, how it is used in the model, and its sources.

Category Data

This data set is a lookup table that lists the codes used to categorize how releases are modeled. The score category codes resemble the media codes that are reported by TRI facilities, but also include information on how the model is able to deal with specific kinds of releases.

Category Data	
Variable	**Description**
ScoreCategory	Codes corresponding to the medium into which the chemical is released. Examples of the information include: volatilization from a transfer to a POTW, fugitive air releases, releases to an onsite landfill. [See **Score Category Information** in Chapter 10 for descriptions]
Category	Descriptions of release media and other descriptors corresponding with the score category codes. [See **Score Category Information** in Chapter 10 for descriptions]
Model	A dummy variable that is '1' when that category can be modeled and '0' when it cannot.
InhaleTox	A dummy variable that is '1' when the model requires an inhalation toxicity score to model this kind of release and '0' when it does not.

Census Data

RSEI Census data are contained in two tables, Census 00 (data from the 2000 Census) and Census 90 (data from the 1990 Census). These two tables contain the Census data that has been transposed onto the RSEI model grid. See the Introduction for a description of how Census data are used in the model. Each Census table is over 600 MB in size. They cannot be exported. Census data have been provided by Geolytics, Inc., and were last updated in 2010.

Census 90 Data	
Variable	**Description**
Grid Code	Number that identifies the model grid within which the cell is located.
X	Assigned grid cell value based on latitude.
Y	Assigned grid cell value based on longitude.

Census 90 Data	
Variable	**Description**
Male0to9 through Female65andUp	The number of people in the grid cell in each Census subpopulation group in the year 1990.
PrimaryFIPS	The FIPS code for the county within which most or all of the grid cell is contained.

Census 00 Data	
Variable	**Description**
Grid Code	Number that identifies the model grid within which the cell is located.
X	Assigned grid cell value based on latitude.
Y	Assigned grid cell value based on longitude.
Male0to9 through Female65andUp	The number of people in the grid cell in each Census subpopulation group in the year 2000.
PrimaryFIPS	The FIPS code for the county within which most or all of the grid cell is contained.

Chemical Data

This data set lists all of the chemical-specific information used by the model. The data can be grouped into four categories:

- **Chemical identifiers** include CAS numbers and chemical names.
- **Chemical toxicity information** includes all of the information used to construct toxicity weights for each chemical. Of the 611 chemicals on the 2007 TRI Reporting list, 433 chemicals have toxicity information included in the model. The sources of these values, in the order of most to least preferred, are EPA's Integrated Risk Information System (IRIS); EPA Office of Pesticide Programs' Toxicity Tracking Reports and Pesticide Reregistration Eligibility Documents (OPP); Agency for Toxic Substances and Disease Registry final, published chronic MRLs (ATSDR); California Environmental Protection Agency's Office of Environmental Health Hazard Assessment final, published toxicity values (Cal/EPA); EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), which include toxicity values developed by EPA's Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC); EPA's Health Effects Assessment Summary Tables (HEAST); and Final Derived/Interim Derived Toxicity Weights (Derived) estimated by EPA's Office of Pollution Prevention and Toxics. In cases where none of the above sources had sufficient data, other secondary sources were consulted and

reviewed by EPA experts (Derived). Chemical toxicity data are reviewed and updated on a continuing basis. See Technical Appendix A for toxicity values.

- **Chemical Properties information** includes all of the physicochemical properties used to model the fate and transport of the chemicals in the environment. Experimental and estimated data are used, most of it obtained from sources published by Syracuse Research Corporation (SRC). These data are also reviewed and updated continuously. See Technical Appendix B for details on each parameter.
- **Chemical Flags** are markers that can be used to select chemicals that are designated in specific ways, usually by EPA. Examples include Hazardous Air Pollutants (HAPs), or chemicals regulated under the Safe Drinking Water Act (SDWA). The chemical flags were last comprehensively checked against each relevant list in the summer of 2008.

Chemical Data	
Variable	**Description**
CASNumber	Chemical Abstracts Service Registry Number, which identifies a unique chemical. For chemical categories, CAS Numbers begin with "N", followed by three digits.
CASStandard	The Chemical Abstracts Service Registry Number identifies a unique chemical. The standard format contains three sets of numbers divided by hyphens (00-00-0).
ChemicalNumber	Unique internal identifier.
Category	This identifier is not yet active.
SortCAS	Chemical Abstracts Service Registry Number, which identifies a unique chemical, formatted for sorting (no hyphens). For chemical categories, CAS Numbers begin with "N", followed by three digits.
SortName	Common name of chemical, with initial modifiers moved to end of name. Used for internal sorting purposes.
FullChemicalName	Full scientific name(s) of the chemical.
Chemical	Common name(s) of the chemical.
Added	The year the chemical was added to the Toxics Release Inventory
Toxicity Source	All sources used for toxicity data, and date of addition to database.
RfCInhale	The inhalation reference concentration (RfC) is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer health effects during a lifetime". Units are mg/m^3.

Chemical Data	
Variable	**Description**
RfCUF	The uncertainty factor (UF) is applied to the no-observed-adverse-effect level (NOAEL) upon which the RfC is based, thereby reducing the dose. The UF accounts for uncertainties in extrapolation from experimental data to an estimate appropriate to humans.
RfCMF	The modifying factor (MF) is a value applied to the NOAEL when scientific uncertainties in the study chosen for estimating the RfC are not explicitly addressed by the standard UFs.
RfCConf.	Confidence levels are assigned to the study used to derive the RfC, the overall database, and to the RfC itself.
RfCSource	Source used for the RfC value.
RfCListingDate	Date that RfC was listed, if available.
RfDOral	The oral reference dose (RfD) is "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure [by ingestion] to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime". (mg/kg-day)
RfDUF	The uncertainty factor (UF) is applied to the no-observed-adverse-effect level (NOAEL) upon which the RfD is based, thereby reducing the dose. The UF accounts for uncertainties in extrapolation from experimental data to an estimate appropriate to humans.
RfDMF	The modifying factor (MF) is a value applied to the NOAEL when scientific uncertainties in the study chosen for estimating the RfD are not explicitly addressed by the standard UFs.
RfDConf.	Confidence levels are assigned to the study used to derive the RfD, the overall database, and to the RfD itself.
RfDListingDate	Date that RfD was listed, if available.
RfDSource	Source used for the RfD value.
UnitRiskInhale	The unit inhalation risk is the excess lifetime risk due to a "continuous constant lifetime exposure of one unit of carcinogen concentration"(51 FR 33998). ($1/mg/m^3$)
QSTAROral	The oral cancer slope factor (q1*): a measure of the incremental lifetime risk of cancer by oral intake of a chemical, expressed as risk per mg/kg-day. (1/mg/kg-day)

Chemical Data	
Variable	**Description**
WOE	Weight of evidence (WOE) categories indicate how likely a chemical is to be a human carcinogen, based on considerations of the quality and adequacy of data and the type of responses induced by the suspected carcinogen. EPA WOE classifications include the following categories and associated definitions (51 FR 33996): A Carcinogenic to humans B Probable carcinogen based on: •B1 Limited human evidence •B2 Sufficient evidence in animals and inadequate or no evidence in humans: C Possible carcinogen D Not classifiable E Evidence of non-carcinogenicity
UnitRiskListingDate	Date that Unit Risk was listed, if available.
UnitRiskSource	Source used for the Unit Risk value.
QStarListingDate	Date that QStar was listed, if available.
QStarSource	Source used for the QStar value.
WOEListingDate	Date that WOE was listed, if available.
WOESource	Source used for the WOE classification.
ITW	Inhalation Toxicity Weight: the RSEI toxicity weight for a chemical for the inhalation pathway.
OTW	Oral Toxicity Weight: the RSEI toxicity weight for a chemical for the oral pathway.
ToxicityClassOral	This indicates whether the toxicity weight for the oral pathway is based on cancer or noncancer health effects.
ToxicityClassInhale	This indicates whether the toxicity weight for the inhalation pathway is based on cancer or noncancer health effects.
ToxicityCategory	This indicates whether the oral and inhalation toxicity weights are based on cancer health effects, non-cancer health effects, or both.
AirDecay	The rate at which a chemical degrades in air, due primarily to photooxidation by radicals (hr^{-1}).
Koc	The organic carbon-water partition coefficient, used in estimates of chemical sorption to soil (mL/g).
H2ODecay	The rate at which a chemical degrades in water, due to abiotic hydrolysis, biodegradation, or photolysis (hr^{-1}).

Chemical Data	
Variable	**Description**
LOGKow	The logarithm of the octanol-water partition coefficient. Kow is the ratio of a chemical's concentration in the octanol phase to its concentration in the aqueous phase at equilibrium in a two-phase octanol/water system.
Kd	The soil-water partition, or distribution, coefficient. For organics, the value is often estimated as the product of Koc and foc (the fraction of organic carbon in the soil) (L/kg).
WaterSolubility	The amount of chemical that dissolves in water at a particular temperature (mg/L).
POTWPartitionRemoval	Percent of chemical removed from the wastewater by the POTW (Publicly Owned Treatment Works).
POTW PartitionSludge	Percent of total POTW removal efficiency attributable to sorption of the chemical to sewage sludge.
POTW PartitionVolat	Percent of total POTW removal efficiency attributable to volatilization of the chemical.
POTW PartitionBiod	Percent of total POTW removal efficiency attributable to biodegradation of the chemical.
IncineratorDRE	Destruction/removal efficiencies, expressed as the percent of chemical fed to the incinerator that is not released to the air.
BCF	Bioconcentration factor: the ratio of a chemical's concentration in fish to its concentration in water at equilibrium (L/kg).
Henrys	Henry's law constant: the ratio of a chemical's concentration in the air to its concentration in the water at equilibrium (atm·m3/ mol).
MCL	Maximum Contaminant Level, which is EPA's national primary drinking water standard for the chemical. This is the current value; historical data are contained in the table, 'MCL.'
Molecular Weight	The mass in grams of one mole of molecules of the chemical.
T33/50Flag	This flag is a marker which indicates that the chemical is included in EPA's 33/50 program, a program in which facilities voluntarily reduce their chemical releases by 33 percent and 50 percent by certain dates.
HAPFlag	This flag marks the chemicals that are hazardous air pollutants, as defined by the Clean Air Act.
CAAFlag	This flag marks the chemicals that are Clean Air Act pollutants.
PriorityPollutantFlag	This flag marks the chemicals that are priority pollutants, as defined by the Clean Water Act.

Chemical Data	
Variable	**Description**
SDWAFlag	This flag marks the chemicals that have national primary or secondary drinking water standards under the Safe Drinking Water Act.
CERCLAFlag	This flag marks the chemicals that are regulated under Superfund (CERCLA—the Comprehensive Environmental Response, Compensation, and Liability Act).
OSHACarcinogens	This flag indicates whether the chemical is a known or suspect human carcinogen based on OSHA criteria. Known human carcinogens are defined as those that have been shown to cause cancer in humans. Suspect human carcinogens have been shown to cause cancer in animals. The list of chemicals flagged as OSHA carcinogens is based on the list of carcinogens provided in the 1997 TRI Public Data Release.*
ExpansionFlag	This flag marks the chemicals that were added to the Section 313 toxic chemical list for reporting beginning in 1995.
CoreChemicalFlag	This flag marks the chemicals that are common to all reporting years of TRI and that have had no modifications of reporting requirements, as determined by the 1988 Core Chemical List found on the TRI Explorer website. For RSEI Version 2.3.0, this flag produces the same results as the MiniCoreChemical Flag (data for TRI reporting years 1988 through 1995 are not included in Version 2.3.0, except upon request).
MiniCoreChemicalFlag	This flag marks the chemicals that are common to TRI reporting years 1995 through 2000 and that have had no modifications of reporting requirements in that time period, as determined by the 1995 Core Chemical List found on the TRI Explorer website. For RSEI Version 2.3.0, this flag produces the same results as the CoreChemical Flag (data for TRI reporting years 1988 through 1995 are not included in Version 2.3.0, except upon request).
Core98ChemicalFlag	This flag marks the chemicals that are common to TRI reporting years 1998 through 2002 and that have had no modifications of reporting requirements in that time period, as determined by the 1998 Core Chemical List found on the TRI Explorer website.
HPVFlag	Indicates whether the chemical is designated as a High Production Chemical.
HPVChallengeValue	Describes the value or combination of values assigned to the chemical by EPA's HPV Challenge program to describe the chemical's status under the program.
PBTFlag	Indicates whether EPA has designated this chemical as a priority chemical under the Persistent Bioaccumulative and Toxic (PBT) Chemical Program.

Chemical Data	
Variable	**Description**
Metal	This flag indicates whether the chemicals are metals and also whether they are core chemicals. (Core chemicals are those that are common to all reporting years of TRI and which have had no modifications of reporting requirements.)
User Tags 1 through 5	Using these tags, you can select a set of chemicals based on your own selection criteria.
HasTox	Indicates that the chemical has a toxicity weight (either oral or inhalation) in the data set.
MaxTW	Shows the greater of the two possible toxicity weights (oral or inhalation).
*Even if a chemical is flagged as an OSHA carcinogen, its toxicity weight for a given exposure pathway may not be based on its carcinogenic effects. For example, a chemical that causes both carcinogenic and noncarcinogenic effects when inhaled may have a higher inhalation toxicity weight associated with noncarcinogenic effects than with its carcinogenic effects. If you wish to view all chemicals that have inhalation toxicity weights based on cancer health effects, see the Toxicity Class - Inhale field. For a list of chemicals that have toxicity weights based only on cancer health effects, see the Toxicity Category field.	

County Data

This data set is based on U.S. Census data, and was last updated in August 2000. Total county population is taken directly from U.S. Census bureau estimates (these data are not directly used in the model). Total fishing population is obtained from state counts of county-specific records on hunting and fishing licenses, where available. The fishing population is used to model the ingestion of contaminated fish in one of the two surface water pathways. In the model, the total fishing population is adjusted for family size (to take into account the family of the licensed fisher who also eat the caught fish), and 95 percent of the total is considered to be recreational fishers, and 5 percent are considered to be subsistence fishers; the variable in this data set is the unadjusted number of licensed fishers only. The fishing population data were collected and added to the model for the first time in August 2000. See Chapter V of the Methodology document for details.

County Data	
Variable	**Description**
FIPS	FIPS (Federal Information Processing Standard) code which identifies the county associated with the facility
Name	State, County
Latitude	Latitude in decimal degrees of the county centroid.
Longitude	Longitude in decimal degrees of the county centroid.
AreaSqKm	County area in square kilometers.

County Data	
Variable	**Description**
WaterAreaSqKm	Area of the county that is covered with water in square kilometers.
Population1998 through Population1970	Total midyear population of each county for year indicated.
TotalFishingPopulation	Number of people in each county with fishing licenses.

CountyExp Data

This data set is used in conjunction with the total population data in the 'County' data set to construct detailed yearly population estimates. These data were last updated in August 2000. All of the data are from the U.S. Census Bureau. These data are not used directly by the RSEI model.

CountyExp Data	
Variable	**Description**
FIPS	FIPS (Federal Information Processing Standard) code which identifies the county.
Year	Year (1988 through 1998) of the record's data.
Male0to9 through Female65Up	Fields showing number of people in each indicated demographic group for the indicated year for the indicated county. These fields are mutually exclusive (they sum to the total number of people in the county).

Elements Data

This table lists unique Indicator Elements and their attributes. All of these data are internal to the RSEI model, and are used solely for modeling purposes. It is shown for comprehensiveness only, and is unlikely to be useful to users. The table is approximately 400 MB in size. It cannot be exported.

Elements Data	
Variable	**Description**
ElementNumber	Unique internal identifier.
ReleaseNumber	Unique internal identifier.
PoundsPT	Total pounds after any treatment by POTWs or other offsite facilities.

Elements Data	
Variable	**Description**
ScoreCategory	Codes corresponding to the medium into which the chemical is released. Examples of the information include: direct air releases from the stack using a "rural" air dispersion model, fugitive air releases, releases to an onsite landfill. [See Score Category Information in Chapter 10 for descriptions]
Score	Total Indicator Element score.
Population	Total population exposed.
ScoreA	Indicator Element score for children 0 through 9 years of age (inclusive).
PopA	Number of children 0 through 9 years of age (inclusive) exposed.
ScoreB	Indicator Element score for children between 10 and 17 (inclusive).
PopB	Number of children between 10 and 17 (inclusive) exposed
ScoreC	Indicator Element score for adults 18 through 44 (inclusive).
PopC	Number of adults 18 through 44 (inclusive) exposed.
ScoreD	Indicator Element score for adults 45 through 64 (inclusive).
PopD	Number of adults 45 through 64 (inclusive) exposed.
ScoreE	Indicator Element score for adults 65 years old and greater.
PopE	Number of adults 65 years old and greater exposed.

Facility Data

This data set is a combination of TRI Reported data, and derived data used to model emissions from the facilities. Each case is noted after the variable description in the table below.

Derived stack parameter data were primarily collected from three national EPA databases (NEI, AFS and NET). AFS and NET data were last collected in 2001; NEI data was last collected in 2008. Facilities are matched where possible- i.e., facility-specific parameters are used. For facilities that cannot be matched, median values at the 3-digit SIC code level (constructed using only AFS and NET data) are used. If that is not possible, in cases where the TRI facility did not submit a valid SIC code, or there are no facilities for that SIC code in the two EPA databases, median values for all SIC codes are used. The NEI/AFS/NET data are supplemented by a one-time data pull conducted in 1998 from three state databases containing facility-specific data. The states involved are Wisconsin, New York and California. Only data for facilities that were not matched through AFS/NET were used from these databases. Starting in Reporting Year (RY) 1998, electric utilities are required to report to TRI. Because their stack parameters are generally quite different from other facilities, facility-specific data collected by the Electric

Power Research Institute (EPRI) were used to represent these facilities. In cases where facilities falling in the electric utility SIC codes could not be matched, the overall median of all coal and gas electric utilities from EPRI's data set was used. For the complete method used in this process, see Technical Appendix E.

Facility locations are obtained from EPA's Locational Reference Tables (LRT). A small number of facilities did not have coordinates available in the LRT; for these facilities, either previous RSEI coordinates or zip code centroids were used. For a complete account of this process, see Technical Appendix D.

The SIC code data are based on the primary and additional five SIC codes reported by facilities on each Form R. They are described as "Derived" in the the table below because the submitted data are processed to make them easier to use before including them in the model. Facilities may submit multiple Form R's, and so may report more than six SIC codes in total, and more than one primary SIC code. For any facility that has multiple primary SIC codes, RSEI assigns the most frequently reported. If more than five additional SIC codes are reported, RSEI assigns the five most frequently reported as SIC Codes 2 through 6. Users can use the other fields to make selections at a more aggregated level (2 or 3-digit SIC Codes). For details, see Technical Appendix F. NAICS codes, which facilities are required to report instead of SIC codes beginning with RY 2006, are handled in the same manner.

Facility Data	
Variable	**Description**
FacilityID	Unique TRI identifier for facility. (As Reported)
FacilityNumber	Unique internal identifier. (Derived)
Latitude	Final latitude of the facility in decimal degrees. (Derived)
Longitude	Final longitude of the facility in decimal degrees. (Derived)
GridCode	Number that identifies the model grid within which the cell is located. (Derived)
X	Assigned grid value based on latitude. (Derived)
Y	Assigned grid value based on longitude. (Derived)
DataSource	This variable is not yet active.
StackHeight	Height of facility stack that is emitting the pollutant (m). (Derived)
StackVelocity	Rate at which the pollutant exits the stack (m/s). (Derived)
StackDiameter	Diameter of facility stack that is emitting the pollutant (m). (Derived)
StackHeightSource	Source of information on stack height. (Derived)
StackVelocitySource	Source of information on stack velocity. (Derived)
StackDiameterSource	Source of information on stack diameter. (Derived)

Facility Data	
Variable	**Description**
RadialDistance	Distance from approximate center point of grid. (Derived)
Name	TRI facility name. (As Reported)
Street	Street address of facility. (As Reported)
City	City where the TRI facility is located. (As Reported)
County	County where the TRI facility is located. (As Reported)
State	State in which the facility is located. (As Reported)
FIPS	FIPS (Federal Information Processing Standard) code which identifies the county associated with the facility. (As Reported)
STFIPS	FIPS (Federal Information Processing Standard) code which identifies the state associated with the facility. (As Reported)
ZIPCode	Five-digit facility ZIP code. (As Reported)
ZIP9	Nine-digit facility ZIP code, if reported. (As Reported)
DUNS	The 9-digit number assigned by Dun & Bradstreet for the facility or establishment within the facility. (As Reported)
Region	EPA region where facility is located. There are 10 EPA regions. Any information which cannot be matched to an actual EPA region (e.g., an unrecognized ZIP code) is assigned to a dummy region (called UK). (As Reported)
FederalFacilityFlag	Code describing federal status for purposes of Executive Order 12856. (C =commercial; F = federal; G= government contractor). (As Reported)
FederalAgencyName	Name of Federal Agency of which the federal facility is a part. (As Reported)
ParentName	Name of the corporation or other business entity located in the U. S. that directly owns at least 50 percent of the voting stock of the facility. (As Reported)
ParentDUNS	The 9-digit number assigned by Dun & Bradstreet for the US parent company. (As Reported)
PublicContactName	Name submitted by TRI facility as public contact. (As Reported)
PublicContactPhone	Phone number submitted by TRI facility for public contact. (As Reported)
SIC1	Facility's 4-digit SIC code designated as "primary" by facility on Form R. If no primary SIC is designated, the field displays "NR." (Derived)
SIC2	Facility's most frequently reported non-primary 4-digit SIC code. (Derived)

Facility Data	
Variable	**Description**
SIC3	Facility's second most frequently reported non-primary 4-digit SIC code. (Derived)
SIC4	Facility's third most frequently reported non-primary 4-digit SIC code. (Derived)
SIC5	Facility's fourth most frequently reported non-primary 4-digit SIC code. (Derived)
SIC6	Facility's fifth most frequently reported non-primary 4-digit SIC code. (Derived)
SIC7	Facility's sixth most frequently reported non-primary 4-digit SIC code. (Derived)
Multiple Primary SIC	Code that indicates whether the facility designated multiple SIC codes as primary on Form R's submitted. (Derived)
SICCodeSame2Digit	This code uses all SIC codes reported by a facility to arrive at a single 2-digit code for the facility, if applicable. (Derived)
SICCode2Digit	First 2 digits of facility's primary SIC code. (Derived)
SICCode3Digit	First 3 digits of facility's primary SIC code. (Derived)
DerivedSICCode	"True" if SIC1 was populated with code crosswalked from submitted NAICS code. (Derived)
NAICS1	Facility's 6-digit NAICS code designated as "primary" by facility on Form R. If no primary NAICS is designated, the field displays "NR." (Derived)
NAICS2	Facility's most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS3	Facility's second most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS4	Facility's third most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS5	Facility's fourth most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS6	Facility's fifth most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS7	Facility's sixth most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS8	Facility's seventh most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS9	Facility's eighth most frequently reported non-primary 6-digit NAICS code. (Derived)

Facility Data	
Variable	**Description**
NAICS10	Facility's ninth most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS11	Facility's tenth most frequently reported non-primary 6-digit NAICS code. (Derived)
NAICS12	Facility's eleventh most frequently reported non-primary 6-digit NAICS code. (Derived)
MultiplePrimaryNAICS	Code that indicates whether the facility designated multiple NAICS codes as primary on Form R's submitted. (Derived)
NAICSCodeSame3Digit	This code uses all SIC codes reported by a facility to arrive at a single 3-digit code for the facility, if applicable. (Derived)
NAICSCode3Digit	First 3 digits of facility's primary NAICS code. (Derived)
NAICSCode4Digit	First 4 digits of facility's primary NAICS code. (Derived)
NPDESPermit	Permit number issued by US EPA for facilities discharging to water. (As Reported)
RCRANumber	Number assigned by EPA to facilities handling hazardous waster under the Resource Conservation and Recovery Act. (As Reported)
FRSID	EPA's Facility Registry System ID. (As Reported)
NHDRegion	NHD Region in which facility is located (see http://www.horizon-systems.com/nhdplus/data.php for codes). (Derived)
WaterReleases	"True" if facility reported direct water releases for any year 1988-2007. (Derived)
NearReach	14-digit NHD reach identifier associated with the reach that is nearest facility. (Derived)
NearComID	ComID from NHDPlus dataset that uniquely identifies reach segment nearest facility. (Derived)
DistanceToReach	The distance between an off-site facility discharging to water and the reach of the receiving water body (m). (Derived)
HEM3ID	The ID assigned to the nearest National Weather Service (NWS) observation station. (Derived)
DistanceToHEM3	The distance between a facility and the nearest observation station. (Derived)
SubmitLat	Latitude in decimal degrees exactly as submitted by the TRI facility. (As Reported)
SubmitLong	Longitude in decimal degrees exactly as submitted by the TRI facility. (As Reported)

Facility Data	
Variable	**Description**
PreferredLat	Latitude in decimal degrees after correction by TRI. (Derived)
PreferredLong	Longitude in decimal degrees after correction by TRI. (Derived)
OnTribalLand	Whether facility is located within the boundaries of a Tribal Land (True/False). (Derived)
TribalLandName	Name of Tribal Land within which facility is located, if any. (Derived)
SK	Internal sort key containing the first two letters of the facility name (excluding spaces, periods, numbers, etc.). (Derived)
Method	Code describing method by which coordinates were collected (e. g., based on street address). See Appendix D for code descriptions. (Derived)
HDatum	Horizontal datum of the final coordinates. (Derived) See Appendix D for code descriptions. (Derived)
LatLongSource	Source of final lat/long found in 'Latitude' and 'Longitude' fields. (Derived)
LatLongTable	Detail on source of final lat/long, where necessary. (Derived)
AssignedReach	14-digit NHD reach identifier associated with reach assigned by EPA or determined through QA. (Derived)
AssignedComID	ComID from NHDPlus dataset that uniquely identifies reach segment for assigned reach. (Derived)
ReachSource	Source for assigned reach.
NearStream	USGS Reach Identifier from RF1 stream network (not currently used). (Derived)
DistanceToStream	The distance between the facility and its RF1 stream reach (m) (not currently used). (Derived)
WBANID	The ID assigned to the Weather Bureau/Army/Navy WeatherStation nearest to the facility. (Derived)
DistanceToWBAN	The distance between a facility and the nearest WBAN weather station (m). (Derived)

MCL (Maximum Contaminant Level)

This data set contains yearly information on Maximum Contaminant Levels (MCLs) that EPA sets for chemicals to limit the level of contaminants in drinking water from public water systems. As the MCLs are legally enforceable, the RSEI model assumes that drinking water from public systems is in compliance with these standards. The first MCLs were instituted in 1976; changes to existing MCLs and new MCLs have been instituted since then, including the addition of a large number of new MCLs in 1991.

This table lists the value for each MCL for each year of TRI data. For several chemicals for which MCLs were first instituted in 1976 and then revised in 1991, the original MCL values were not readily available, so the revised values were also used for the years before the revision. These chemicals are barium, cadmium, chromium, lead, lindane, mercury, methoxychlor, nitrate, selenium, and toxaphene.

MCL Data	
Variable	**Description**
CASNumber	Chemical Abstracts Service Registry Number, which identifies a unique chemical. For chemical categories, CAS Numbers begin with "N", followed by three digits.
CASStandard	The Chemical Abstracts Service Registry Number identifies a unique chemical. The standard format contains three sets of numbers divided by hyphens (00-00-0).
ChemicalNumber	Unique internal identifier.
Chemical	Common name(s) of the chemical.
MCL1988...MCL2010	MCL for each year an MCL was in effect.

Media Data

This data set lists the release media codes and their description as reported in TRI Reporting Form R. For reported media codes that begin with 'M', the RSEI model has substituted a 7. For instance, code M54 would be the same as 754 in the table below.

Media Data	
Variable	**Description**
Media	Code associated with the media and/or method of release, as reported by facility in TRI Reporting Form R. See Media Information for codes.
MediaText	Descriptions of receiving media associated with Media Codes
Sum	This variable is not yet implemented.

Media Data	
Variable	**Description**
Itw	Internal dummy variable used for modeling.
Otw	Internal dummy variable used for modeling.
Mtw	Internal dummy variable used for modeling.
MediaCode	Internal variable used for modeling.

NAICS Table Data

The North American Industry Classification System (NAICS) codes are used to classify businesses into industry groups producing the same or similar goods. They are maintained by the U.S. Census Bureau and can be found online at http://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2002. This data set is a direct reproduction of that portion of the 2002 NAICS code table that is reportable to TRI.

NAICS Data	
Variable	**Description**
NAICSCode	Six-digit NAICS code.
LongName	Text description of code.

NHD Pops Data

This data set contains information derived from the placement of the population (from U.S. Census data) on the model grid in relation to stream reaches (from the National Hydrography Dataset (NHD).

NHD Pops Data	
Variable	**Description**
COMID	Unique identifier from NHD assigned to a portion of a stream reach.
PrimaryFIPS	County in which the reach portion is located.
ExposedPop	Number of people eating from reach portion.
TotalPop	All people within 50 km of reach portion.
Cells	Number of populated cells within 50 km of reach portion.

NHD Pops Data	
Variable	**Description**
Male0to9 through Female65Up	Fields showing number of people in each indicated demographic group for the indicated year for the indicated county. These fields are mutually exclusive (they sum to the total number of people in the county).

Off-site Data

This data set is derived from TRI reported data. Offsite facilities are any facilities to which a TRI reporting facility transfers a reportable chemical. The names and addresses of these offsite facilities are reported by the TRI facilities transferring their chemicals. Because multiple facilities may transfer chemicals to the same offsite facility, the same offsite facility may be reported multiple times in slightly different forms. To approximate a set of unique offsite facilities, a sophisticated program was developed to match slightly different reported entries that are in reality the same offsite facility. Because latitude and longitude are not reported but are necessary to model releases, the offsite facilities were also geocoded (assigned latitude and longitude coordinates based on street address) by Thomas Computing Services, a commercial firm, using standard geocoding software based on U.S. Census Tiger files. This data set contains the results of both the matching exercise and the geocoding exercise. For a complete account of the process, see Technical Appendix D.

Off-site Data	
Variable	**Description**
OffsiteID	Unique internal identifier for each off-site facility.
FacilityNumber	Unique internal identifier for each off-site facility.
NewNumber	This variable is not yet active.
POTW_Incin	Identifies off-site facilities for which releases are modeled: 1= POTW; 2=Incinerator; 3=POTW and Incinerator. (Derived)
DataSource	This variable is not yet active.
Name	Best submitted name for off-site facility.
Street	Best submitted street address for off-site facility.
City	Best submitted city for off-site facility.
State	Best submitted state for off-site facility.
ZIPCode	Best submitted ZIP code for offsite facility.
ZIP9	This variable is not yet implemented.

Off-site Data	
Variable	**Description**
Latitude	Geocoded latitude in decimal degrees for off-site facility.
Longitude	Geocoded longitude in decimal degrees for off-site facility.
GridCode	Number that identifies the model grid within which the cell is located. (Derived)
X	Assigned grid value based on latitude.
Y	Assigned grid value based on longitude.
Radial Distance	Distance from approximate center point of grid.
StackHeight	Default stack height used for off-site facilities.
StackVelocity	Default stack velocity used for off-site facilities.
StackDiameter	Default stack diameter used for off-site facilities.
Class	This variable is not implemented.
FRSID	EPA's Federal Registry System ID for off-site facility.
NPDESPermit	Permit number issued by US EPA for facilities discharging to water.
RCRANumber	Number assigned by EPA to facilities handling hazardous waster under the Resource Conservation and Recovery Act.
HEM3ID	The ID assigned to the nearest National Weather Service (NWS) observation station.
DistanceToHEM3	The distance between a facility and the nearest observation station.
NHDRegion	NHD Region in which facility is located (see http:// www.horizon-systems.com/nhdplus/data.php for codes).
NearReach	14-digit NHD reach identifier associated with the reach that is nearest to off-site facility.
NearComID	ComID from NHDPlus dataset that uniquely identifies reach segment nearest facility.
DistanceToReach	The distance between an off-site facility discharging to water and the reach of the receiving water body (m).
AssignedReach	14-digit NHD reach identifier associated with reach assigned by EPA or determined through QA.

Off-site Data	
Variable	**Description**
AssignedComID	ComID from NHDPlus dataset that uniquely identifies reach segment for assigned reach.
StreamSource	Data source linking stream reach to facility.
GDTType	Type of geocoded match.
Method	Description of the collection method used to determine lat/longs.
Quality	Rank from 1 to 9 describing quality of geocoded match (1 is best).
Freq	Number of TRI transfers sent to this off-site facility.
NearStream	USGS Reach Identifier from RF1 stream network (not currently used). (Derived)
DistanceToStream	The distance between the facility and its RF1 stream reach (m) (not currently used). (Derived)
WBANID	The ID assigned to the Weather Bureau/Army/Navy WeatherStation nearest to the facility. (Derived)
DistanceToWBAN	The distance between a facility and the nearest WBAN weather station (m). (Derived)

Release Data

This data set contains the total pounds released as reported in TRI, and the total score for each release, as well as the release media and the off-site facility that received the release, if any.

Release Data	
Variable	**Description**
ReleaseNumber	Unique internal identifier.
SubmissionNumber	Unique internal identifier.
Media	Code associated with the media and/or method of release, as reported by facility in TRI Reporting Form R. See Media Information for explanation of codes.
PoundsReleased	Total pounds released, without accounting for treatment.
OffsiteNumber	Unique identifier for off-site facility receiving this release, if any.
TotalScore	Total score (risk-related result) for release.

SIC Table Data

Standard Industrial Classification (SIC) codes are used to classify businesses into industry groups producing the same or similar goods. They are maintained by the U.S. Occupational Health and Safety Administration (OSHA) and can be found online at http://www.osha.gov/oshstats/sicser.html. This data set is a direct reproduction of that portion of the OSHA SIC code table that is reportable to TRI.

SIC Data	
Variable	**Description**
SICCode	Four-digit SIC code.
LongName	Text description of code.
PCT_CH6	Estimated percent of total chromium releases from SIC code that are hexavalent chromium (remainder is assumed to be trivalent form).

Submission Data

This data set reproduces TRI reported data. However, SubmissionNumber, FacilityNumber, and ChemicalNumber are unique identifiers internal to the model.

Submission Data	
Variable	**Description**
DCN	Unique identifier assigned by TRI to each facility submission.
SubmissionNumber	Internal identifier assigned to each submission.
FacilityNumber	Internal identifier unique to each facility.
ChemicalNumber	Internal identifier unique to each chemical.
Year	Year of facility release.
Use	Code describing how chemical is used in reporting facility, as reported on TRI Reporting Form R. See **On-site Chemical Information** in Chapter 10 for an explanation of the codes.
LongOrShort	Code describing whether the submission came from a short or long form.

Submission Data	
Variable	**Description**
MaxOnsite	Code describing the maximum amount of the chemical on-site at reporting facility, as reported in TRI Reporting Form R. See **On-site Chemical Information** in Chapter 10 for an explanation of the codes.
TotalPounds	Total pounds released.

Weather Data

Weather data used in the model include wind speed, wind direction, and atmospheric stability. The source of these data are STability ARray (STAR) data, which are available from weather stations throughout the U.S. The model uses STAR data averaged over the period 1988-1996 from the weather station closest to the facility being modeled. This data set contains the averaged data for each weather station, but the format of the data prevents it from being viewed in the data browser. These data were last updated in 2000.

Weather Data	
Variable	**Description**
WBAN	Unique internal identifier.
Year	This variable is not yet active.
WBANID	The ID assigned to the Weather Bureau/Army/Navy Weather Station.
Radial Distance	Distance from approximate center point of grid, used in searching for the weather station nearest to facility.
Name	This variable is not yet active.
Latitude	Latitude of the weather station in decimal degrees.
Longitude	Longitude of the weather station in decimal degrees.
Temperature	This variable cannot be viewed in the data browser.
F	This variable cannot be viewed in the data browser.
PointUrban	This variable cannot be viewed in the data browser.
AreaUrban	This variable cannot be viewed in the data browser.
PointRural	This variable cannot be viewed in the data browser.
AreaRural	This variable cannot be viewed in the data browser.

WSDB (Water System) Data

This data set contains public water systems, the locations of their drinking water intakes (although this information is not viewable by the public), and the population served by each intake. These data are taken from USGS's Public Supply Database and EPA's Safe Drinking Water Information System (SDWIS). However, this data set only lists the intake location and the number of people served by each intake, not the location of the served population itself. In the absence of data on exactly which people are drinking from the intake in question, the model assumes the closest people to the drinking water intake are using it. This data set was last updated in 2009.

This data set also contains information on the reach that supplies the drinking water intake. In the absence of this information, it is assumed that the intake is located on the reach nearest the reported coordinates for the drinking water intake. If no reach is found within one kilometer of the reported coordinates, then exposure for that intake is not modeled. The closest reach was determined using reach shapefiles and plotting the intakes using their coordinates.

WSDB (Water System) Data

Variable	Description
UniqueRecord ID	Unique internal identifier.
IntakeID	Internal identifier.
USADRS_Pwsid *	Public Water System ID
SystemName	Name of Public Water System
PopulationServed	Number of people served by the public water system.
State	State in which water system is located.
County	Primary county served by the public water system.
Latitude	Latitude of the water system in decimal degrees (zeroed out).
Longitude	Longitude of the water system in decimal degrees (zeroed out).
ReachCode	14-digit NHD reach identifier associated with the reach that is nearest to the intake (zeroed out).

*One intake for the Los Angeles Dept. of Water and Power is not modeled, although the applied intake-reach methodology indicates that there is a reach within one kilometer (the L.A. River). This intake is not modeled since it is clear that the L.A. River is not its correct source; however, the actual reach on which this intake is located is not known.

ZIP Code Data

The percent of persons who drink well water is available for each county from the National

Well Water Association's data files. These percentages are applied to the population in individual grid cells to estimate the well water drinkers in a given grid cell. This is used in modeling ground water contamination. This data set was last updated in 1996.

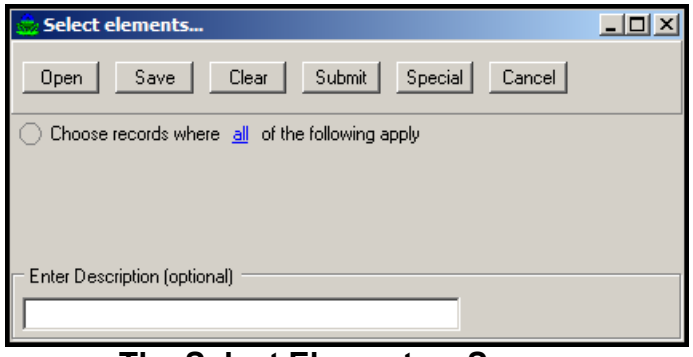
ZIP Code Data	
Variable	**Description**
ZIPCode	Five-digit ZIP code
Latitude	Latitude of the ZIP code centroid in decimal degrees.
Longitude	Longitude of the ZIP code centroid in decimal degrees.
WellWaterPct	Percent of the population in the ZIP code that get their drinking water from a well.
RadialDistance	Distance from approximate center point of grid.

CHAPTER 6
Selecting Releases

Selecting releases (Select button)

The **Select** button, found at the top of the menu panel, allows you to build selection statements that pull out specific subsets of data in the model. These subsets can be based on the geographic locations of facilities, the year of the chemical releases, the kinds of chemicals released, or any other single variable or combination of variables included in the model. This selection will then be used as the basic data set for all of the other model functions, like crosstab and sorted tables, graphs, and maps.

The following sections explain how the **Select** button can be used to develop new selections, and save and reopen them. Pressing the **Select** button brings up the **Select elements...** screen.



The Select Elements... Screen

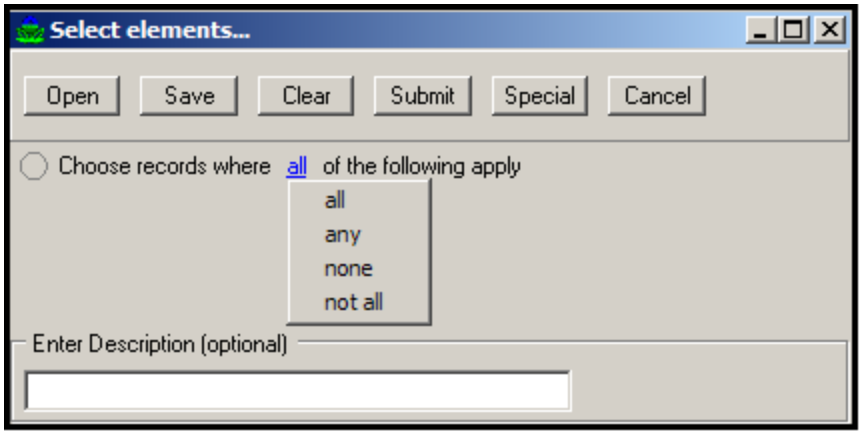
Opening Existing Selections

The **Open** button loads the selection statements for selections that have already been saved. The default directory for saved selections is C:\Program Files\RSEI\User, although you can store them anywhere. Once opened, you can edit the selection, or just click **Submit** to run the selection.

New Selections

Each selection is made up of one or more selection statements, which tells the model what kind of records you want to pull out of the database. Each record is an element - the building block of the model that defines a chemical release to a specific exposure pathway. There are two parts to each selection statement - bracket statements and condition statements. Bracket statements tell the model how to interpret a list of conditions. Bracket statements always come immediately before a condition or a list of conditions. When you click on the **Select** button and the **Select elements...** screen opens, the first line of text in the dialog box is a bracket

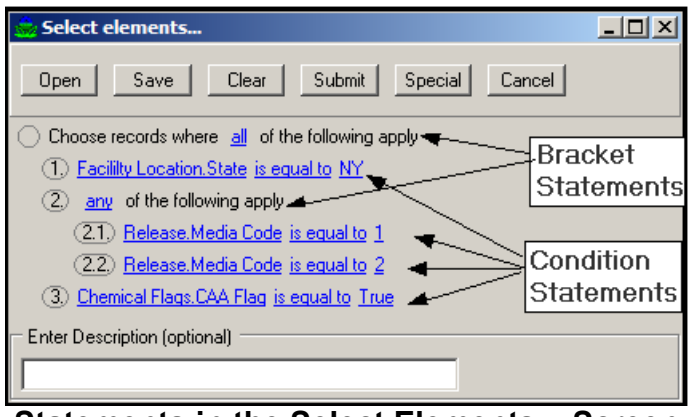
statement, 'Choose records where all of the following apply.' This bracket statement tells the model that a list is coming, and to only select those scores to which ALL of the conditions in the list apply. If you click on **all**, a drop-down box will appear with the other operators you can choose: **any**, **none**, or **not all**.



Operators in the Select Elements... Screen

When you open the **Select elements...** screen, the most recent selection you submitted is displayed. You can either modify this selection and resubmit it, or click the **Clear** button at the top of the screen to remove all but the very first bracket statement.

Condition statements are the actual criteria you use to select elements. For instance, a condition could be that the facility releasing the chemical is located in New York, or that the chemical being released is benzene. Condition statements can pull out any variable that is included in the model, and select elements that are equal to the criteria you enter, or not equal, less than, greater than, etc. With the combination of bracket and condition statements, you can construct very complex selections to pull out only those elements you are interested in.



Statements in the Select Elements... Screen

Adding Selection Statements

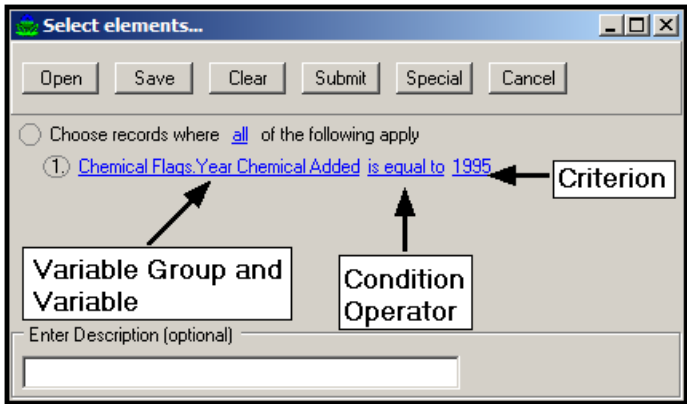
When you open the **Select elements...** screen by clicking on the **Select** button, you will see one line of text that says, 'Choose records where all of the following apply.' This is your first bracket statement, and tells the model how to interpret the condition or list of conditions that comes next. If you click on all, you can change how the model interprets the ensuing list. You have the following options:

Bracket Operator	Definition
all	Every condition in the next list must apply for a record to be selected.
any	At least one condition in the next list must apply for a record to be selected.
none	All of the conditions in the next list must NOT apply for a record to be selected.
not all	At least one of the conditions in the next list must NOT apply for a record to be selected.

Once you have decided how you want to define your bracket statement, click on the circle to the left of the text. Click 'Add Condition' in the drop down menu. The following text line will appear:

1. Chemical Flags.Year Chemical Added is equal to ___

This is your first condition statement. The first part of the condition, where it says, 'Chemical Flags,' is the variable group. 'Chemical Flags' is shown as the default text because it happens to be the first variable group in the drop down menu. Click on that part of the text, and a drop down box will show the 12 available variable groups. Click on any group name, and a list of the variables in that group will appear in a menu to the right. See the next section for a complete listing of all the groups and variables. Click on the desired variable. The variable group and variable name will now show in the text line. Note that a period separates the variable group name from the variable name.

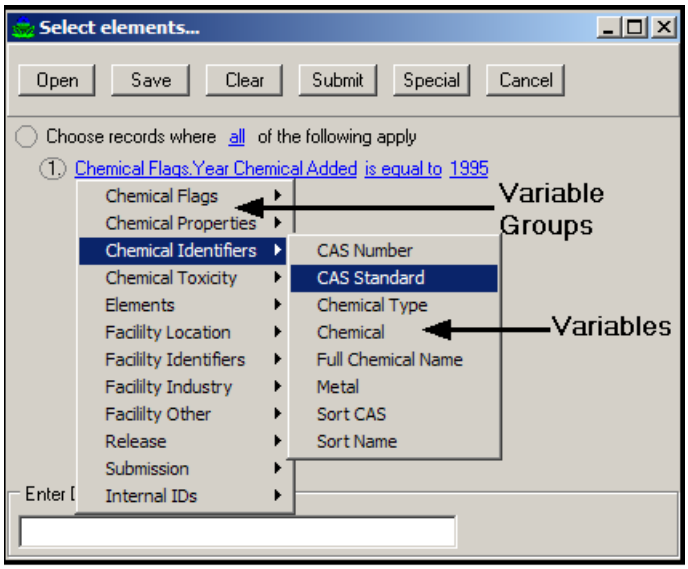


Parts of the Condition Statement

The second part of the condition is the condition operator. Click on the phrase 'is equal to,' and a drop down will appear with a list of other available operators. Click on the condition operator desired, and it will appear in the text line. Note that the operator 'between' is inclusive: 'is between 1 and 3' will select 1, 2 and 3.

Condition Operator	Note
is equal to	Returns results where variable is exactly equal to value entered. Used for text and numeric fields. In some instances a list will appear- click on the selected value in list.
is not equal to	Used for numeric fields only.
is less than	Used for numeric fields only.
is less than or equal to	Used for numeric fields only.
is greater than	Used for numeric fields only.
is greater than or equal to	Used for numeric fields only.
is null	Returns results where variable field is blank. Will not return results where variable field is zero.
is in list	Not currently functional.
is between	Used for numeric fields only. Is inclusive: 'is between 3 and 5' selects 3, 4, and 5.
starts with	Used for text fields only.
does not start with	Used for text fields only.
contains	Used for text fields only.
does not contain	Used for text fields only.

The third part of the condition is the criterion itself. Depending on the variable you entered, you may have to enter text or numbers in the space, or if you click on that space, a list of possible entries for you to choose from may appear. Consult the variable list at the end of this section for the correct entry format for each variable. Note that after you enter your criterion, you must click somewhere in the window outside of the box you just typed in, so that the entire text line turns blue (this enters your change).

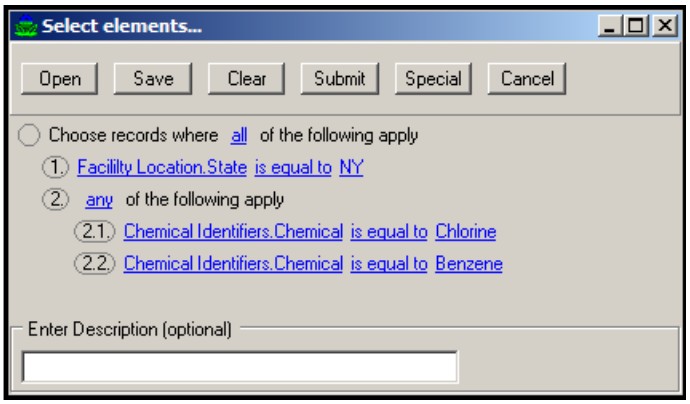


Variable Groups and Variables

Once you have completed your selection, you can either submit it (by clicking the **Submit** button) or further refine it by adding more conditions and/or selection statements.

To add more conditions within the same bracket statement, click on the '1' to the left of your first condition, then click 'Add condition.' A new text line will appear, which you can change to reflect your desired criterion. Remember that because you are within the same bracket statement, the model will evaluate this condition along with the first, according to whatever bracket operator you selected in the bracket statement. For instance, if you selected 'any' as your bracket statement operator (in the first text line), your first condition was 'Facility Location.State is equal to NY' and your second condition was 'Chemical Identifiers.Chemical is equal to Benzene,' the model will return all releases from facilities in New York (regardless of the chemical) PLUS all releases of benzene in the U.S. (regardless of the state). If what you really wanted was all releases of benzene from New York, change the bracket statement operator in the first text line to 'all'. Then the model will only select those releases that are 1) from facilities in New York, and also 2) benzene releases.

You can also add additional selection statements. Having more than one selection statement is useful when you want to use different operators on different sets of criteria. For instance, consider the example above of benzene releases in New York. Perhaps you would like to look more closely at benzene releases and chlorine releases in New York. In this case, you cannot simply add another condition statement for chlorine (with 'all' as the bracket operator), because the model will then look for releases that are 1) from facilities in New York, 2) benzene releases, and 3) chlorine releases, which is not logically possible. So here you can use an additional bracket statement to group together benzene and chlorine, and direct the model to pick releases that are either one.



Selection Statement

To select benzene and chlorine releases in New York, keep the first text line as is, so it reads 'Choose records where all of the following apply.' Then click on the circle to the left of the text line, and choose 'Add Condition.' For the first condition, enter 'Facility Location. State is equal to NY.' Then click on the '1' next to the condition, and click 'Add Bracket.' Change 'all' to 'any'. In line 2.1, which is the first condition of your new selection statement, change the variable to read, 'Chemical Identifiers.Chemical is equal to Benzene.' Then click on the circled '2.1', and click 'Add Condition.' A new line 2.2 will appear. Change that line so it reads 'Chemical Identifiers.Chemical is equal to Chlorine.' Now the model will understand this selection as selecting all releases that are 1) from facilities in New York, and 2) Benzene OR Chlorine.

Note that the selection statements work similarly to outlines. How a line is indented shows you what grouping it belongs to. The first line (the initial bracket statement) will always apply to the entire selection, and all additional selection statements are nested within it. Refer to the example selections at the end of this section for ideas on how to build complex selections with multiple selection statements.

Deleting Selection Statements

To delete statements, click on the circle to the left of the text line you no longer want, then click 'Delete Current Row'. If the text line you delete is a bracket statement with conditions underneath it, those conditions will also be deleted. Note that the first bracket statement cannot be deleted. Clicking on the **Clear** button will erase your entire selection.

'Special' Button

Under the **Special** button in the **Select elements...** screen, there are two options that allow you to create two different types of selections with multiple condition statements quickly and easily. The 'SIC code chain' option will automatically select all those facilities that report the 4-digit SIC code you enter as any one of their six reported SIC codes. The 'Read Facility IDs from File' option allows you to import a text file containing a list of TRI facility IDs that you wish to use in your selection. The list should be in a plain text file (extension .txt with no extraneous

formatting) with each facility ID followed by a hard return, and no hard return after the very last entry. After entering either option, the model will add a sequence of condition statements to the selection window. You can then further modify your selection.

Saving/Opening Selections

The RSEI model allows you to save your selection statements, so that you can either use the selection again in a later analysis, or just use the selection statements as a starting point for a similar selection. In the box at the bottom of the screen, beneath 'Enter Description' you can enter a fairly lengthy text description of your selection that will be displayed the next time you open it. Click the **Save** button at the top of the screen, and the selection will be saved to your hard drive. Note that this only saves the selection itself, not the results of the selection. Next time you open it (using the **Open** button at the top left), you will have to resubmit in order to use the resulting set.

Submitting Your Selection

When you are finished building your selection, click **Submit** to run it. Depending on your computer's memory (RAM) and the size of the requested set, your selection may take up to 30 minutes or longer to finish. Shorter selections, such as all facilities in one state for one year, should be done in under five minutes.

> At any time, if you forget what your selection is, click on the text that lists the number of selected facilities, releases, and elements in the far upper right of the screen. A selection box will appear reminding you of your selection statements.

Variable Descriptions

The following tables describe the variables and variable groups that you can use to build your selection. Each table also provides the correct entry format for each variable, or notes that the model contains a list to select from.

NOTE: It is important to use the entry format listed (e.g., use all capitals if indicated). Otherwise, your selection will contain incorrect data, or will not return any results at all.

Chemical Flags

Chemical flags indicate whether a chemical is in a particular group of interest. For example, as noted below, chemicals with primary or secondary drinking water standards under the Safe Drinking Water Act contain the word 'True' in the SDWA Flag field.

Chemical Flags		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Year Chemical Added	The year the chemical was added to the Toxics Release Inventory	Choices are: 1987 - 2000 Enter all four digits. [e.g., 1988]
CAA Flag	This flag marks the chemicals that are Clean Air Act pollutants.	True [chemical meets this criterion] False [chemical does not meet this criterion]
CERCLA Flag	This flag marks the chemicals that are regulated under Superfund (CERCLA-the Comprehensive Environmental Response, Compensation, and Liability Act).	True [chemical meets this criterion] False [chemical does not meet this criterion]
Core Chemical Flag	This flag marks the chemicals that are common to all reporting years of TRI and that have had no modifications of reporting requirements, as determined by the 1988 Core Chemical List found on the TRI Explorer website. For RSEI Version 2.3.0, this flag produces the same results as the Mini Core Chemical Flag (data for TRI reporting years 1988 through 1995 are not included in Version 2.3.0, except upon request).	True [chemical meets this criterion] False [chemical does not meet this criterion]
Core 98 Chemical Flag	This flag marks the chemicals that are common to TRI reporting years 1998 through 2007 and that have had no modifications of reporting requirements, as determined by the 1998 Core Chemical List found on the TRI Explorer website.	True [chemical meets this criterion] False [chemical does not meet this criterion]
Expansion Flag	This flag marks the chemicals that were added to the Section 313 toxic chemical list for reporting in 1995 and later years.	True [chemical meets this criterion] False [chemical does not meet this criterion]
HAP Flag	This flag marks the chemicals that are hazardous air pollutants, as defined by the Clean Air Act.	True [chemical meets this criterion] False [chemical does not meet this criterion]

Chemical Flags		
Variable	**Description**	**Format for Entering Information/ Possible Values**
OSHA Carcinogens	This flag indicates whether the chemical is a known or suspect human carcinogen based on OSHA criteria. Known human carcinogens are defined as those that have been shown to cause cancer in humans. Suspect human carcinogens have been shown to cause cancer in animals. The list of chemicals flagged as OSHA carcinogens is provided on the TRI website.*	True [chemical meets this criterion] False [chemical does not meet this criterion]
Priority Pollutant Flag	This flag marks the chemicals that are priority pollutants, as defined by the Clean Water Act.	True [chemical meets this criterion] False [chemical does not meet this criterion]
33/50 Flag	This flag is a marker which indicates that the chemical is included in EPA's 33/50 program, a program in which facilities voluntarily reduce their chemical releases by 33 percent and 50 percent by certain dates.	True [chemical meets this criterion] False [chemical does not meet this criterion]
PBT Flag	Indicates whether EPA has designated this chemical as a priority chemical under the Persistent Bioaccumulative and Toxic (PBT) Chemical Program.	True [chemical meets this criterion] False [chemical does not meet this criterion]
SDWA Flag	This flag marks the chemicals that have national primary or secondary drinking water standards under the Safe Drinking Water Act.	True [chemical meets this criterion] False [chemical does not meet this criterion]

Chemical Flags		
Variable	**Description**	**Format for Entering Information/ Possible Values**
High Production Volume Flag	This flag marks the chemicals that are included in EPA's High Production Volume program. Inclusion is defined as having been assigned any combination of 0,1,2,3 or 4 in EPA's HPV Challenge list. Chemicals assigned a 5 are not considered included. These values are defined as follows (for more information see EPA's HPV Challenge website. 0 = Within the scope of the HPV Challenge Program and may be sponsored. 1 = Not considered a candidate for testing under the program, based on preliminary EPA review indicating that testing using the SIDS base set would not further understanding of the chemical's properties. May be sponsored, however. 2 = Otherwise being handled under the OECD's Screening Information Data Set (SIDS) Program (may be sponsored). 3 = Not subject to the program because it is a polymer or inorganic substance (may be sponsored). 4 = Sponsorship of a chemical under the International Council of Chemical Associations (ICCA) HPV Initiative has been confirmed by ICCA and all information essentially equivalent to a Full Commitment under the program has been provided to the Agency. 5 = Chemical meets the criteria for being "No Longer HPV" and is no longer subject to the program (may be sponsored)	True [chemical meets this criterion] False [chemical does not meet this criterion]
Mini Core Chemical Flag	This flag marks the chemicals that are common to TRI reporting years 1995 through 2002 and that have had no modifications of reporting requirements in that time period, as determined by the 1995 Core Chemical List found on the TRI Explorer website. For RSEI Version 2.3.0, this flag produces the same results as the Core Chemical Flag (data for TRI reporting years 1988 through 1995 are not included in Version 2.3.0, except upon request).	True [chemical meets this criterion] False [chemical does not meet this criterion]

Chemical Flags		
Variable	**Description**	**Format for Entering Information/ Possible Values**
HPV Challenge Value	Chemical's status as assigned by EPA. See descriptions under "High Production Volume Flag" above.	Enter single number 0 through 5, or specific combination of numbers, e. g., '2,4.' For all possible combinations of a value, use the 'contains' operator with the desired value. Note that this variable includes chemicals assigned '5,' which the previous variable does not. To query all HPV Challenge chemicals, including those assigned '5,' use the following selection: any of the following apply- High Production Volume Flag is equal to True; HPV Challenge Value contains 5.
*Even if a chemical is flagged as an OSHA carcinogen, its toxicity weight for a given exposure pathway may not be based on its carcinogenic effects. For example, a chemical that causes both carcinogenic and noncarcinogenic effects when inhaled may have a higher inhalation toxicity weight associated with noncarcinogenic effects than with its carcinogenic effects. If you wish to view all chemicals that have inhalation toxicity weights based on cancer health effects, see the Toxicity Class - Inhale field. To obtain a list of chemicals that have toxicity weights based only on cancer health effects, see the Toxicity Category field.		

Chemical Properties

Chemical properties are used in the model to estimate fate and transport of the chemicals in soil, water, and air. Because of the number of chemicals in the model, there may be a wide range of values associated with each property. In addition, there may be no information available for some chemicals and properties. For convenience, the approximate range of properties for chemicals currently in the model is presented in the following table.

Chemical Properties		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Air Decay (1/hr)	The rate at which a chemical degrades in air, due primarily to photooxidation by radicals (hr^{-1}).	Range is 0.000000324 to 276.

Chemical Properties		
Variable	**Description**	**Format for Entering Information/ Possible Values**
BCF (L/kg)	Bioconcentration factor: the ratio of a chemical's concentration in fish to its concentration in water at equilibrium (L/kg).	Range is 0 to 550,000.
H2O Decay (1/ hr)	The rate at which a chemical degrades in water, due to abiotic hydrolysis, biodegradation, or photolysis (hr^{-1}).	Range is 0 to 276.
Henrys (atm/ (mole/m^3))	Henry's law constant: the ratio of a chemical's concentration in the air to its concentration in the water at equilibrium (atm·m^3/mol).	Range is 9.11 e-44 to 94.5.
Incinerator DRE (pct)	Destruction/removal efficiencies, expressed as the percent of chemical fed to the incinerator that is not released to the air.	Range is 88.5 to 100.
Kd (L/kg)	The soil-water partition, or distribution, coefficient. For organics, the value is often estimated as the product of Koc and foc (the fraction of organic carbon in the soil) (L/kg).	Range is 4 to 4100.
Koc (mL/g)	The organic carbon-water partition coefficient, used in estimates of chemical sorption to soil (mL/g).	Range is 1 to 10,000,000,000.
LOGKow	The logarithm of the octanol-water partition coefficient. Kow is the ratio of a chemical's concentration in the octanol phase to its concentration in the aqueous phase at equilibrium in a two-phase octanol/water system.	Range is -7.18 to 12.11.
Molecular Weight (g/mole)	The mass in grams of one mole of molecules of a chemical compound.	Range is 9.01 to 1,052.7
POTW Partition (Biod) (pct)	Percent of total POTW (Publicly Owned Treatment Works) removal efficiency attributable to biodegradation of the chemical.	Range is 0 to 100.
POTW Partition (Removal) (pct)	Percent of chemical removed from the wastewater by the POTW.	Range is 1.85 to 100.
POTW Partition (Sludge) (pct)	Percent of total POTW removal efficiency attributable to sorption of the chemical to sewage sludge.	Range is 0 to 100.
POTW Partition (Volat) (pct)	Percent of total POTW removal efficiency attributable to volatilization of the chemical.	Range is 0 to 99.01.
Water Solubility (mg/L)	The amount of chemical that dissolves in water at a particular temperature, usually 25 degrees Celsius (mg/L).	Range is 0 to 3,320,000.

Chemical Identifiers

Chemicals can be identified by common or scientific name and by the Chemical Abstracts Service (CAS) Registry number. Chemicals may have more than one common (or scientific name), but they have only one CAS Number. Another important identifier is whether or not the chemical is a metal. Also, the designation of core chemical, as noted below, indicates whether or not facilities have been required to report releases of the chemical during all years of TRI reporting included in the RSEI Model, without any changes or modifications to the chemical's reporting requirements.

Chemical Identifiers

Variable	Description	Format for Entering Information/ Possible Values
CAS Number	Chemical Abstracts Service Registry Number, which identifies a unique chemical. For chemical categories, CAS Numbers begin with "N", followed by three digits.	Select from list.
CAS Standard	The Chemical Abstracts Service Registry Number identifies a unique chemical. The standard format contains three sets of numbers divided by hyphens (00-00-0).	Select from list.
Chemical	Common name(s) of the chemical.	Select from list.
ChemType	This identifier is not yet active.	
Full Chemical Name	Full scientific name(s) of the chemical.	Enter as text with initial capital (not recommended- Use of variable 'Chemical' is more reliable.)
Metal	This flag indicates whether the chemicals are metals and also whether they are core chemicals. (Core chemicals are those that are common to all reporting years of TRI and which have had no modifications of reporting requirements.)	Choices are: M [metal]; CM [core metal]; NM [non-metal]; or CNM [core non-metal]
Sort CAS	Chemical Abstracts Service Registry Number, which identifies a unique chemical. For chemical categories, CAS Numbers begin with "N", followed by three digits.	Enter without hyphens (functions same as variable 'CAS Number')
Sort Name	Common name of chemical, with initial modifiers moved to end of name. Used for internal sorting purposes.	Enter as text with initial capital (not recommended- Use of variable 'Chemical' is more reliable.)

Chemical Toxicity

A variety of toxicity information is stored in the RSEI Model, ranging from information that makes up the underlying non-cancer and cancer toxicity values to the actual toxicity weights assigned to the chemicals using the method applied by the RSEI Model. You can choose subsets any of these variables when building your selection. See the Introduction for a description of toxicity data in the model and for information on the method used to assign toxicity weights.

Chemical Toxicity		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Inhale Tox Weight	The RSEI toxicity weight for a chemical for the inhalation pathway.	Range is 0.07 to 240,000,000.
MCL (mg/L)	EPA's current Maximum Contaminant Level, which is the national primary drinking water standard for the chemical.	Range is 0.00000003 to 10.
Oral Tox Weight	The RSEI toxicity weight for a chemical for the oral pathway.	Range is 0.02 to 500,000,000.
QSTAR Oral (1/mg/kg-day)	The oral cancer slope factor (q1*): a measure of the incremental lifetime risk of cancer by oral intake of a chemical, expressed as risk per mg/kg-day.	Range is 0.000012 to 230.
RfC Conf.	Confidence levels are assigned to the study used to derive the RfC, the overall database, and to the RfC itself.	Five levels may be assigned: H [high]; M-H [medium-high]; M [medium]; L-M [low-medium]; L [low]
RfC Inhale (mg/m^3)	The inhalation reference concentration (RfC) is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer health effects during a lifetime."	Range is 0.00001 to 50.
RfC MF	The modifying factor (MF) is a value applied to the NOAEL when scientific uncertainties in the study chosen for estimating the RfC are not explicitly addressed by the standard UFs.	Three values may be assigned: 1.0 3.0 10.0

Chemical Toxicity		
Variable	**Description**	**Format for Entering Information/ Possible Values**
RfC UF	The uncertainty factor (UF) is applied to the no-observed-adverse-effect level (NOAEL) upon which the RfC is based, thereby reducing the dose. The UF accounts for uncertainties in extrapolation from experimental data to an estimate appropriate to humans.	Range is 10 to 10,000.
RfD Conf.	Confidence levels are assigned to the study used to derive the RfD, the overall database, and to the RfD itself.	Three levels may be assigned: H [high] M [medium] L [low]
RfD MF	The modifying factor (MF) is a value applied to the NOAEL when scientific uncertainties in the study chosen for estimating the RfD are not explicitly addressed by the standard UFs.	Four values may be assigned: 1.0 3.0 5.0 10.0
RfD Oral (mg/ kg-day)	The oral reference dose (RfD) is "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure [by ingestion] to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime."	Range is 0.000007 to 50.
RfD UF	The uncertainty factor (UF) is applied to the no-observed-adverse-effect level (NOAEL) upon which the RfD is based, thereby reducing the dose. The UF accounts for uncertainties in extrapolation from experimental data to an estimate appropriate to humans.	Range is 1 to 30,000.
Toxicity Category	This indicates whether the oral and inhalation toxicity weights are based on cancer health effects, non-cancer health effects, or both.	Choices are: Carcinogen [indicates that the chemical's most sensitive endpoint for both exposure pathways is cancer]; Non-carcinogen [indicates that the chemical's most sensitive endpoint for both exposure pathways is noncancer effects]; and Mixed [indicates that the chemical's most sensitive endpoint varies by exposure pathway]

Chemical Toxicity		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Toxicity Class - Inhale	This indicates whether the toxicity weight for the inhalation pathway is based on cancer or noncancer health effects.	Choices are: Carcinogen [indicates that the chemical's most sensitive endpoint for the inhalation pathway is cancer]; Non-carcinogen [indicates that the chemical's most sensitive endpoint for the inhalation pathway is noncancer effects]; Carcinogen*; and Non-carcinogen*. An asterisk indicates that the toxicity weight came from the oral exposure pathway.
Toxicity Class - Oral	This indicates whether the toxicity weight for the oral pathway is based on cancer or noncancer health effects.	Choices are: Carcinogen [indicates that the chemical's most sensitive endpoint for the oral pathway is cancer]; Non-carcinogen [indicates that the chemical's most sensitive endpoint for the oral pathway is noncancer effects]; Carcinogen*; and Non-carcinogen*. An asterisk indicates that the toxicity weight came from the inhalation pathway.
Toxicity Source	Source of toxicity information	Choices are: IRIS, OPP, ATSDR, CalEPA, HEAST, or DERIVED plus the date of search. This field is not recommended for searching.
Unit Risk Inhale ($1/mg/m^3$)	The unit inhalation risk is the excess lifetime risk due to a "continuous constant lifetime exposure of one unit of carcinogen concentration"(51 FR 33998).	Range is 0.00026 to 67.

Chemical Toxicity		
Variable	**Description**	**Format for Entering Information/ Possible Values**
WOE	Weight of evidence (WOE) categories indicate how likely a chemical is to be a human carcinogen, based on considerations of the quality and adequacy of data and the type of responses induced by the suspected carcinogen. EPA WOE classifications include the following categories and associated definitions (51 FR 33996): A Carcinogenic to humans B Probable carcinogen based on: B1 • Limited human evidence B2 • Sufficient evidence in animals and inadequate or no evidence in humans: C Possible carcinogen D Not classifiable E Evidence of non-carcinogenicity	Choices are: A B1 B2 C D E

Elements

The variables in the following table are associated with the elements generated by the RSEI model. In general, the information in the following table describes output from the model or describes the variables as used in the model.

Elements		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Pounds (Post treatment)	Total pounds released associated with each element after any treatment by POTWs or offsite facilities.	Range is 0 to 330,000,000.
Population	Exposed population associated with each element.	Range is 0 to 15,560,700.
Score	Indicator Element Score.	Range is 0 to 924,784,000.
Score Category Code	Codes corresponding to the medium into which the chemical is released. Examples of the information include: direct air releases from the stack using a "rural" air dispersion model, fugitive air releases, releases to an on-site landfill.	Choices are 0-33 [See **Score Category Information** in Chapter 10 for descriptions]

Elements		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Score Category Text	Descriptions of release media and other descriptors corresponding with the score category codes.	[See **Score Category Information** in Chapter 10 for descriptions] [The descriptions in this table are not the exact descriptions included in the model; it is recommended that you use the Media Codes when building your selection rather than these media descriptions]
Score Children < 10	Indicator Element Score for children less than ten years old.	Range is 0 to 220,291,500.
Score Children 10 to 17	Indicator Element Score for children between ten and 17 years of age (inclusive).	Range is 0 to 143,589,000.
Score Males 18 to 44	Indicator Element Score for males 18 years old through 44 years old (inclusive).	Range is 0 to 367,750,000.
Score Females 18 to 44	Indicator Element Score for females 18 years old through 44 years old (inclusive).	Range is 0 to 135,000,500.
Score Adults 65 and older	Indicator Element Score for adults 65 years old and greater.	Range is 0 to 65,744,500.

Facility Location

One or more facilities can be used in a selection based on location. For example, a single facility may be located using the street address, or all facilities in a state may be chosen. Facilities can also be chosen based on their distance from the nearest stream reach or the nearest weather station (WBAN). All variables that can be used to select facilities based on location are listed in the following table:

Facility Location		
Variable	**Description**	**Format for Entering Information/ Possible Values**
City	City where the TRI facility is located	Enter city name using all capital letters.*
County	County where the TRI facility is located	Select from list. Entries are in the following form: State abbreviation, County name

Facility Location		
Variable	**Description**	**Format for Entering Information/ Possible Values**
FIPS	TRI facility FIPS (Federal Information Processing Standard) code which identifies the county associated with the facility	Enter code using leading zeros if code is less than five digits.
Latitude	Final facility latitude after RSEI QA process.	Range is -14.29 to 68.07.
Longitude	Final facility longitude after RSEI QA process.	Range is -170.69 to 145.71.
EPA Region	EPA region where facility is located. There are 10 EPA regions. Any information which cannot be matched to an actual EPA region (such as an unrecognized ZIP code) is assigned to a dummy region (called UK)	Enter EPA region number 1 through 10.
On Tribal Land	Flag indicating whether facility is located on a tribal land.	True [facility is on tribal land] False [facility is not on tribal land]
Tribal Land Name	Name of tribal land on which facility is located.	Enter text.
State	State in which the facility is located	Enter the two character state postal code, using all capital letters
Street	Street address of facility.	Enter text. (Not recommended unless exact entry from Form R is known)
LatLongMethod	Method by which the final coordinates of the facility were determined.	Enter text.
X	Assigned grid value based on latitude	Range is -2888 to 2783 (-999999 is for no value).
Y	Assigned grid value based on longitude	Range is -1935 to 3906 (-999999 is for no value).
ZIP Code	Facility ZIP code	Enter five digits**
State FIPS	TRI facility FIPS (Federal Information Processing Standard) code which identifies the state associated with the facility.	Enter code using leading zeros if code is less than two digits.

Facility Location		
Variable	**Description**	**Format for Entering Information/ Possible Values**
*Because there may be some variation in the spelling of city, county, or facility names in the TRI database, you may need to enter several spellings of the item you are interested in. For example, to obtain data for St. Louis, Missouri, you should enter all of the following city spellings: SAINT LOUIS ST. LOUIS ST LOUIS **Over the years covered by the model, some ZIP codes have been deleted, others have been reassigned, and yet others have been added. Thus, when doing regional selections, use of city, county, state, or region is advisable.		

Facility Identifiers

Some users may be familiar with facility identifiers, and may wish to use this information to choose the facilities of interest. A variety of identifiers, from the name as reported to TRI to identifying numbers associated with marketing data (DUNS numbers) are listed in the following table, along with the formats required when selecting the facilities:

Facility Identifiers		
Variable	**Description**	**Format for Entering Information/ Possible Values**
DUNS	The 9-digit number assigned by Dun & Bradstreet for the facility or establishment within the facility	Enter the nine digits.
Facility ID	Unique TRI identifier for facility	Enter the 15 character TRI identifier, using digits and upper case letters.
Name	TRI facility name	Enter name using capital letters.*
Near Reach	USGS Reach Identifier (Concatenation of Catalog, Unit, Segment)	Enter the 11 digits.
NPDES Permit Number	Permit number issued by US EPA for facilities discharging to water.	Enter the nine digits.
Parent DUNS	The 9-digit number assigned by Dun & Bradstreet for the US parent company.	Enter the nine digits.
Parent Name	Name of the corporation or other business entity located in the U.S. that directly owns at least 50 percent of the voting stock of the facility.	Enter name using all capital letters.

Facility Identifiers		
Variable	**Description**	**Format for Entering Information/ Possible Values**
RCRA Number	Number assigned by EPA to facilities handling hazardous waster under the Resource Conservation and Recovery Act.	Enter the 12 digits.
HEM3ID	The ID assigned to the Weather Bureau/Army/Navy Weather Station nearest to the facility.	Enter 1 to 3 digits.
*Because there may be some variation in the spelling of city, county, or facility names in the TRI database, you need to carefully consider your search criteria. Facility IDs are the most reliable way to select individual facilities. Selecting facilities using Facility Name may provide unexpected results. For instance, if you wish to select all Dow Chemical facilities, you might query releases where Facility Name contains DOW. However, this will also select facilities such as ABC WINDOW CORP.		

Facility Industry

A subset of all industries are required to report their releases to TRI. Specifically, all facilities within 2-digit Standard Industrial Classification (SIC) codes 20 through 39 must report releases (if those releases exceed given thresholds), and selected facilities within SIC codes 10, 12, 49, 51, and 73 must report their releases. A given facility may produce more than one type of product or may be associated with more than one type of activity, and therefore, the facility may report up to six SIC codes on TRI Form R, with one code designated as primary. Facilities may submit multiple Form R's, and so potentially may report more than six SIC codes and multiple primary codes.

Because sector-based analyses are an important component of RSEI, facility reporting data are processed to make them easier to use. For any facility that has multiple primary SIC codes, RSEI assigns the most frequently reported as SIC Code 1. If more than five additional SIC codes are reported, RSEI assigns the five most frequently reported as SIC Codes 2 through 6. Users can use the other fields to make selections at a more aggregated level (2 or 3-digit SIC Codes). Note that if you choose to select releases using a numerical value in the 'SIC Code Same 2 Digit' field, the model will not select facilities that have reported more than one 2-digit SIC Code (in such cases the code shows 'MU,' 'MO' or 'MN'). For details on the processing of the SIC Code data, see Technical Appendix F. See Standard Industrial Classification Codes for a list of the industries associated with 2-digit and 3-digit SIC codes.

Beginning with RY 2006, TRI requires facilities to report their North American Industry Classification System (NAICS) code. RSEI processes the NAICS code in the same way as SIC codes are processed. However, in the RY 2007 data, less than half of the total facilities over the entire reporting period (1988-2007) have reported NAICS codes, so users should not perform selections based on NAICS codes when attempting to include all of the facilities in a given industry. For this purpose, it is more accurate to perform selections based on SIC codes. TRI maintains the SIC codes that each facility has historically reported, and that information is

contained in the facility table in RSEI; for reporters new in RY 2007 who reported only NAICS codes, RSEI crosswalks the NAICS to SIC codes to provide the most complete coverage possible.

In addition, facilities can report up to 12 NAICS codes; while these codes are all recorded in the facility table, users can only perform selections on the first four NAICS codes. Less than 100 facilities report more than four NAICS codes.

The following table describes all the industry variables used in the model.

Facility Industry		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Federal Facility Flag	Code that indicates whether a facility is considered federal for purposes of Executive Order 12856.	Choices are: C = commercial; F = federal; or G = government contractor.
SIC Code 1	Facility's 4-digit SIC code designated as "primary" by facility on Form R. If no primary SIC is designated, the field displays "NR."	Select from list.
SIC Code 2	Facility's most frequently reported non-primary 4-digit SIC code.	Select from list.
SIC Code 2 Digit Primary	First 2 digits of facility's primary SIC code.	Enter two digits.
SIC Code 3	Facility's second most frequently reported non-primary 4-digit SIC code.	Select from list.
SIC Code 3 Digit Primary	First 3 digits of facility's primary SIC code.	Enter three digits.
SIC Code 4	Facility's third most frequently reported non-primary 4-digit SIC code.	Select from list.
SIC Code 5	Facility's fourth most frequently reported non-primary 4-digit SIC code.	Select from list.
SIC Code 6	Facility's fifth most frequently reported non-primary 4-digit SIC code.	Select from list.
Multiple Primary SIC	Code that indicates whether the facility designated multiple SIC codes as primary on Form R's submitted.	Choices are: True [facility reported multiple primary SIC codes] or False [facility reported only one primary SIC code].

Facility Industry		
Variable	**Description**	**Format for Entering Information/ Possible Values**
SIC Code Same 2 Digit	This code uses all SIC codes reported by a facility to arrive at a single 2-digit code for the facility, if applicable.	Choices are: 10, 12, 20-39, 49, 51, 73; MU [for multiple codes among the two digit codes listed above]; MO [for multiple codes within the original industries only (20-39)]; MN [for multiple codes within the expansion industries only (10, 12, 49, 51, 73)]; or NR [for codes outside the valid reporting range, NR or INVA].

Facility Other

Facility-specific information is used to model air releases from the facility. For example, unique stack heights are used where available. Stack-specific variables are described in the following table:

Facility Other		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Stack Diameter	Diameter of facility stack that is emitting the pollutant (m).	Range is 0.001 to 36.58.
Stack Diameter Source	Source of information on stack diameter.	Choices are: Calif [facility-specific data obtained from California state database]; EPRI fac [facility-specific data provided by the Electric Power Research Institute]; EPRI med [the overall median of coal/oil electric utilities provided by the Electric Power Research Institute]; Fac Spec [facility-specific data obtained from NEI, AFS, or NET]; New York [facility-specific data obtained from New York state database]; Overall [median of all facilities obtained from AFS and NET]; SIC 2dig [median of all facilities in 2-digit SIC code obtained from AFS and NET]; SIC 3dig [median of all facilities in 3-digit SIC code obtained from AFS and NET]; Wisc [facility-specific data obtained from Wisconsin state database].

Facility Other		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Stack Height	Height of facility stack that is emitting the pollutant (m).	Range is 0.3 to 336.18.
Stack Height Source	Source of information on stack height.	See Stack Diameter Source.
Stack Velocity	Rate at which the pollutant exits the stack (m/s).	Range is 0.0001 to 51.93.
Stack Velocity Source	Source of information on stack velocity.	See Stack Diameter Source.

Release

The following table includes variables similar to some of the variables described in the Elements table. The main difference, however, is that the following variables reflect the information as reported by facilities to the TRI rather than information specific to the method used to model releases in the RSEI Model. For example, there is a Media Code for releases to the air from the facility stack (i.e., Stack Air), but there is no indication of whether the release occurs in an urban or rural area (a distinction used in the air dispersion models).

Release		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Media Text	Descriptions of receiving media associated with Media Codes.	See **Media Information** in Chapter 10 for descriptions of Media Codes. [The descriptions in this table are not the exact descriptions included in the model; it is recommended that you use the Media Codes when building your selection rather than these media descriptions].
Media Code	Code associated with the media and/ or method of release.	Enter digits using the codes listed in **Media Information** in Chapter 10 .
Pounds Released	Number of pounds released into this media (lbs).	Range is 1 to 330,000,000.

Submission

Information other than media-specific releases and SIC codes is submitted by facilities to TRI, and is retained in the model. This information is described in the following table:

Submission		
Variable	**Description**	**Format for Entering Information/ Possible Values**
DCN	Unique document control number assigned by TRI to each submission by a reporting facility .	Enter 13 digits.
Max Amount Onsite	Maximum amount of chemical stored onsite in any given calendar year.	Enter digits using the codes listed in On-site Chemical Information.
Total Pounds to All Media	Combined releases to all media for each TRI submission.	No longer active.
Chemical Use Code	Code describing whether chemical is manufactured, processed, or otherwise used at the facility	Enter letter using the codes listed in On-site Chemical Information.
Long/Short Form	Code describing whether data were submitted via the TRI long form or the TRI short form.	Enter L for long form and S for short form.
Year	Reporting year of interest	Select from list.

Internal IDs

Numbers assigned within the RSEI Model can be used to identify facilities, chemicals, and releases. Use the following formats for building selections using these numbers:

Internal IDs		
Variable	**Description**	**Format for Entering Information/ Possible Values**
Element Number	Unique identifier for Indicator Elements.	Range is 1 to 5,474,914.
Release Number	Unique identifier for facility releases.	Range is 1 to 5,028,878.
Chemical Number	Unique identifier for TRI chemicals.	Range is 1 to 614.
Facility Number	Unique identifier for TRI facilities.	Range is 1 to 53,219.
Submission Number	Unique identifier for submissions.	Range is 1 to 1,825,482.
Off-site Number	Unique identifier for off-site facilities.	Range is 1 to 1,008,171.

Examples of Complex Selections

The following examples explain how to build complex queries to answer specific questions. Note that when building a complex query, the order in which you list condition statements does not matter; what does matter is how you bracket them.

Example 1

Suppose you want to look at air releases of chemicals that are Clean Air Act pollutants or Hazardous Air pollutants. You have already looked at California specifically, so you are not interested in releases from that state. In addition, you have already looked at benzene and toluene releases by themselves, so you would like to exclude them, too. Your selection would look like the following:

Choose records where all of the following apply
1. Facility Location.State is not equal to CA
2. any of the following apply
    2.1. Chemical Flags. HAP Flag is equal to True
    2.2. Chemical Flags. CAA Flag is equal to True
3. Chemical Identifiers.Chemical is not equal to Benzene
4. Chemical Identifiers.Chemical is not equal to Toluene
5. any of the following apply
    5.1. Release Media.Code is equal to 1
    5.2. Release Media.Code is equal to 2

Example 2

Suppose you want to look at a specific industry, for instance paints and allied products, SIC code 2851. Because reporting facilities are allowed to report up to six 4-digit SIC codes, to be sure that you select all of the facilities in the industry, it is safest to allow the selection of a facility with that SIC code in any one of those six fields. Suppose you are also only interested in releases of OSHA carcinogens, and only those facilities in Texas. Your period of interest is 1998 to the present, and you want to exclude large facilities that release over 1,000,000 pounds annually. Your selection would look like the following:

Choose records where all of the following apply
1. any of the following apply
    1.1. Facility Industry.SIC Code 1 is equal to 2851
    1.2. Facility Industry.SIC Code 2 is equal to 2851
    1.3. Facility Industry.SIC Code 3 is equal to 2851
    1.4. Facility Industry.SIC Code 4 is equal to 2851
    1.5. Facility Industry.SIC Code 5 is equal to 2851
    1.6. Facility Industry.SIC Code 6 is equal to 2851
2. Facility Location.State is equal to TX
3. Chemical Flags.OSHA Carcinogens is equal to True
4. Submission.Total Pounds is less than 1000000
5. Submission.Year is greater than 1998

Example 3

Suppose you want to look at a trend over time (1996-2007) in risk-related scores. As noted previously, changes have been made to the TRI reporting requirements that need to be accounted for when doing time trend analyses. The first change is that in 1998 TRI required facilities in new SIC codes to report. These facilities must be excluded to get an accurate time trend. The second change is that TRI has added and deleted chemicals from the list of reportable chemicals, and changed how some chemicals are reported. RSEI includes a flag called 'Core Chemical,' that marks only those chemicals that have been reported over the entire time period of TRI reporting with no changes in the details of their reporting requirements. RSEI also contains a flag called 'MiniCore Chemical,'which has the same practical effect in the current version of the model as 'Core Chemical,', since RSEI does not contain TRI data for TRI reporting years before 1996 (except upon request). In this example, you can use 'Core Chemical.' In addition, if you are only interested in risk-related scores, you can limit your selection to the media that are fully modeled (air, direct water, POTW and off-site incineration releases). Your selection would look like the following:

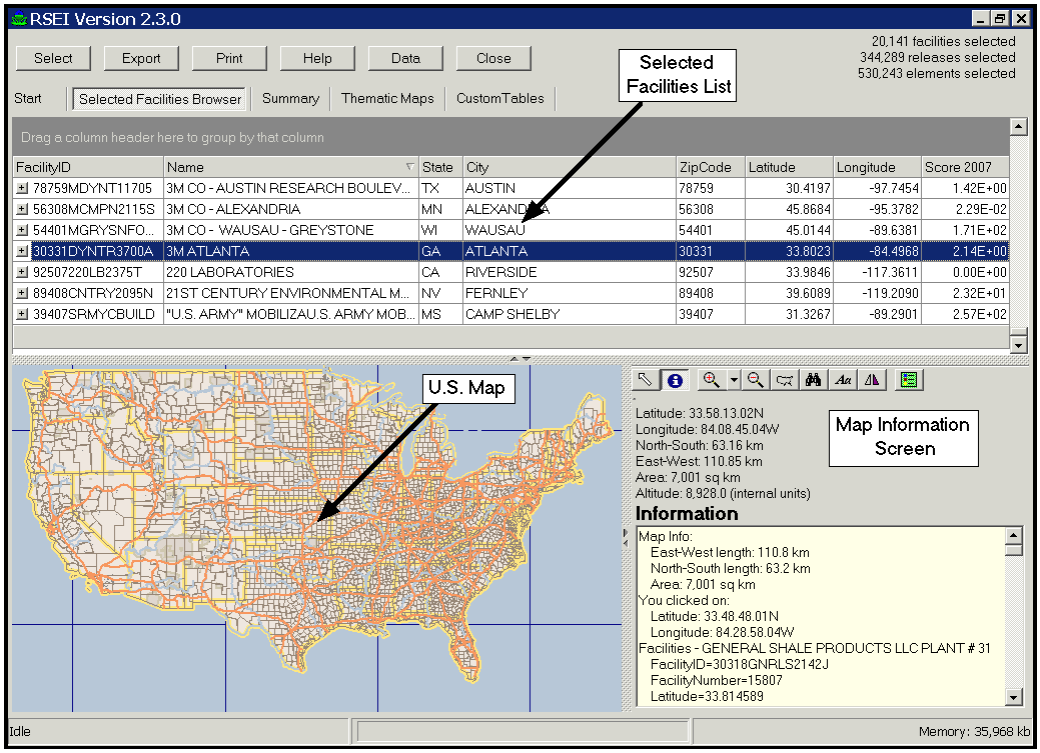
Choose records where all of the following apply
1. none of the following apply
    1.1. Facility Industry.SIC Code 1 is equal to 1021
    1.2. Facility Industry.SIC Code 1 is equal to 1031
    1.3. Facility Industry.SIC Code 1 is equal to 1041
    1.4. Facility Industry.SIC Code 1 is equal to 1044
    1.5. Facility Industry.SIC Code 1 is equal to 1061
    1.6. Facility Industry.SIC Code 1 is equal to 1099
    1.7. Facility Industry.SIC Code 1 is equal to 1221
    1.8. Facility Industry.SIC Code 1 is equal to 1222
    1.9. Facility Industry.SIC Code 1 is equal to 1231
    1.10. Facility Industry.SIC Code 1 is equal to 4911
    1.11. Facility Industry.SIC Code 1 is equal to 4931
    1.12. Facility Industry.SIC Code 1 is equal to 4939
    1.13. Facility Industry.SIC Code 1 is equal to 4953
    1.14. Facility Industry.SIC Code 1 is equal to 5169
    1.15. Facility Industry.SIC Code 1 is equal to 5171
    1.16. Facility Industry.SIC Code 1 is equal to 7389
2. Chemical Flags.Core Chemical Flag is equal to True
3. any of the following apply
    3.1. Release.Media Code is less than or equal to 3
    3.2. Release.Media Code is equal to 6
    3.3. Release.Media Code is equal to 750
    3.4. Release.Media Code is equal to 754

Because it is always a good idea to exclude the new industries and include only the core chemicals when doing a time trend analysis, this is a very useful selection. It saves the need to retype the selection statements each time you do a time trend if you save the first two statements (everything up to '3. any of the following apply') the first time you type them, by

clicking on the **Save** button at the top of the **Select Elements...** screen. To retrieve the selection, click the **Open** button, and modify the selection as needed. If you do not click the **Save** button after your modifications, only the original part of the selection will be saved. If you want to save your modifications in addition to your original statements, simply save the modified selection with a new name.

CHAPTER 7
Displaying Selected Facilities - The Selected Facilities Browser

Once you have selected the records you would like to analyze using the **Select** button, you can view your data in a variety of ways. To see a list of the facilities in the selected data set and their locations on a map, choose **Selected Facilities Browser** from the second row of options at the top of the screen. You will see a screen with three parts. The top part of the screen is the list of the facilities selected in your selection. You can group and sort this list, and expand it to look at specific chemical releases for each facility. The bottom left part of the screen is the U.S. map. Here you can map your selected facilities. The map information screen at the bottom right provides the buttons which navigate and customize the map, and displays information about the map's current display. You can resize each of the sections of the screen by clicking and dragging on the arrows separating each section of the screen. The following sections describe each part of the screen, and how they function together to allow you to see the information you need in the most helpful way.



The Selected Facilities Browser

When you open the **Selected Facilities Browser**, it may take a few minutes to update the display with the set of selected facilities. Even if your set has not changed, if you open another screen, then go back to the **Selected Facilities Browser**, the model will refresh the screen

again, which will take a few minutes to complete. The status bar at the bottom left of your screen will inform you of what the model is doing.

The Selected Facilities List

The list at the top of the screen shows all the facilities that have at least one release in the selected set. For each facility, the list shows its TRI facility ID number, the facility name, the city, state and ZIP code of the facility, its latitude and longitude, and the total score for the facility in 2007. The default sort order of the list is by TRI Facility ID. However, by clicking on the header for any column, you can sort the list by that column's variable. A grayed-out arrow will appear in the right-hand corner of the header to show you that the list is sorted by that column. Note that if a facility is highlighted before sorting, it will remain in the display afterward. If you want to see the beginning of your list, use the arrow buttons to scroll up to the beginning.

The list works like a directory tree (such as in Windows Explorer) that you can expand or collapse by double-clicking on rows (or by clicking on the plus or minus sign at the far left of a highlighted row). To open up a level in the **Selected Facilities List**, either double-click on the desired entry, or click on the entry once to highlight it, then click on the plus sign at the far left of the row. Clicking on a plus sign will not work if the entry is not highlighted first. If you double-click on a facility in the list, you will see two entries below that facility: 'Submissions' and 'Full Facility Record.' Double-click on the 'Full Facility Record' to get a complete listing of all the information contained in the model about that particular facility.

If you double-click on 'Submissions,' you will get a full listing of all of the facility's TRI submissions. Those submissions that are included in your selected set will be highlighted in green. The default sort order for these releases is by DCN (the Document Control Number assigned by TRI), but, like the facility list, you can double-click on any column's header to sort by that column. For each submission, this list displays DCN, the year of the submission, the chemical name, its use and Max Onsite codes (see **On-site Chemical Information** in Chapter 10 for explanations of codes), the total pounds released, and the inhalation and oral toxicity weight for the chemical. If you double-click on a submission that has a nonzero entry for 'Total Pounds,' an entry titled 'Releases' will appear. Double-click on that entry, and 'Media Text' will appear. Double-click on any of the 'Media Text' entries that appears, and the screen will display an entry called 'Scores.' Double-click on that, and the 'Scores' screen will display the total pounds, total score, population affected and the score category text. If the score is zero, the score category text will inform you of the reason the release could not be modeled.

To return to a previous level, simply click on the minus sign to the left of each entry, and the entry will be hidden. Either double-click on the entry, or click on the plus sign to show it again.

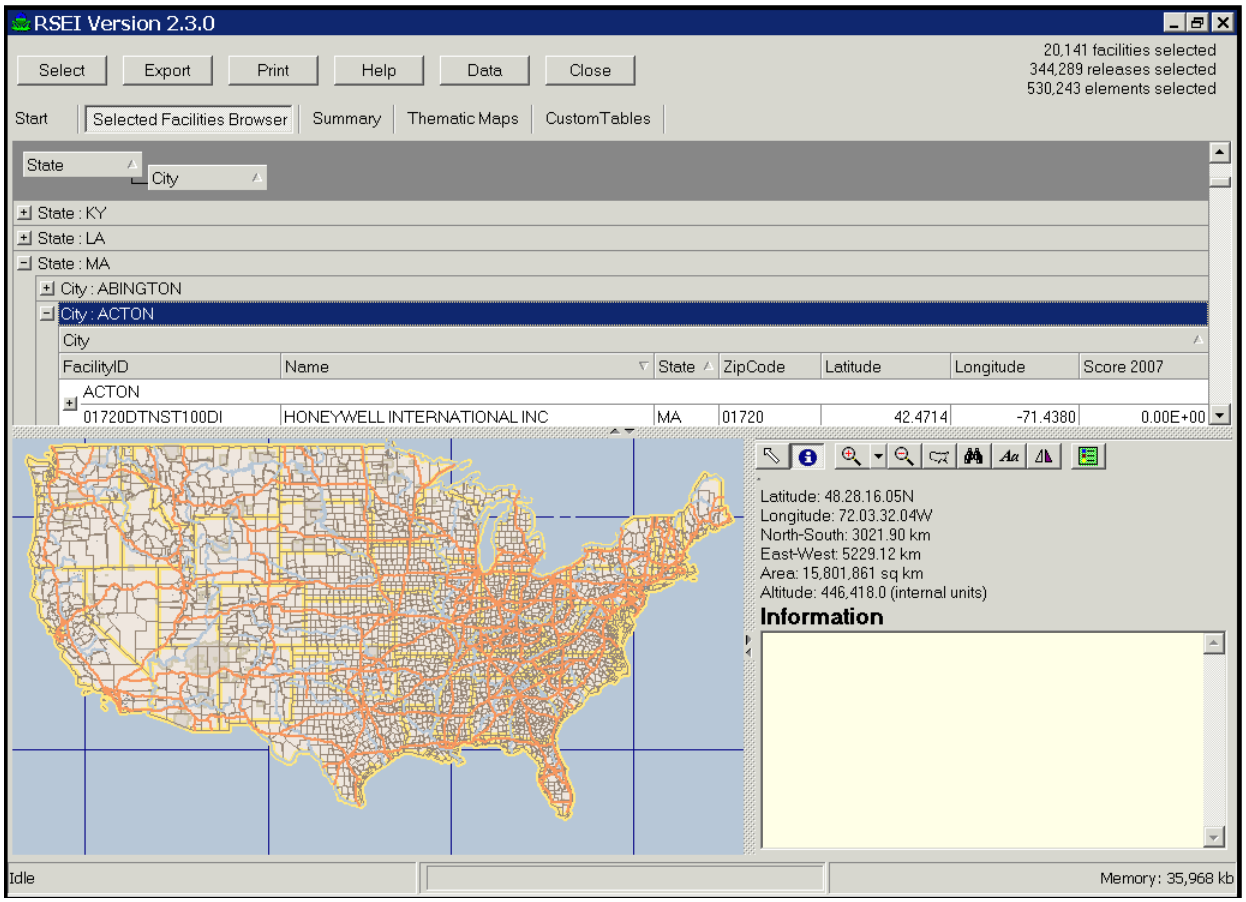
If you find a certain facility that you would like more information on and you wish to make a new selection including that specific facility, you can copy the TRI ID in order to paste it into the selection statement. Simply highlight the row in the **Selected Facilities List** containing the desired TRI ID, and right-click on it. Nothing will noticeably change in the display. But you can then press Control-C, which will copy the TRI ID to the Windows clipboard. Once the TRI ID is on the clipboard, you can paste it anywhere, including the **Select Elements...** screen, or even

other programs like Excel, WordPerfect, etc.

Changing the Grouping

The default organization is to list facilities singly. However, if you want to group them, for instance by state, you can. Just click on the column header that you want to group by, such as 'State,' and drag it up to the darker gray bar at the top of the screen and drop it there. Then the list will show an entry for each state in your selection. If you double-click on a state, the list will expand to show all the facilities in that state. The rest of the list works as described above.

You can also group on more than one column variable. For instance, you may want to group first on state, then on city. Click and drag 'State' first, then 'City' and the model will show them linked in the gray bar at the top of the screen. The collapsed list will show all states in your selection. If you click on a state, a list of all cities in that state in your selection will be displayed. Then if you click on a city, a list of all the facilities in that state will be displayed.

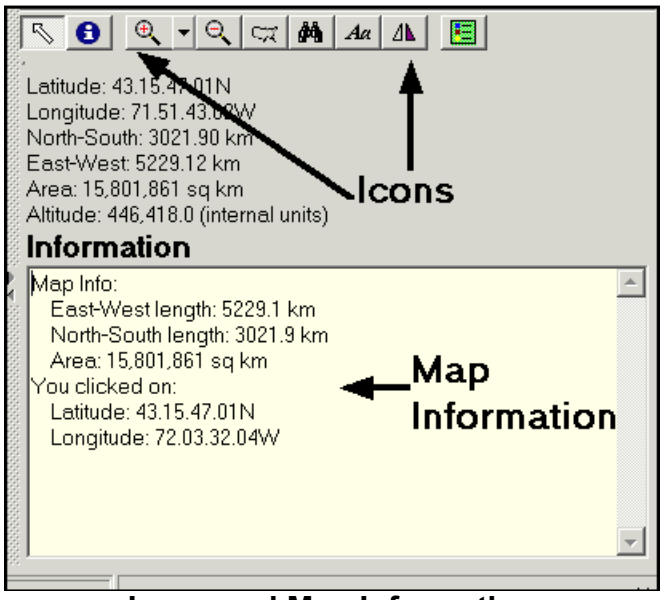


The List of Selected Facilities, Grouped by State and City

To return to the default grouping, simply click and drag the column headers from the gray bar at the top of the screen back to their original position.

Using Map Functions

The map is shown in the bottom left of the **Selected Facilities Browser**. The buttons you can use to navigate and modify the map are in the bottom right. The **Map** works with the list of selected facilities at the top of the screen. All TRI reporting facilities are shown as purple circles on the map. As described below, you can select an option to make facilities in your selected set appear larger and darker purple. Off-site facilities are shown as yellow squares.



Icons and Map Information

Finding a Location (Position)

The default view of the map is the continental U.S. view. Alaska and Hawaii are not shown in the initial map but are available in other views (see below for details). The information to the right of the **Map View** screen describes the current map. You can click on any part of the map with the mouse.

When the **Position** button is highlighted the following information is displayed:

- **Latitude** and **Longitude** refer to the last point where the cursor was placed on the map (latitude and longitude will change as the cursor is moved);
- **North-South** and **East-West** express the kilometers that can be viewed along each axis in the current map;
- **Area** shows the square kilometers shown on the current map;
- **Altitude** reflects the zoom level of the current map, and is approximately the kilometers that can be viewed in the width of the screen;
- **Information** shows, in the bottom right-hand window, a list of geographic and demographic

facts about the area on the map that you have clicked on. Facts include the FIPS code of the state and county, and the name of the facility if a triangle was clicked on.

Changing the Zoom

Three zoom icons are available for selecting a position on the map. The **Zoom-in** icon will zoom in on the center of the current map.

> To zoom in, either click the zoom-in icon, or draw a box with the cursor around the area you want to zoom in on, while holding down the right mouse button.

The **Zoom-in** icon also allows you to select a specific state by clicking on the arrow to the right of the icon and then the desired state. The **Zoom-out** icon zooms out from the current map.

Click on the **U.S. map** icon to zoom back to the full continental U.S. view. You can also zoom into a particular area by drawing the diagonal of a square with the cursor while holding down the right mouse button.

You can move the map by left-clicking on the map and dragging the cursor in the direction that you want the map to move. There will be a slight time delay as the map adjusts itself. In this way you can move the map to view Alaska, Hawaii and the territories.

Retrieving Information

To retrieve geographic information about a point on the map, click the **Identify** icon then click on any point on the map. In the **Information** box geographic and demographic data for the selected point will be displayed. Displayed data include locational information like latitude and longitude, state, county, and nearby geographic features; population data from the U.S. Census Bureau (at the grid-cell level); and data on nearby TRI reporting facilities. (See the tables of variable descriptions in Chapter 5 for an explanation of the information displayed here.)

Highlighting Selected Facilities

When you open the **Selected Facilities Browser**, the map will only show the facilities in your selected set. On-site facilities will be shown as purple circles. Off-site facilities will be shown as yellow squares. If you click on the 'Toggle highlight of selected facilities,' the remaining facilities not in your selected set will also be shown. Nonselected onsite facilities will be shown as light purple circles. Nonselected offsite facilities will be shown as white squares.

Locating the Selected Facility

First click on a facility in the selected facilities list at the top of the screen, so it is highlighted.

You can also highlight a particular submission or full facility record for a facility. Then click on the binoculars icon. The model will zoom in using concentric circles to show you where the facility is located. If you like, you can then click the zoom in icon to zoom in to more detail.

Showing Facility Names

Click on the **Show/Hide Facility Names** icon to display the names of all facilities (not just those in your selected set). If your map is zoomed out too far, the names will appear printed over each other and will be illegible. This function is only useful when you are zoomed in to a handful of facilities. To remove the facility names, simply click on the button again.

Displaying the Map Legend

For help with any of the symbols used on the map, click on the **Display Legend** icon at the far right of the row of icons. This will display a pop-up window with short descriptions of each of the symbols used to represent physical and political entities, such as roads, streams, and boundary lines for states, counties and tribal lands. To hide the window once it is displayed, either click on the small 'x' in the upper right corner of the window, or simply click on anything else on the screen outside the window. The window can also be moved anywhere else on the screen by clicking and dragging the top title bar.

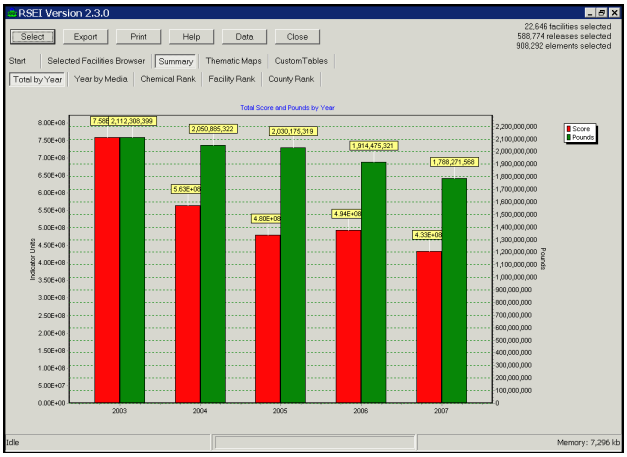
CHAPTER 8
Snapshots of Selected Releases - Summary and Thematic Maps

The **Summary** and **Thematic Maps** buttons, found in the second row of menu buttons, provide quick standard ways to look at the set of releases you selected using the **Select** button. The **Summary** button lets you quickly see graphs of total score and pounds by year, and year by media, as well as ranked lists of chemicals released and facilities. These options are frequently requested analyses, but may not be exactly what you want. More customized functions can be found under the **Custom Tables** button, as explained in Chapter 9.

The Summary Button

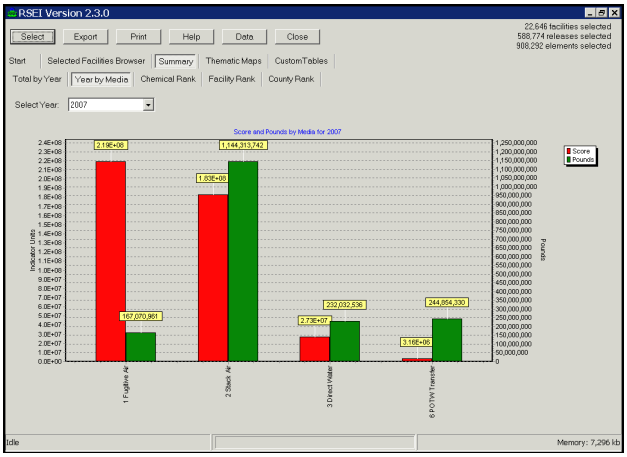
There are five options under the **Summary** button. Each is explained below.

- **Total by Year**. This button brings up a preformatted graph that shows the combined score and pounds for all releases in the selected set. There are two bars for each year in your selection. The red bar on the left displays the total score for the year indicated underneath the bars.The total score is shown in a yellow box above the red bar, and is measured using the scale on the left side of the graph. The green bar on the right displays total pounds for the year indicated. The total score is shown in a yellow box above the green bar, and is measured using the scale on the right side of the graph. If your selection only includes one year, the graph will only show the two bars.



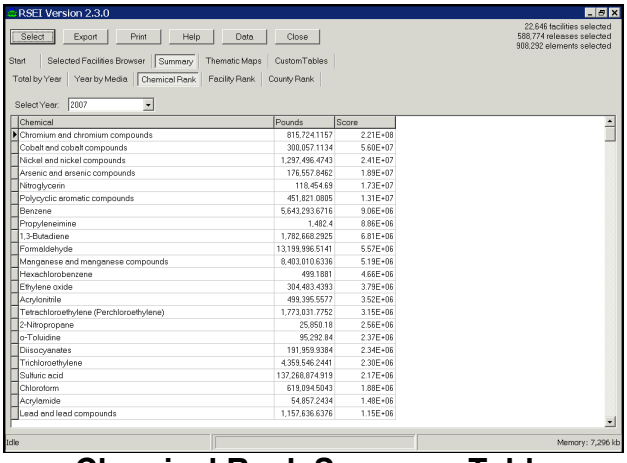
Total By Year Graph

- **Year by Media**. This button uses the same color scheme and scales as **Total by Year**. But in this case the horizontal axis shows media instead of year. The graph only shows one year at a time, which can be changed in the 'Select Year' box located above the graph.



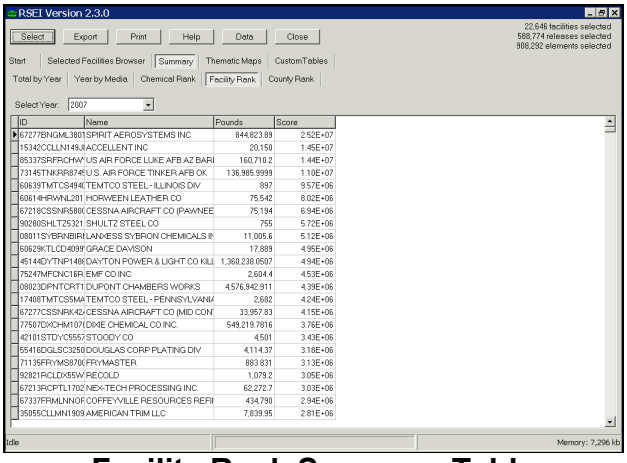
Year by Media Graph

- **Chemical Rank**. This button shows all of the chemicals in the set of selected releases, ranked in order of highest score (risk-related result) first. This table only shows one year at a time, which can be changed in the 'Select Year' box at the top of the screen.



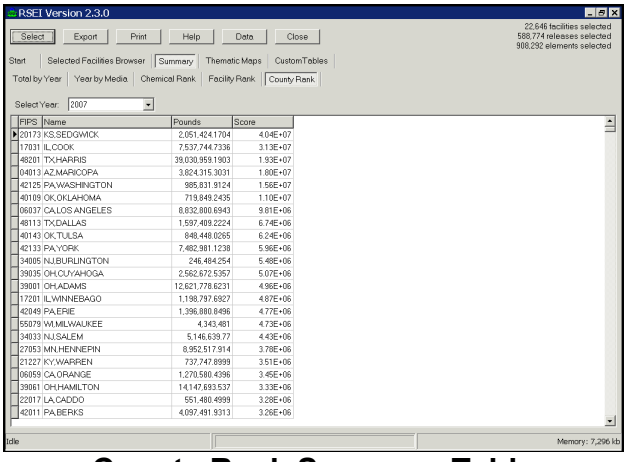
Chemical Rank Summary Table

- **Facility Rank**. This button shows all of the facilities in the selected set, ranked in order of highest score (risk-related result) first. This table only shows one year at a time, which can be changed in the 'Select Year' box at the top of the screen.



Facility Rank Summary Table

- **County Rank**. This button shows all of the facilities in the selected set, ranked in order of highest score (risk-related result) first. This table only shows one year at a time, which can be changed in the 'Select Year' box at the top of the screen

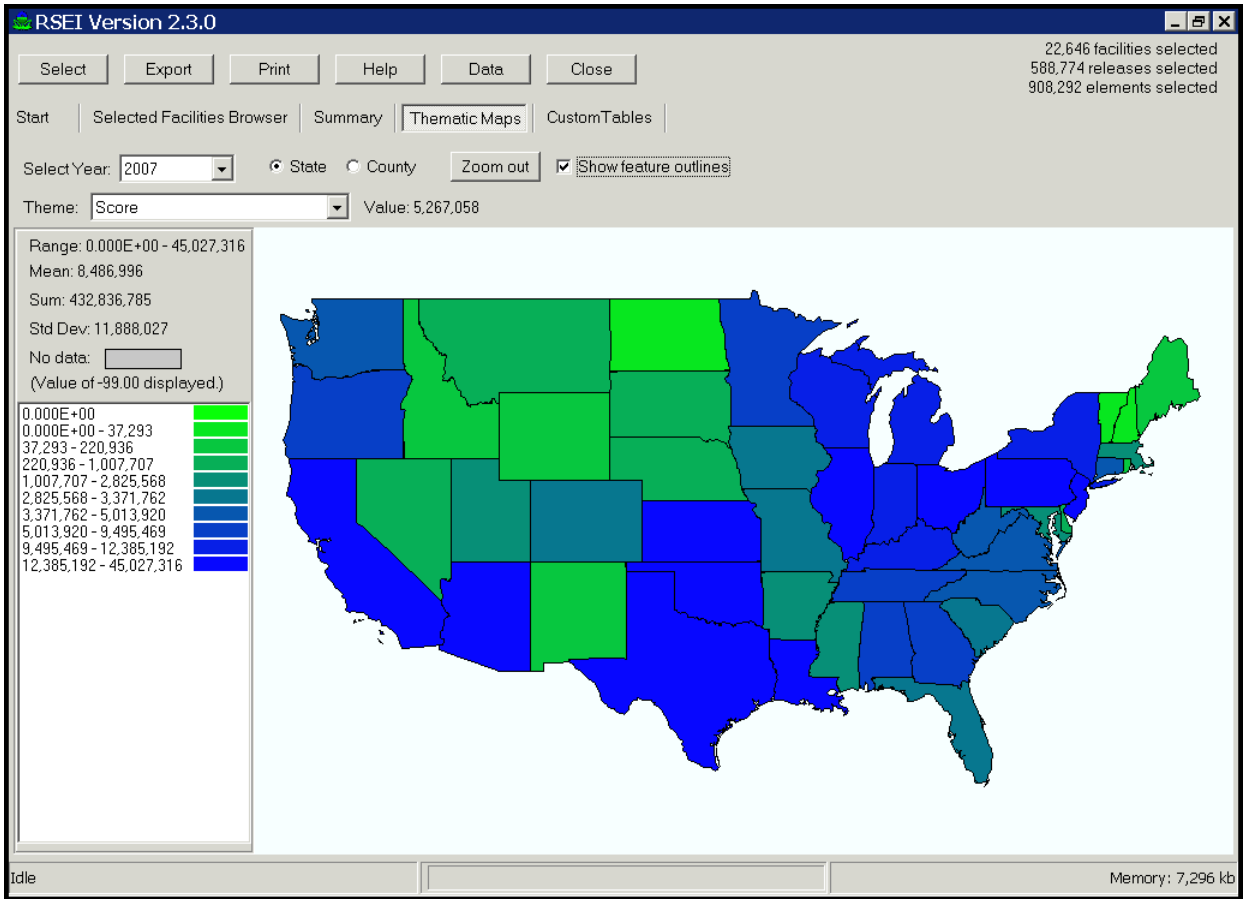


County Rank Summary Table

The Thematic Maps Button

This button allows you to quickly see geographic differences for different themes. At the top of the screen, you can select the year that you want to map, whether you would like to do it at the state or county level, and the theme you would like to display. You can display the total score for each county or state for that year, the score for population subgroups, the total pounds released for each county or state, or the total number of releases, facilities or chemicals for each county or state. When you select a theme, the model will automatically display it on the map. You can zoom in to a specific area by drawing a box with the cursor while holding down the right mouse button. You can zoom back out using the button above the map. You can pan the map to see Alaska, Hawaii, or the territories by clicking and dragging the map. The legend in the window on the lower left shows the range of values and their corresponding colors. The text above it displays the range, mean, sum, and standard deviation for the national distribution.

Adjacent to the theme selection, you can see the value for your selected theme wherever you currently have the cursor placed. If you click on the 'Show feature outlines' option, the map will display the state or county boundaries in black, to clearly outline states and counties.



Thematic Map, Showing Score by State for 2007

The model may take a few minutes to load the **Thematic Map**. The number and type of class breaks are fixed and cannot be changed.

CHAPTER 9
Analyzing Selected Releases - Custom Tables

The **Custom Tables** button allows for the display of information in many different ways. Like the **Selected Facilities Browser**, custom tables work from the data set selected using the **Select** button.

You can construct a table using any variables in the model (including variables that were not used in your selection), change the rows and columns, examine different statistics, sort the data, and cut the data in many different ways.

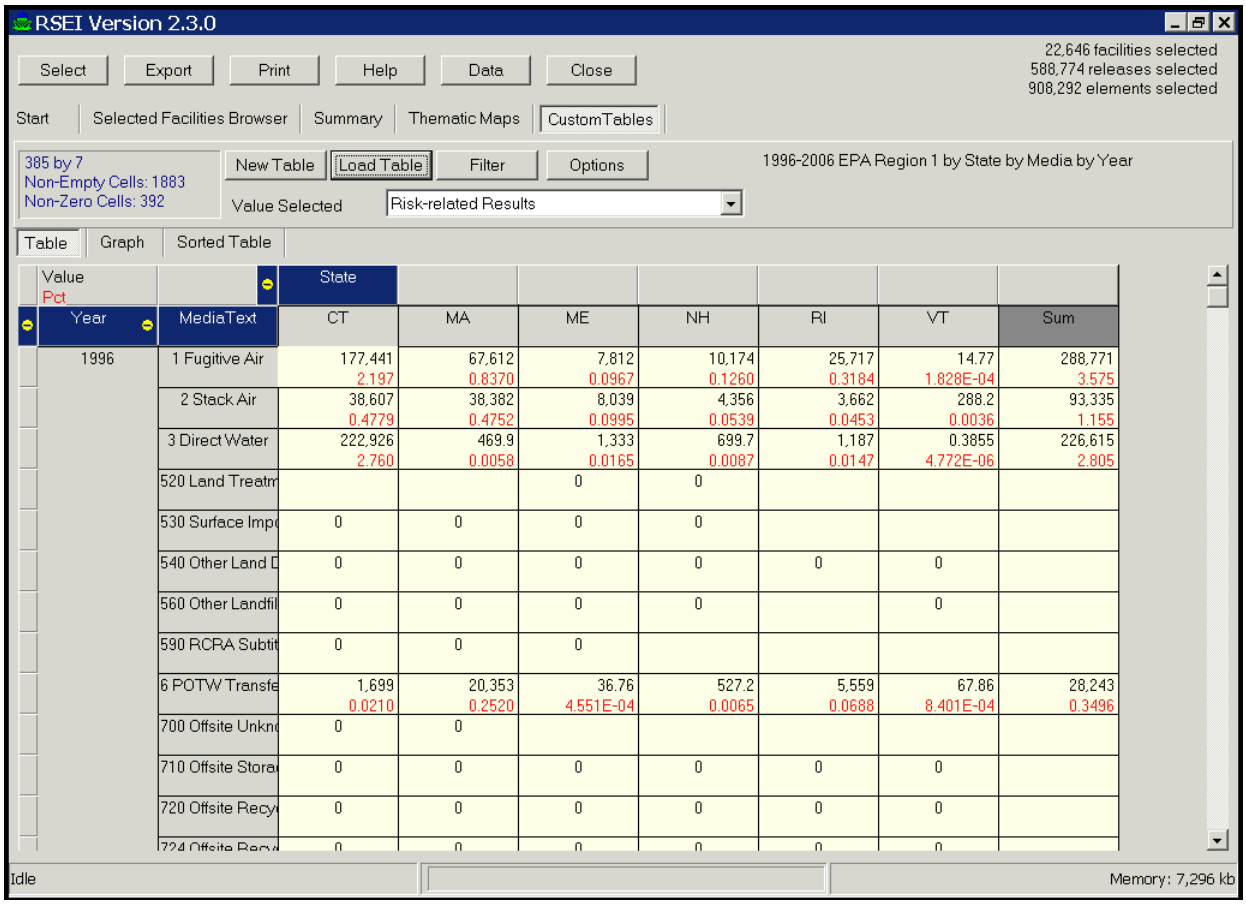
Creating a New Table

Click **New Table** to create a new table based on your selected data. This will bring up the **Select Dimensions** dialog. Here you can select the variables that will be displayed in your new table. The variable names are in the format **Category.Variable**. There are five categories: Chemical, Facility, Submission, Release, and Element. Each variable is associated with a category. For instance, **Chemical.CAS Number** refers to the **CAS number** variable, which is in the **Chemical** category. Check the boxes next to the variable name to include the variable in your crosstab table. There is no firm upper limit on how many variables you can select. It depends on how many values each variable can show, and how much data will be displayed on the screen. If your table is too large or too complicated to be displayed you will see a 'list index out of bounds' error, and the model will not display the table. However, the table is often completed, and can be found in the C:\Program Files\RSEI\User directory, as a Paradox table with .db extension.

Enter a name for your table in the box at the bottom of the screen. Note that file names cannot include any of the following characters: forward slash (/), backslash (\), greater-than sign (>), less-than sign (<), asterisk (*), question mark (?), quotation mark (“), pipe symbol (|), colon (:), or semicolon (;). If you attempt to enter any of these characters, the model will not accept it. If this is not your first table, the name must be different than the previous table; the model will not overwrite what is currently showing. The table will be saved to the C:\Program Files\RSEI \User directory as a Paradox table with a .db extension.

The model will make the first variable selected the column variable, and the rest will be row variables; however, you can change the order once the table is displayed (see **Modifying the Table View**). Hit **Run!**, and the table will be displayed in the window. Depending on how big your selected data set is and how complicated the table you requested is, it may take anywhere from 30 seconds to 30 minutes to display the table.

The new table is saved so that it can be loaded for future use. You can click the **New Table** button again to make a different table (using the same set of selected facilities). The row and column options you selected previously will still be checked, so be sure to deselect them if you do not want them included in your next table. The name of the table currently showing appears to the right of the third row of menu buttons.



Custom Crosstab Table

Note that when your new table is displayed, it may show only one row variable and one column variable. Any additional row and column variables that you have selected may be hidden. Click on the small yellow plus sign on the right side of the row variable to show the additional variables. The table is fully expanded when the last row or column does not show a small yellow plus sign on its right edge. It will be faster to re-display your table if you leave the row and column variables hidden when not viewing them. The values in black in the table represent the value as shown in the **Value Selected** box. For instance, if the box displays **Risk-related**, the value in black in each cell is the risk-related score. The value in red beneath it is the **Total Percent**, that is, the percent of the total value of the table for that summary that is contributed by that cell. You can remove the **Total Percent** display or add additional percentage displays by using the **Options** button.

Loading a Table

Every new table that you create and name is saved to your hard drive, in the C:\Program Files \RSEI\User directory. To load any table you have previously created, simply click on the **Load**

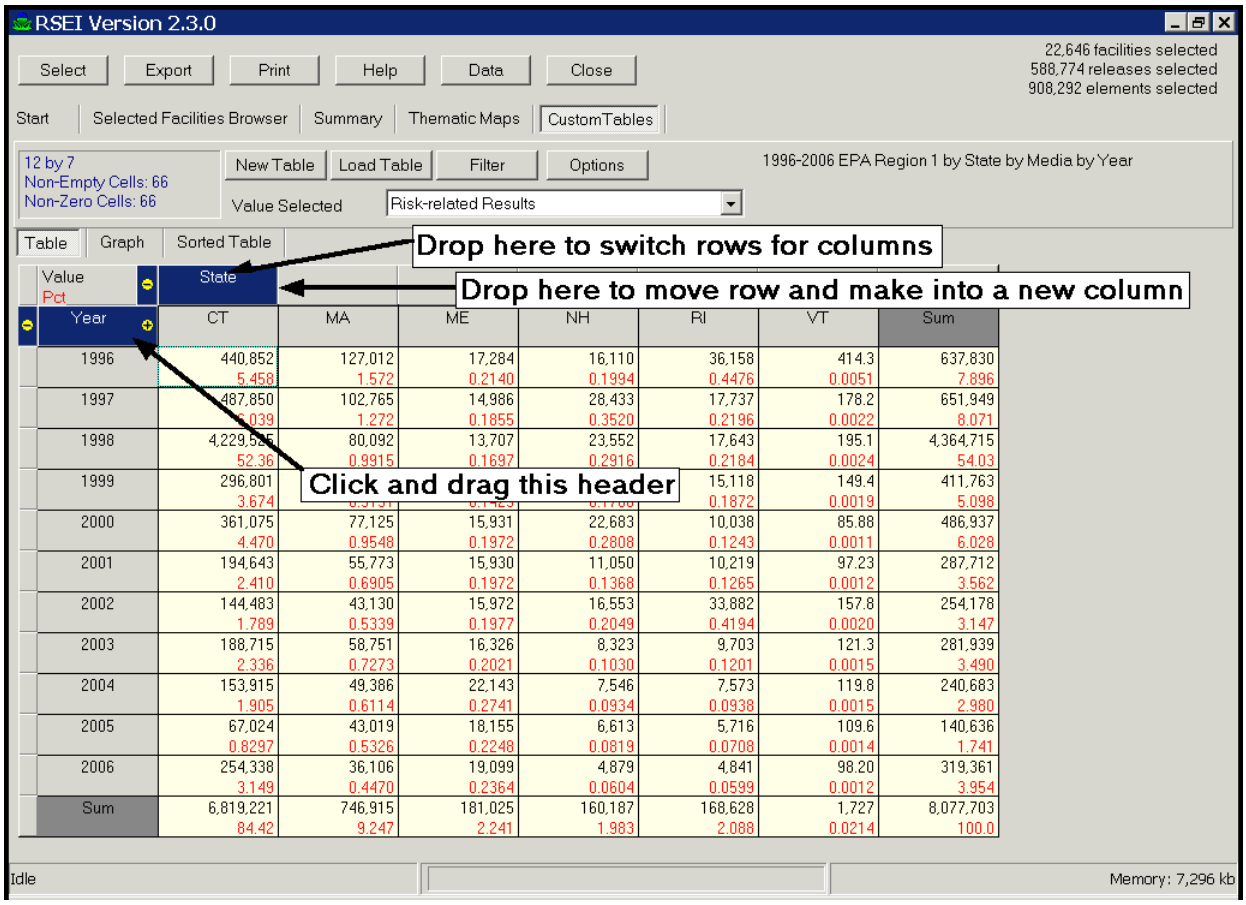
Table button, and select the desired table. Note that loading a table will only change the data in the **Custom Table** functions (**New Table**, **Graph** and **Sorted Table** functions). The last underlying set that you selected using the **Select** button will still be the active set for all the other functions. To see the set that was used in the generation of the table that is presently loaded, click on the table name, and you will see a window with the selection statements used for that set. Remember, if you want to see the selection being used for all of the other functions, you can click on the text displaying the number of selected facilities, releases, and elements in the upper right corner of your screen to see the selection statements for that set.

Once you have loaded the table, you can modify it as you would any new table you create.

Modifying the Table View

To switch the rows and columns, simply click and drag one row or column heading over the heading of the row or column heading you would like to switch with it. Hold down the mouse button until a double arrow sign appears over the heading . Then release the mouse button and drop the heading. To move columns or rows, click on the heading of the row or column you want to move, and drag it next to the row or column heading where you would like to add it, until you see two arrows pointing at each other. Then release the mouse button. Note that you can only move variables that are open and showing. However, it will increase the speed of moving rows and columns if you collapse any variables that are not being moved.

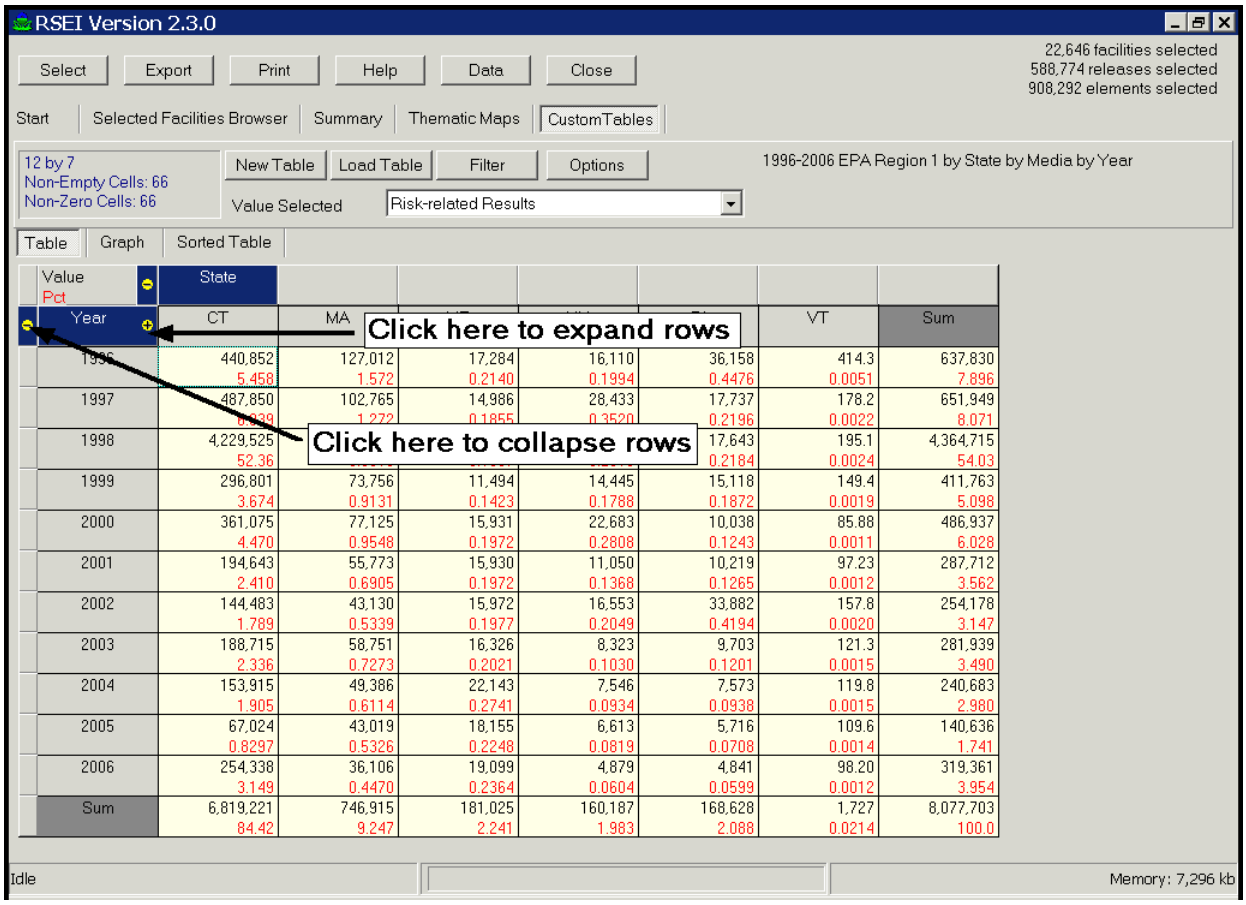
To switch a row variable with a column variable (or vice versa) click and drag the heading of one variable and drop it on top of the other heading. To move one variable, click and drag the heading and drop it next to another heading.



Changing Rows and Columns

To collapse rows or columns, click on the yellow circle with a minus sign immediately to the left of the row you want to collapse, or immediately above the column you want to collapse. Clicking on a minus sign collapses every row or column after it (i.e., closer to the middle of the table). If, for instance, you have three row variables, and you click on the leftmost minus sign (to the left of the first variable name), you will collapse all of the rows, and table will show only the totals for each column variable. If you click on the minus sign to the right of the first row variable name, you will collapse the second and third row variables.

When a row or column is hidden, the minus sign will change to a plus sign; click on the plus sign to restore the row or column. If a following row or column was collapsed when the preceding row or column was collapsed, the following column will remain that way when the preceding one is restored. Click on the following row or column's plus sign to restore that one as well.



Collapsing and Expanding Rows

Any column can be resized by using the mouse to move to the right-hand border of the heading of the column you wish to size, until the arrow becomes a double line with two arrows. You can then move the mouse to the right to make the column wider or move the mouse to the left to make the column narrower. The row heights can be resized in a similar way. The row widths cannot be resized.

Using the Filter

In addition to collapsing rows and columns, you can also control how your data are displayed by using the **Filter** option. The **Filter** option allows you to select specific values for the variables in your table. Once filtered, only the selected values will be displayed, allowing you to focus on specific entries. For instance, if you create a table with state and media text as variables, you can set the filter to show only states in EPA Region 1.

Click on the **Filter** button at the top of the **Tables** screen. This brings up the **Set Filter** dialog. In the first window, select the variable you would like to filter by clicking on its name. This will bring up a list of values in your table from which you can select filter parameters. Click on the box next to any of the values that you would like to see displayed in the table, then click

Apply Filters. The **Crosstab** table will be shown, using only the values you selected for the variables you modified. To remove the filter, click **Filter** again, then click **Clear** this filter, then **Apply Filters**. Filters for multiple variables can be selected, at the same time, or in succession. Simply click on each variable in the **Set Filter** dialog, and then select the values you are interested in. You can clear one filter by highlighting the variable in the top window, then clicking **Clear this filter**. Clear all filters by simply clicking **Clear all filters**.

The filters in effect at any time are shown at the bottom of the **Set Filter** dialog.

Value Selected

In this window you can select how you want to express the data in your table. You can choose from pounds-based, hazard-based, or full risk-related results. Each option gives a different perspective on the reported releases and transfers. Descriptions of these selections are:

Count of Elements. This number reflects the total number of individual Indicator Elements.

Count of Releases. This number reflects the total number of individual releases. The number of releases for some media is slightly less than the number of elements, because some releases (such as those to surface water) end up partitioned between two or more pathways (fish ingestion and drinking water in the case of surface water).

Count of Facilities. This is the total number of facilities.

TRI Pounds. This number reflects the number of pounds released or transferred that are reported to the Toxics Release Inventory for the exposure pathway being considered. [Note: When 'Element.Category Code' or 'Element.Category Text' is used as column or row variable in a custom table, the TRI Pounds shown for the direct water, POTW effluent, and fish ingestion categories are modeled apportionments of the total pounds for a direct water release. While these apportionments will sum to the correct total for a water release, the ratio of score categories is only for modeling purposes.]

TRI Pounds with Toxicity Weights. This value shows only TRI pounds for the chemicals that have toxicity weights. This value differs from Modeled Pounds because it includes those chemicals which have toxicity weights regardless of whether they have physicochemical properties.

Hazard. This value is TRI pounds multiplied by the toxicity weight of the chemical appropriate for the exposure pathway selected. The inhalation toxicity weight is used for releases or transfers to media 1 (fugitive air), media 2 (stack air), media 750 (off-site incineration), and media 754 (off-site incineration- no fuel value). The oral toxicity weight is used for releases and transfers to media 3 (direct water) and 6 (transfers to POTWs) (see Chapter 10 for a list of modeled media). For releases that are not modeled (because the pathway is not modeled or because other necessary data, such as physicochemical properties, are lacking), the higher toxicity weight is used.

Modeled Pounds. This number reflects the number of pounds released or transferred (TRI Pounds) that can be modeled. Reasons that releases may not be able to be modeled include lack

of physicochemical information required for exposure modeling or lack of toxicity weights

Modeled Hazard. This value is modeled pounds multiplied by the toxicity weight of the chemical appropriate for the exposure pathway selected. It does not measure how the chemical moves through the environment and comes in contact with an individual. The inhalation toxicity weight is used for releases or transfers to media 1 (fugitive air), media 2 (stack air), media 750 (off-site incineration), and media 754 (off-site incineration- no fuel value). The oral toxicity weight is used for releases and transfers to media 3 (direct water) and 6 (transfers to POTWs) (see Chapter 10 for a list of modeled media).

Modeled Hazard*Pop. This value is the number of modeled pounds multiplied by the toxicity weight of the chemical appropriate for the exposure pathway selected and by the population potentially exposed. The inhalation toxicity weight is used for releases or transfers to media 1 (fugitive air), media 2 (stack air), media 750 (off-site incineration), and media 754 (off-site incineration- no fuel value). The oral toxicity weight is used for releases and transfers to media 3 (direct water) and 6 (transfers to POTWs) (see Chapter 10 for a list of modeled media). Also note that **Modeled Hazard*Pop** uses total population only, and is not available for subpopulations.

Risk-related Results - Children Under 10. This value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the population under 10 years of age. The pounds used in this result differ from the pounds used for **Modeled Hazard*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made.

Risk-related Results - Children 10 to 17. This value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the population from 10 to 17 (inclusive) years of age. The pounds used in this result differ from the pounds used for **Modeled Hazard*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made. Also note that **Modeled Hazard*Pop** uses total population only, and is not available for subpopulations.

Risk-related Results - Males 18 to 44. This value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the male population from 18 to 44 (inclusive) years of age. The pounds used in this result differ from the pounds used for **Modeled Hazard*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made. Also note that **Modeled Hazard*Pop** uses total population only, and is not available for subpopulations.

Risk-related Results - Females 18 to 44. This value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the female population from 18 to 44 (inclusive) years of age. The pounds used in this result differ from the pounds used for **Modeled Hazard*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made.

Risk-related Results - Adults Over 65. This value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the population over 65 years of age. The pounds used in this result differ from the pounds used for **Modeled**

Hazard*Pop (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made.

Risk-related Results. This value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the population. The pounds used in this result differ from the pounds used for **Modeled Hazard*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made.

Examples of useful comparisons among the above results include:

1. TRI Pounds vs. TRI Pounds (with toxicity)

This comparison allows you to determine the proportion of total TRI Pounds released that are associated with chemicals that have toxicity weights. This proportion may be somewhat different than the overall proportion of TRI chemicals that have toxicity weights. For example, 50% of a given set of TRI chemicals may have toxicity weights. However, it is possible that 80% of the TRI Pounds released for the same set of chemicals may be associated with chemicals that have toxicity weights.

2. TRI Pounds vs. Modeled Pounds

This comparison allows you to determine the proportion of chemical releases for which risk-related impacts can be estimated using the Risk-related option.

3. Hazard vs. Modeled Hazard

This comparison shows you (a) the amount of toxicity-weighted releases associated with chemicals that have toxicity weights versus (b) the amount of toxicity-weighted releases for chemicals that have both toxicity weights and physicochemical data that are used to model exposure. An important difference between this comparison and the comparison in example (2) above is that this comparison addresses only those chemicals that have toxicity weights.

4. Modeled Hazard vs. Modeled Hazard * Pop

This comparison allows you to determine the extent to which total population contributes to the result. However, no exposure modeling is considered in this crude approximation.

Within the model, you can only display one type of summary in a custom table at a time. However, if you export the table to another format such as Microsoft Excel or Lotus 1-2-3, you can work with all of the data at once. Simply click on the **Export** button at the top of the screen (see below for details on exporting).

Options

These selections allow you to modify how values are expressed in the table.

Normalization

For any of the summaries selected except **TRI Pounds**, you can choose to normalize the RSEI

results. Click **Options,** then 'Normalization,' then 'National.' The value shown in each cell is that cell's portion of the national value for that year, divided by the total value for 1988 and multiplied by 100,000. In this way, each national summary (i.e., **Risk-related**, **Modeled Hazard**) for 1988 is 100,000, and any other selection is displayed as a percentage of that.

Cell Display

This option will display additional values in your table (underneath each current cell value) that shows how that cell's value contributes to different portions of the aggregate table value. The default display includes the first three options listed below, **Total Percent**, **Column Percent**, and **Row Percent**. To turn them off, simply click on each one to remove the check mark. Clicking on them again will turn them back on. The box in the upper left corner of the table shows the color of each cell display option.

Total Percent. The percent contribution of the current cell to the total table sum. For instance, if the 'Risk-related' summary is selected, a cell's total percent value (shown in red) would be that cell's risk-related score divided by the sum of all cells. The sum of all the cells in the table is shown in the bottom right corner in black.

Row Percent. The percent contribution of the current cell to the total row sum. If the **Risk-related** summary is selected, a cell's row percent value (shown in green) would be that cell's risk-related score divided by the sum of all cells in that row, as shown in far right cell in that row in black.

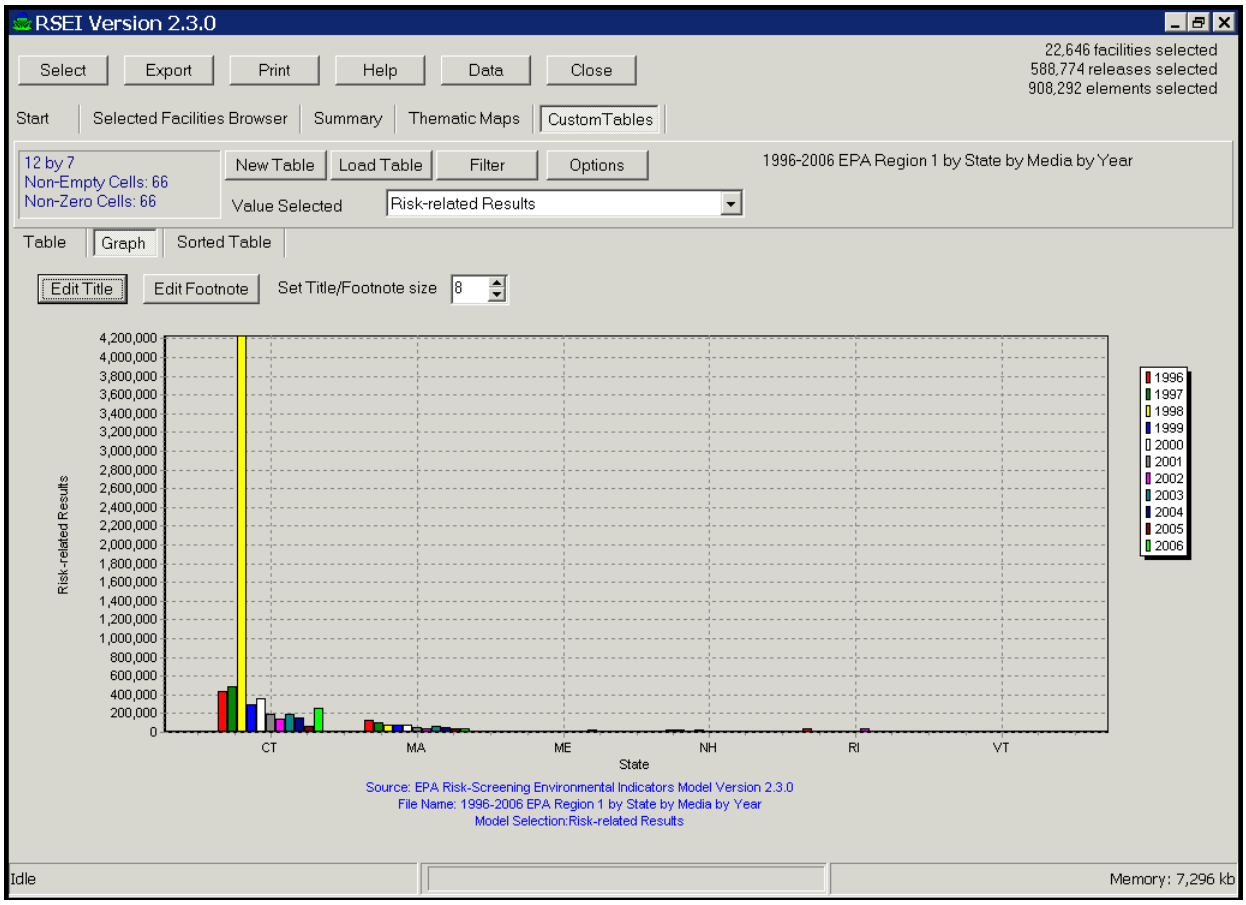
Column Percent. The percent contribution of the current cell to the total column sum. If the **Risk-related** summary is selected, a cell's total percent value (shown in blue) would be that cells risk-related score divided by the sum of all cells in the column, as shown in the bottom cell in the column in black.

Percentile. The percentile that the cell's value falls into, when all of the cell values in the table are taken into account.

Rank. The cell's rank, from highest (1) to lowest, of all of the cell values in the table.

Graph

The **Graph** function allows you to quickly create a pre-formatted graph based on the current **Custom Table**. The **Graph** works from your current display, not from the underlying table, so if columns or rows are collapsed, they will not be included. Also, if you have used the filter to select certain values of your variables, the excluded variables will not be shown on the graph. Whatever summary statistic (TRI pounds, Risk-related, etc.) is showing will be used. You can go back and forth between the two screens. Anything you change in the **Custom Table** will automatically be updated and displayed in the **Graph**.



Custom Graph

If your table is very large or contains many variables, the model will attempt to graph it, but the graph may not legible. If this is the case, simply collapse rows and/or columns, or use the **Filter** option to reduce the number of values that need to be displayed on the graph.

If you choose to print your graph (using the **Print** button at the top of the screen), you can add a title for it by clicking on the **Edit Title** button above the graph, and typing in the desired text.

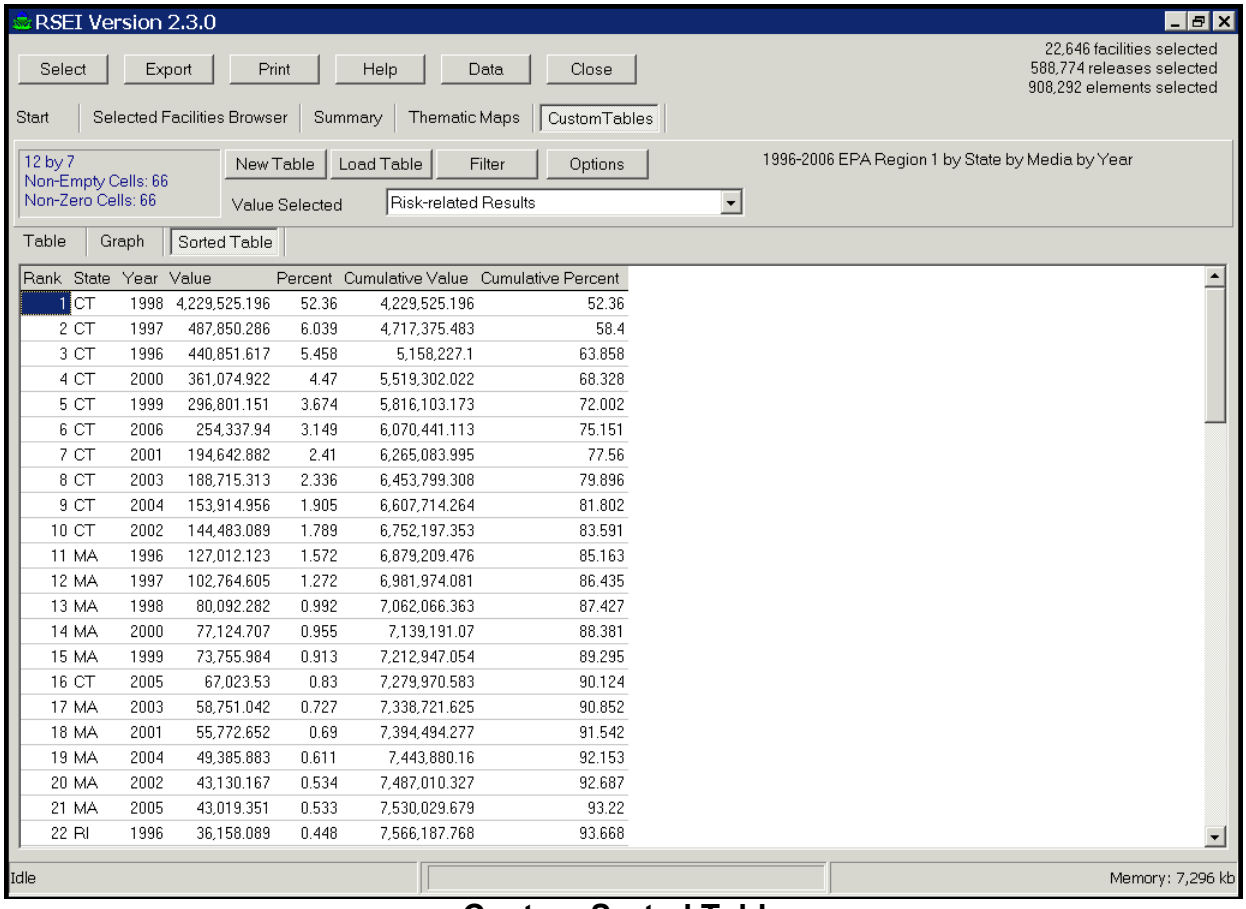
The footnote that will be printed on your **Graph** is shown in blue below the graph. The default footnote shows the RSEI model version number, the file name of your table, and the model selection (summary) that is being graphed. You can change this footnote by clicking the **Edit Footnote** button above the graph, and typing in the desired text.

You can also change the font size for both the title and the footnote in the box above the graph.

Sorted Tables

The **Sorted Table** option allows you to display your table in the form of a sorted list. Like the **Graph** function, the **Sorted Table** works from whatever you have displayed on the **Custom Table** at the time. Each table cell showing is given one entry in the list, which is sorted in

descending order. The value for that statistic (i.e., if it is TRI Pounds it would be the total number of pounds in that cell) is shown in the 'Value' column, and then that cell's percent of the total is shown in the 'Percent' column. The cumulative values and percents are presented in the next two columns.



Rank	State	Year	Value	Percent	Cumulative Value	Cumulative Percent
1	CT	1998	4,229,525.196	52.36	4,229,525.196	52.36
2	CT	1997	487,850.286	6.039	4,717,375.483	58.4
3	CT	1996	440,851.617	5.458	5,158,227.1	63.858
4	CT	2000	361,074.922	4.47	5,519,302.022	68.328
5	CT	1999	296,801.151	3.674	5,816,103.173	72.002
6	CT	2006	254,337.94	3.149	6,070,441.113	75.151
7	CT	2001	194,642.882	2.41	6,265,083.995	77.56
8	CT	2003	188,715.313	2.336	6,453,799.308	79.896
9	CT	2004	153,914.956	1.905	6,607,714.264	81.802
10	CT	2002	144,483.089	1.789	6,752,197.353	83.591
11	MA	1996	127,012.123	1.572	6,879,209.476	85.163
12	MA	1997	102,764.605	1.272	6,981,974.081	86.435
13	MA	1998	80,092.282	0.992	7,062,066.363	87.427
14	MA	2000	77,124.707	0.955	7,139,191.07	88.381
15	MA	1999	73,755.984	0.913	7,212,947.054	89.295
16	CT	2005	67,023.53	0.83	7,279,970.583	90.124
17	MA	2003	58,751.042	0.727	7,338,721.625	90.852
18	MA	2001	55,772.652	0.69	7,394,494.277	91.542
19	MA	2004	49,385.883	0.611	7,443,880.16	92.153
20	MA	2002	43,130.167	0.534	7,487,010.327	92.687
21	MA	2005	43,019.351	0.533	7,530,029.679	93.22
22	RI	1996	36,158.089	0.448	7,566,187.768	93.668

Custom Sorted Table

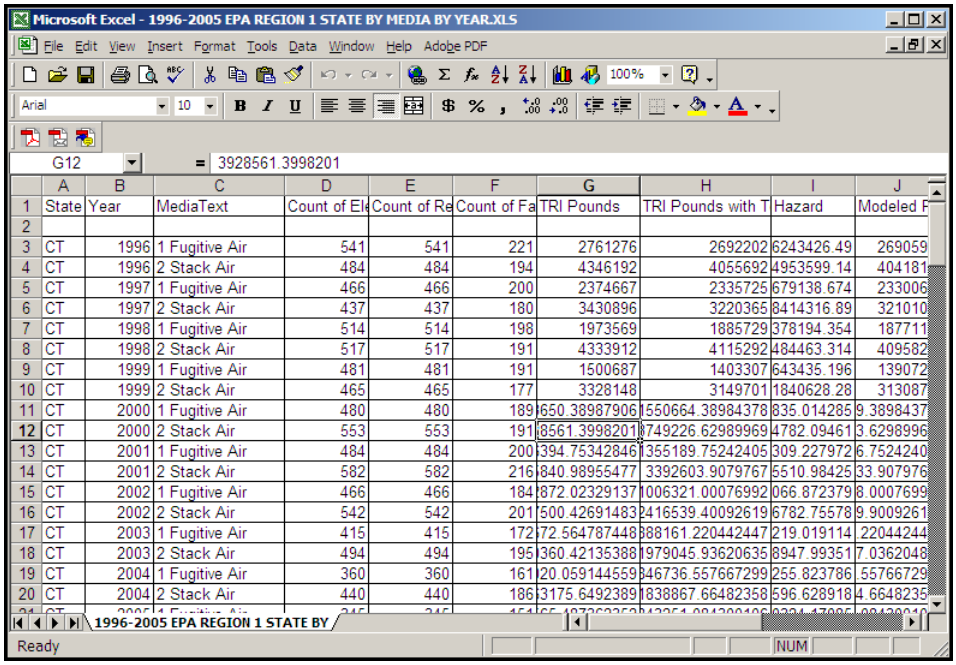
The **Sorted Table** is very useful when looking at large complicated tables. It shows very quickly what cells are of most concern, and for how much of the total the top few entries are responsible. If you have a table with several row variables, for instance, you can quickly zoom in on the area of most concern by collapsing the table to one row and one column, and then clicking **Sorted Table** to find which value of the first row or column variable is of most concern. Then you can expand the table and look at a more detailed breakdown for that value.

Exporting Tables

Any table can be exported to a variety of formats, including Dbase, Lotus 1-2-3, Microsoft Excel, and text. Exporting can be very useful for a variety of reasons. One of the most common uses is to be able to compare the different model summaries, as listed under Value Selected. The advantage in using exported tables is that all of the summaries are visible at the same time,

so you can compare them, and make new calculations with them.

To export a table, click on the **Export** button. Select the file type. Depending on what type you select, some options will be grayed out and some will be active. Select the options you would like of the ones that are active. Name the file in the 'Export to file' box, and click the file icon next to the name box to select a directory for your saved file. The C:\Program Files\RSEI\User directory is a convenient place provided to store model output files. Click **OK**, and the file will be saved in the C:\Program Files\RSEI\User directory.



	A	B	C	D	E	F	G	H	I	J
1	State	Year	MediaText	Count of El	Count of Re	Count of Fa	TRI Pounds	TRI Pounds with T	Hazard	Modeled F
2										
3	CT	1996	1 Fugitive Air	541	541	221	2761276	2692202	6243426.49	269059
4	CT	1996	2 Stack Air	484	484	194	4346192	4055692	4953599.14	404181
5	CT	1997	1 Fugitive Air	466	466	200	2374667	2335725	679138.674	233006
6	CT	1997	2 Stack Air	437	437	180	3430896	3220365	8414316.89	321010
7	CT	1998	1 Fugitive Air	514	514	198	1973569	1885729	378194.354	187711
8	CT	1998	2 Stack Air	517	517	191	4333912	4115292	484463.314	409582
9	CT	1999	1 Fugitive Air	481	481	191	1500687	1403307	643435.196	139072
10	CT	1999	2 Stack Air	465	465	177	3328148	3149701	1840628.28	313087
11	CT	2000	1 Fugitive Air	480	480	189	650.38987906	1550664.38984378	835.014285	9.3898437
12	CT	2000	2 Stack Air	553	553	191	8561.3998201	8749226.62989969	4782.09461	3.6298996
13	CT	2001	1 Fugitive Air	484	484	200	394.75342846	1355189.75242405	309.227972	6.7524240
14	CT	2001	2 Stack Air	582	582	216	840.98955477	3392603.9079767	5510.98425	33.907976
15	CT	2002	1 Fugitive Air	466	466	184	872.02329137	1006321.00076992	066.872379	8.0007699
16	CT	2002	2 Stack Air	542	542	201	500.42691483	2416539.40092619	6782.75578	9.9009261
17	CT	2003	1 Fugitive Air	415	415	172	72.564787448	388161.220442447	219.019114	.22044244
18	CT	2003	2 Stack Air	494	494	195	360.42135388	1979045.93620635	8947.99351	7.0362048
19	CT	2004	1 Fugitive Air	360	360	161	20.059144559	346736.557667299	255.823786	.55766729
20	CT	2004	2 Stack Air	440	440	186	3175.6492389	1838867.66482358	596.628918	4.6648235

Exported Custom Table

Note that file names cannot include any of the following characters: forward slash (/), backslash (\), greater-than sign (>), less-than sign (<), asterisk (*), question mark (?), quotation mark (“), pipe symbol (|), colon (:), or semicolon (;). If you attempt to enter any of these characters, the model will not accept it. Note that all of the summaries are listed (not just the summary shown on the screen when the table was exported). Unlike other custom table functions, the table export does not change with what is shown on the screen at the time.

Printing Tables

Any table can also be printed. Simply click **Print** on the top menu, and the currently displaying table will print to your installed default printer. Note that large complicated tables may not print well directly from the program. If this is the case, it may be easier to first export the table to a database or spreadsheet program where more formatting is possible, and then print it from that program.

CHAPTER 10
Additional Information

The following sections present additional information that may help you in selecting the releases you are interested in and interpreting your results.

Standard Industrial Classification Codes

The following table presents the 2-digit and 3-digit SIC codes and corresponding industries that are required to report their releases to the Toxics Release Inventory. All facilities within 2-digit SIC codes 20-39 are required to report, whereas only selected facilities within SIC codes 10, 12, 49, 51, and 73 are required to report.

SIC Codes for TRI Facilities	
SIC Code	**Industry**
10*	Metal Mining
102	Copper Ores
103	Lead and Zinc Ores
104	Gold and Silver Ores
106	Feroalloy Ores, except Vanadium
108	Metal Mining Services
109	Miscellaneous Metal Ores (limited to 4-digit code #1099)
12*	Coal Mining
122	Bituminous Coal and Lignite Mining
123	Anthracite Mining
20	Food and Kindred Products
201	Meat Products
202	Dairy Products
203	Canned, Frozen, and Preserved Fruits, Vegetables, and Food Specialties
204	Grain Mill Products
205	Bakery Products
206	Sugar and Confectionery Products
207	Fats and Oils

SIC Codes for TRI Facilities	
SIC Code	**Industry**
208	Beverages
209	Miscellaneous Food Preparations and Kindred Products
21	Tobacco Products
211	Cigarettes
212	Cigars
213	Chewing and Smoking Tobacco and Snuff
214	Tobacco Stemming and Redrying
22	Textile Mill Products
221	Broadwoven Fabric Mills, Cotton
222	Broadwoven Fabric Mills, Manmade Fiber and Silk
223	Broadwoven Fabric Mills, Wool (Including Dyeing and Finishing)
224	Narrow Fabric and Other Smallwares Mills: Cotton, Wool, Silk, and Manmade Fiber
225	Knitting Mills
226	Dyeing and Finishing Textiles, Except Wool Fabrics and Knit Goods
227	Carpets and Rugs
228	Yarn and Thread Mills
229	Miscellaneous Textile Goods
23	Apparel and Other Finished Products Made from Fabrics and Similar Materials
231	Men's and Boys' Suits, Coats, and Overcoats
232	Men's and Boys' Furnishings, Work Clothing, and Allied Garments
233	Women's, Misses', and Juniors' Outerwear
234	Women's, Misses', Children's, and Infants' Undergarments
235	Hats, Caps, and Millinery
236	Girls', Children's, and Infants' Outerwear
237	Fur Goods
238	Miscellaneous Apparel and Accessories
239	Miscellaneous Fabricated Textile Products
24	Lumber and Wood Products, Except Furniture

SIC Codes for TRI Facilities	
SIC Code	**Industry**
241	Logging
242	Sawmills and Planing Mills
243	Millwork, Veneer, Plywood, and Structural Wood Members
244	Wood Containers
245	Wood Buildings and Mobile Homes
249	Miscellaneous Wood Products
25	Furniture and Fixtures
251	Household Furniture
252	Office Furniture
253	Public Building and Related Furniture
254	Partitions, Shelving, Lockers, and Office and Store Fixtures
259	Miscellaneous Furniture and Fixtures
26	Paper and Allied Products
261	Pulp Mills
262	Paper Mills
263	Paperboard Mills
265	Paperboard Containers and Boxes
267	Converted Paper and Paperboard Products, Except Containers and Boxes
27	Printing, Publishing, and Allied Industries
271	Newspapers: Publishing, or Publishing and Printing
272	Periodicals: Publishing, or Publishing and Printing
273	Books
274	Miscellaneous Publishing
275	Commercial Printing
276	Manifold Business Forms
277	Greeting Cards
278	Blankbooks, Looseleaf Binders, and Bookbinding and Related Work
279	Service Industries for the Printing Trade
28	Chemicals and Allied Products

SIC Codes for TRI Facilities	
SIC Code	**Industry**
281	Industrial Inorganic Chemicals
282	Plastics Materials and Synthetic Resins, Synthetic Rubber, Cellulosic and Other Manmade Fibers, Except Glass
283	Drugs
284	Soap, Detergents, and Cleaning Preparations; Perfumes, Cosmetics, and Other Toilet Preparations
285	Paints, Varnishes, Lacquers, Enamels, and Allied Products
286	Industrial Organic Chemicals
287	Agricultural Chemicals
289	Miscellaneous Chemical Products
29	Petroleum Refining and Related Industries
291	Petroleum Refining
295	Asphalt Paving and Roofing Materials
299	Miscellaneous Products of Petroleum and Coal
30	Rubber and Miscellaneous Plastics Products
301	Tires and Inner Tubes
302	Rubber and Plastics Footwear
305	Gaskets, Packing, and Sealing Devices and Rubber and Plastics Hose and Belting
306	Fabricated Rubber Products, Not Elsewhere Classified
308	Miscellaneous Plastics Products
31	Leather and Leather Products
311	Leather Tanning and Finishing
313	Boot and Shoe Cut Stock and Findings
314	Footwear, Except Rubber
315	Leather Gloves and Mittens
316	Luggage
317	Handbags and Other Personal Leather Goods
319	Leather Goods, Not Elsewhere Classified
32	Stone, Clay, Glass, and Concrete Products
321	Flat Glass

SIC Codes for TRI Facilities	
SIC Code	**Industry**
322	Glass and Glassware, Pressed or Blown
323	Glass Products, Made of Purchased Glass
324	Cement, Hydraulic
325	Structural Clay Products
326	Pottery and Related Products
327	Concrete, Gypsum, and Plaster Products
328	Cut Stone and Stone Products
329	Abrasive, Asbestos, and Miscellaneous Nonmetallic Mineral Products
33	Primary Metal Industries
331	Steel Works, Blast Furnaces, and Rolling and Finishing Mills
332	Iron and Steel Foundries
333	Primary Smelting and Refining of Nonferrous Metals
334	Secondary Smelting and Refining of Nonferrous Metals
336	Nonferrous Foundries (Castings)
339	Miscellaneous Primary Metal Products
34	Fabricated Metal Products, Except Machinery and Transportation Equipment
341	Metal Cans and Shipping Containers
342	Cutlery, Handtools, and General Hardware
343	Heating Equipment, Except Electric and Warm Air; and Plumbing Fixtures
344	Fabricated Structural Metal Products
345	Screw Machine Products, and Bolts, Nuts, Screws, Rivets, and Washers
346	Metal Forgings and Stampings
347	Coating, Engraving, and Allied Services
348	Ordnance and Accessories, Except Vehicles and Guided Missiles
349	Miscellaneous Fabricated Metal Products
35	Industrial and Commercial Machinery and Computer Equipment
351	Engines and Turbines
352	Farm and Garden Machinery and Equipment
353	Construction, Mining, and Materials Handling Machinery and Equipment

SIC Codes for TRI Facilities	
SIC Code	**Industry**
354	Metalworking Machinery and Equipment
355	Special Industry Machinery, Except Metalworking Machinery
356	General Industrial Machinery and Equipment
357	Computer and Office Equipment
358	Refrigeration and Service Industry Machinery
359	Miscellaneous Industrial and Commercial Machinery and Equipment
36	Electronic and Other Electrical Equipment and Components, Except Computer Equipment
361	Electric Transmission and Distribution Equipment
362	Electrical Industrial Apparatus
363	Household Appliances
364	Electric Lighting and Wiring Equipment
365	Household Audio and Video Equipment, and Audio Recordings
366	Communications Equipment
367	Electronic Components and Accessories
369	Miscellaneous Electrical Machinery, Equipment, and Supplies
37	Transportation Equipment
371	Motor Vehicles and Motor Vehicle Equipment
372	Aircraft and Parts
373	Ship and Boat Building and Repairing
374	Railroad Equipment
375	Motorcycles, Bicycles, and Parts
376	Guided Missiles and Space Vehicles and Parts
379	Miscellaneous Transportation Equipment
38	Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks
381	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Systems, Instruments, and Equipment
382	Laboratory Apparatus and Analytical, Optical, Measuring, and Controlling Instruments
384	Surgical, Medical, and Dental Instruments and Supplies

SIC Codes for TRI Facilities	
SIC Code	**Industry**
385	Ophthalmic Goods
386	Photographic Equipment and Supplies
387	Watches, Clocks, Clockwork Operated Devices, and Parts
39	Miscellaneous Manufacturing Industries
391	Jewelry, Silverware, and Plated Ware
393	Musical Instruments
394	Dolls, Toys, Games and Sporting and Athletic Goods
395	Pens, Pencils, and Other Artists' Materials
396	Costume Jewelry, Costume Novelties, Buttons, and Miscellaneous Notions, Except Precious Metal
399	Miscellaneous Manufacturing Industries
49*	Electric, Gas, and Sanitary Services
491	Electric services (limited to: facilities that combust coal and/or oil to generate electricity for distribution in commerce)
493	Combination Electric and Gas, and Other Utility Services (limited to: 4-digit codes 4931 and 4939, and facilities that combust coal and/or oil to generate electricity for distribution in commerce)
495	Sanitary Services (limited to 4-digit code 4953, and to commercial hazardous waste treatment – facilities regulated under RCRA Subtitle C, 42 U.S.C. Section 6921 et seq.)
51*	Wholesale Trade-Nondurable Goods
516	Chemicals and Allied Products (limited to 4-digit code 5169 -- products that are not elsewhere classified)
517	Petroleum and Petroleum Products (limited to 4-digit code 5171 -- petroleum bulk stations and terminals)
73*	Business Services
738	Limited to 4-digit code 7389 -- Business Services not elsewhere classified.
*All listed codes in these categories are new as of the 1998 reporting year, except for as noted in the table.	

NAICS Codes

The following table presents the 6-digit 2002 NAICS codes for TRI-reportable facilities. This table was created by crosswalking TRI-reportable SIC codes to their corresponding NAICS codes, using the Census crosswalk available at http://www.census.gov/epcd/naics02/NAICS02toSIC87.xls. Not all of the facilities classified under any given NAICS code are necessarily required to report to TRI. For more information, see the TRI website at http://www.epa.gov/tri/lawsandregs/naic/index.htm.

NAICS Codes for TRI Facilities

NAICS Code	Description
111998	All Other Miscellaneous Crop Farming
113310	Logging
211112	Natural Gas Liquid Extraction
212111	Bituminous Coal and Lignite Surface Mining
212112	Bituminous Coal Underground Mining
212113	Anthracite Mining
212221	Gold Ore Mining
212222	Silver Ore Mining
212231	Lead Ore and Zinc Ore Mining
212234	Copper Ore and Nickel Ore Mining
212299	All Other Metal Ore Mining
212324	Kaolin and Ball Clay Mining
212325	Clay and Ceramic and Refractory Minerals Mining
212393	Other Chemical and Fertilizer Mineral Mining
212399	All Other Nonmetallic Mineral Mining
221111	Hydroelectric Power Generation
221112	Fossil Fuel Electric Power Generation
221113	Nuclear Electric Power Generation
221119	Other Electric Power Generation
221121	Electric Bulk Power Transmission and Control
221122	Electric Power Distribution
221210	Natural Gas Distribution
311111	Dog and Cat Food Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
311119	Other Animal Food Manufacturing
311211	Flour Milling
311212	Rice Milling
311213	Malt Manufacturing
311221	Wet Corn Milling
311222	Soybean Processing
311223	Other Oilseed Processing
311225	Fats and Oils Refining and Blending
311230	Breakfast Cereal Manufacturing
311311	Sugarcane Mills
311312	Cane Sugar Refining
311313	Beet Sugar Manufacturing
311320	Chocolate and Confectionery Manufacturing
311330	Confectionery Manufacturing from Purchased Chocolate
311340	Nonchocolate Confectionery Manufacturing
311411	Frozen Fruit, Juice, and Vegetable Manufacturing
311412	Frozen Specialty Food Manufacturing
311421	Fruit and Vegetable Canning
311422	Specialty Canning
311423	Dried and Dehydrated Food Manufacturing
311511	Fluid Milk Manufacturing
311512	Creamery Butter Manufacturing
311513	Cheese Manufacturing
311514	Dry, Condensed, and Evaporated Dairy Product Manufacturing
311520	Ice Cream and Frozen Dessert Manufacturing
311611	Animal (except Poultry) Slaughtering
311612	Meat Processed from Carcasses
311613	Rendering and Meat Byproduct Processing
311615	Poultry Processing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
311711	Seafood Canning
311712	Fresh and Frozen Seafood Processing
311812	Commercial Bakeries
311813	Frozen Cakes, Pies, and Other Pastries Manufacturing
311821	Cookie and Cracker Manufacturing
311822	Flour Mixes and Dough Manufacturing from Purchased Flour
311823	Dry Pasta Manufacturing
311830	Tortilla Manufacturing
311911	Roasted Nuts and Peanut Butter Manufacturing
311919	Other Snack Food Manufacturing
311920	Coffee and Tea Manufacturing
311930	Flavoring Syrup and Concentrate Manufacturing
311941	Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing
311942	Spice and Extract Manufacturing
311991	Perishable Prepared Food Manufacturing
311999	All Other Miscellaneous Food Manufacturing
312111	Soft Drink Manufacturing
312112	Bottled Water Manufacturing
312113	Ice Manufacturing
312120	Breweries
312130	Wineries
312140	Distilleries
312210	Tobacco Stemming and Redrying
312221	Cigarette Manufacturing
312229	Other Tobacco Product Manufacturing
313111	Yarn Spinning Mills
313112	Yarn Texturing, Throwing, and Twisting Mills
313113	Thread Mills
313210	Broadwoven Fabric Mills

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
313221	Narrow Fabric Mills
313222	Schiffli Machine Embroidery
313230	Nonwoven Fabric Mills
313241	Weft Knit Fabric Mills
313249	Other Knit Fabric and Lace Mills
313311	Broadwoven Fabric Finishing Mills
313312	Textile and Fabric Finishing (except Broadwoven Fabric Mills)
313320	Fabric Coating Mills
314110	Carpet and Rug Mills
314121	Curtain and Drapery Mills
314129	Other Household Textile Product Mills
314911	Textile Bag Mills
314912	Canvas and Related Product Mills
314991	Rope, Cordage, and Twine Mills
314992	Tire Cord and Tire Fabric Mills
314999	All Other Miscellaneous Textile Product Mills
315111	Sheer Hosiery Mills
315119	Other Hosiery and Sock Mills
315191	Outerwear Knitting Mills
315192	Underwear and Nightwear Knitting Mills
315211	Men's and Boys' Cut and Sew Apparel Contractors
315212	Women's, Girls', and Infants' Cut and Sew Apparel Contractors
315212	Women's, Girls', and Infants' Cut and Sew Apparel Contractors
315221	Men's and Boys' Cut and Sew Underwear and Nightwear Manufacturing
315222	Men's and Boys' Cut and Sew Suit, Coat, and Overcoat Manufacturing
315223	Men's and Boys' Cut and Sew Shirt (except Work Shirt) Manufacturing
315224	Men's and Boys' Cut and Sew Trouser, Slack, and Jean Manufacturing
315225	Men's and Boys' Cut and Sew Work Clothing Manufacturing
315228	Men's and Boys' Cut and Sew Other Outerwear Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
315231	Women's and Girls' Cut and Sew Lingerie, Loungewear and Nightwear Manufacturing
315232	Women's and Girls' Cut and Sew Blouse and Shirt Manufacturing
315233	Women's and Girls' Cut and Sew Dress Manufacturing
315234	Women's and Girls' Cut and Sew Suit, Coat, Tailored Jacket and Coat Manufacturing
315239	Women's and Girls' Cut and Sew Other Outer Outerwear Manufacturing
315291	Infants' Cut and Sew Apparel Manufacturing
315292	Fur and Leather Apparel Manufacturing
315299	All Other Cut and Sew Apparel Manufacturing
315991	Hat, Cap, and Millinery Manufacturing
315992	Glove and Mitten Manufacturing
315993	Men's and Boys' Neckwear Manufacturing
315999	Other Apparel Accessories and Other Apparel Manufacturing
316110	Leather and Hide Tanning and Finishing
316211	Rubber and Plastics Footwear Manufacturing
316212	House Slipper Manufacturing
316213	Men's Footwear (except Athletic) Manufacturing
316214	Women's Footwear (except Athletic) Manufacturing
316219	Other Footwear Manufacturing
316991	Luggage Manufacturing
316992	Women's Handbag and Purse Manufacturing
316993	Personal Leather Good (except Women's Handbag and Purse) Manufacturing
316999	All Other Leather Good Manufacturing
321113	Sawmills
321114	Wood Preservation
321211	Hardwood Veneer and Plywood Manufacturing
321212	Softwood Veneer and Plywood Manufacturing
321213	Engineered Wood Member (except Truss) Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
321214	Truss Manufacturing
321219	Reconstituted Wood Product Manufacturing
321911	Wood Window and Door Manufacturing
321912	Cut Stock, Resawing Lumber, and Planing
321918	Other Millwork (including Flooring)
321920	Wood Container and Pallet Manufacturing
321991	Manufactured Home (Mobile Home) Manufacturing
321992	Prefabricated Wood Building Manufacturing
321999	All Other Miscellaneous Wood Product Manufacturing
322110	Pulp Mills
322121	Paper (except Newsprint) Mills
322122	Newsprint Mills
322130	Paperboard Mills
322211	Corrugated and Solid Fiber Box Manufacturing
322212	Folding Paperboard Box Manufacturing
322213	Setup Paperboard Box Manufacturing
322214	Fiber Can, Tube, Drum, and Similar Products Manufacturing
322215	Nonfolding Sanitary Food Container Manufacturing
322221	Coated and Laminated Packaging Paper and Plastic Films Manufacturing
322222	Coated and Laminated Paper Manufacturing
322223	Plastics, Foil, and Coated Paper Bag Manufacturing
322224	Uncoated Paper and Multiwall Bag Manufacturing
322225	Laminated Aluminum Foil Manufacturing for Flexible Packaging Uses
322226	Surface-Coated Paperboard Manufacturing
322231	Die-Cut Paper and Paperboard Office Supplies Manufacturing
322232	Envelope Manufacturing
322233	Stationery, Tablet, and Related Product Manufacturing
322291	Sanitary Paper Product Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
322299	All Other Converted Paper Product Manufacturing
323110	Commercial Lithographic Printing
323111	Commercial Gravure Printing
323112	Commercial Flexographic Printing
323113	Commercial Screen Printing
323114	Quick Printing
323115	Digital Printing
323116	Manifold Business Form Printing
323117	Book Printing
323118	Blankbook, Loose-leaf Binder, and Device Manufacturing
323119	Other Commercial Printing
323121	Tradebinding and Related Work
323122	Prepress Services
324110	Petroleum Refineries
324121	Asphalt Paving Mixture and Block Manufacturing
324122	Asphalt Shingle and Coating Materials Manufacturing
324191	Petroleum Lubricating Oil and Grease Manufacturing
324199	All Other Petroleum and Coal Products Manufacturing
325110	Petrochemical Manufacturing
325120	Industrial Gas Manufacturing
325131	Inorganic Dye and Pigment Manufacturing
325132	Synthetic Organic Dye and Pigment Manufacturing
325181	Alkalies and Chlorine Manufacturing
325182	Carbon Black Manufacturing
325188	All Other Basic Inorganic Chemical Manufacturing
325191	Gum and Wood Chemical Manufacturing
325192	Cyclic Crude and Intermediate Manufacturing
325193	Ethyl Alcohol Manufacturing
325199	All Other Basic Organic Chemical Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
325211	Plastics Material and Resin Manufacturing
325212	Synthetic Rubber Manufacturing
325221	Cellulosic Organic Fiber Manufacturing
325222	Noncellulosic Organic Fiber Manufacturing
325311	Nitrogenous Fertilizer Manufacturing
325312	Phosphatic Fertilizer Manufacturing
325314	Fertilizer (Mixing Only) Manufacturing
325320	Pesticide and Other Agricultural Chemical Manufacturing
325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
325510	Paint and Coating Manufacturing
325520	Adhesive Manufacturing
325611	Soap and Other Detergent Manufacturing
325612	Polish and Other Sanitation Good Manufacturing
325613	Surface Active Agent Manufacturing
325620	Toilet Preparation Manufacturing
325910	Printing Ink Manufacturing
325920	Explosives Manufacturing
325991	Custom Compounding of Purchased Resins
325992	Photographic Film, Paper, Plate, and Chemical Manufacturing
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing
326111	Plastics Bag Manufacturing
326112	Plastics Packaging Film and Sheet (including Laminated) Manufacturing
326113	Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing
326121	Unlaminated Plastics Profile Shape Manufacturing
326122	Plastics Pipe and Pipe Fitting Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
326130	Laminated Plastics Plate, Sheet (except Packaging) and Shape Manufacturing
326140	Polystyrene Foam Product Manufacturing
326150	Urethane and Other Foam Product (except Polysterene) Manufacturing
326160	Plastics Bottle Manufacturing
326191	Plastics Plumbing Fixture Manufacturing
326192	Resilient Floor Covering Manufacturing
326199	All Other Plastics Product Manufacturing
326211	Tire Manufacturing (except Retreading)
326220	Rubber and Plastics Hoses and Belting Manufacturing
326291	Rubber Product Manufacturing for Mechanical Use
326299	All Other Rubber Product Manufacturing
327111	Vitreous China Plumbing Fixture and China
327112	Vitreous China, Fine Earthenware, and Other Pottery Product Manufacturing
327113	Porcelain Electrical Supply Manufacturing
327121	Brick and Structural Clay Tile Manufacturing
327122	Ceramic Wall and Floor Tile Manufacturing
327123	Other Structural Clay Product Manufacturing
327124	Clay Refractory Manufacturing
327125	Nonclay Refractory Manufacturing
327211	Flat Glass Manufacturing
327212	Other Pressed and Blown Glass and Glassware
327213	Glass Container Manufacturing
327215	Glass Product Manufacturing Made of Purchased Glass
327310	Cement Manufacturing
327320	Ready-Mix Concrete Manufacturing
327331	Concrete Block and Brick Manufacturing
327332	Concrete Pipe Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
327390	Other Concrete Product Manufacturing
327410	Lime Manufacturing
327420	Gypsum Product Manufacturing
327910	Abrasive Product Manufacturing
327991	Cut Stone and Stone Product Manufacturing
327992	Ground or Treated Mineral and Earth Manufacturing
327993	Mineral Wool Manufacturing
327999	All Other Miscellaneous Nonmetallic Mineral Product Manufacturing
331111	Iron and Steel Mills
331112	Electrometallurgical Ferroalloy Product Manufacturing
331210	Iron and Steel Pipe and Tube Manufacturing
331221	Rolled Steel Shape Manufacturing
331222	Steel Wire Drawing
331311	Alumina Refining
331312	Primary Aluminum Production
331314	Secondary Smelting and Alloying of Aluminum
331315	Aluminum Sheet, Plate, and Foil Manufacturing
331316	Aluminum Extruded Product Manufacturing
331319	Other Aluminum Rolling and Drawing
331411	Primary Smelting and Refining of Copper
331419	Primary Smelting and Refining of Nonferrous Metal (Except Copper and Aluminum)
331421	Copper Rolling, Drawing, and Extruding
331422	Copper Wire (except Mechanical) Drawing
331423	Secondary Smelting, Refining, and Alloying of Copper
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing and Extruding
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metals (Except Copper and Aluminum)
331511	Iron Foundries

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
331512	Steel Investment Foundries
331513	Steel Foundries (except Investment)
331521	Aluminum Die-Casting Foundries
331522	Nonferrous (except Aluminum) Die-Casting Foundries
331524	Aluminum Foundries (except Die-Casting)
331525	Copper Foundries (except Die-Casting)
331528	Other Nonferrous Foundries (except Die-Casting)
332111	Iron and Steel Forging
332112	Nonferrous Forging
332114	Custom Roll Forming
332115	Crown and Closure Manufacturing
332116	Metal Stamping
332117	Powder Metallurgy Part Manufacturing
332211	Cutlery and Flatware (except Precious) Manufacturing
332212	Hand and Edge Tool Manufacturing
332213	Saw Blade and Handsaw Manufacturing
332214	Kitchen Utensil, Pot, and Pan Manufacturing
332311	Prefabricated Metal Building and Component Manufacturing
332312	Fabricated Structural Metal Manufacturing
332313	Plate Work Manufacturing
332321	Metal Window and Door Manufacturing
332322	Sheet Metal Work Manufacturing
332323	Ornamental and Architectural Metal Work Manufacturing
332410	Power Boiler and Heat Exchanger Manufacturing
332420	Metal Tank (Heavy Gauge) Manufacturing
332431	Metal Can Manufacturing
332439	Other Metal Container Manufacturing
332510	Hardware Manufacturing
332611	Spring (Heavy Gauge) Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
332612	Spring (Light Gauge) Manufacturing
332618	Other Fabricated Wire Product Manufacturing
332710	Machine Shops
332721	Precision Turned Product Manufacturing
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing
332811	Metal Heat Treating
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers
332813	Electroplating, Plating, Polishing, Anodizing and Coloring
332911	Industrial Valve Manufacturing
332912	Fluid Power Valve and Hose Fitting Manufacturing
332913	Plumbing Fixture Fitting and Trim Manufacturing
332919	Other Metal Valve and Pipe Fitting Manufacturing
332991	Ball and Roller Bearing Manufacturing
332992	Small Arms Ammunition Manufacturing
332993	Ammunition (except Small Arms) Manufacturing
332994	Small Arms Manufacturing
332995	Other Ordnance and Accessories Manufacturing
332996	Fabricated Pipe and Pipe Fitting Manufacturing
332997	Industrial Pattern Manufacturing
332998	Enameled Iron and Metal Sanitary Ware Manufacturing
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing
333111	Farm Machinery and Equipment Manufacturing
333112	Lawn and Garden Tractor and Home Lawn and
333120	Construction Machinery Manufacturing
333131	Mining Machinery and Equipment Manufacturing
333132	Oil and Gas Field Machinery and Equipment
333210	Sawmill and Woodworking Machinery Manufacturing
333220	Plastics and Rubber Industry Machinery Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
333291	Paper Industry Machinery Manufacturing
333292	Textile Machinery Manufacturing
333293	Printing Machinery and Equipment Manufacturing
333294	Food Product Machinery Manufacturing
333295	Semiconductor Machinery Manufacturing
333298	All Other Industrial Machinery Manufacturing
333311	Automatic Vending Machine Manufacturing
333312	Commercial Laundry, Drycleaning, and Pressing Machine Manufacturing
333313	Office Machinery Manufacturing
333314	Optical Instrument and Lens Manufacturing
333315	Photographic and Photocopying Equipment Manufacturing
333319	Other Commercial and Service Industry Machine Manufacturing
333411	Air Purification Equipment Manufacturing
333412	Industrial and Commercial Fan and Blower Manufacturing
333414	Heating Equipment (except Warm Air Furnace) Manufacturing
333415	Air-Conditioning and Warm Air Heating Equipment Manufacturing
333511	Industrial Mold Manufacturing
333512	Machine Tool (Metal Cutting Types) Manufacturing
333513	Machine Tool (Metal Forming Types) Manufacturing
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing
333515	Cutting Tool and Machine Tool Accessory Manufacturing
333516	Rolling Mill Machinery and Equipment Manufacturing
333518	Other Metalworking Machinery Manufacturing
333611	Turbine and Turbine Generator Set Units Manufacturing
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing
333613	Mechanical Power Transmission Equipment Manufacturing
333618	Other Engine Equipment Manufacturing
333911	Pump and Pumping Equipment Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
333912	Air and Gas Compressor Manufacturing
333913	Measuring and Dispensing Pump Manufacturing
333921	Elevator and Moving Stairway Manufacturing
333922	Conveyor and Conveying Equipment Manufacturing
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing
333991	Power-Driven Hand Tool Manufacturing
333992	Welding and Soldering Equipment Manufacturing
333993	Packaging Machinery Manufacturing
333994	Industrial Process Furnace and Oven Manufacturing
333995	Fluid Power Cylinder and Actuator Manufacturing
333996	Fluid Power Pump and Motor Manufacturing
333997	Scale and Balance (except Laboratory) Manufacturing
333999	All Other Miscellaneous General Purpose Manufacturing
334111	Electronic Computer Manufacturing
334112	Computer Storage Device Manufacturing
334113	Computer Terminal Manufacturing
334119	Other Computer Peripheral Equipment Manufacturing
334210	Telephone Apparatus Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334290	Other Communications Equipment Manufacturing
334310	Audio and Video Equipment Manufacturing
334411	Electron Tube Manufacturing
334412	Bare Printed Circuit Board Manufacturing
334413	Semiconductor and Related Device Manufacturing
334414	Electronic Capacitor Manufacturing
334415	Electronic Resistor Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
334416	Electronic Coil, Transformer, and Other Inductor Manufacturing
334417	Electronic Connector Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
334419	Other Electronic Component Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
334512	Automatic Environmental Control Manufacturing
334513	Instruments and Related Products Manufacturing
334514	Totalizing Fluid Meter and Counting Device Manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
334518	Watch, Clock, and Part Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
334612	Prerecorded Compact Disc (except Software) Manufacturing
334613	Magnetic and Optical Recording Media Manufacturing
335110	Electric Lamp Bulb and Part Manufacturing
335121	Residential Electric Lighting Fixture Manufacturing
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing
335129	Other Lighting Equipment Manufacturing
335211	Electric Housewares and Household Fan Manufacturing
335212	Household Vacuum Cleaner Manufacturing
335221	Household Cooking Appliance Manufacturing
335222	Household Refrigerator and Home Freezer Manufacturing
335224	Household Laundry Equipment Manufacturing
335228	Other Major Household Appliance Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
335312	Motor and Generator Manufacturing
335313	Switchgear and Switchboard Apparatus Manufacturing
335314	Relay and Industrial Control Manufacturing
335911	Storage Battery Manufacturing
335912	Primary Battery Manufacturing
335921	Fiber Optic Cable Manufacturing
335929	Other Communication and Energy Wire Manufacturing
335931	Current-Carrying Wiring Device Manufacturing
335932	Noncurrent-Carrying Wiring Device Manufacturing
335991	Carbon and Graphite Product Manufacturing
335999	All Other Miscellaneous Electrical Equipment Manufacturing
336111	Automobile Manufacturing
336112	Light Truck and Utility Vehicle Manufacturing
336120	Heavy Duty Truck Manufacturing
336211	Motor Vehicle Body Manufacturing
336212	Truck Trailer Manufacturing
336213	Motor Home Manufacturing
336214	Travel Trailer and Camper Manufacturing
336311	Carburetor, Piston, Piston Ring, and Valve Manufacturing
336312	Gasoline Engine and Engine Parts Manufacturing
336321	Vehicular Lighting Equipment Manufacturing
336322	Other Motor Vehicle Electrical and Electronic Equipment Manufacturing
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
336340	Motor Vehicle Brake System Manufacturing
336350	Motor Vehicle Transmission and Power Train Manufacturing
336360	Motor Vehicle Seating and Interior Trim Manufacturing
336370	Motor Vehicle Metal Stamping

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
336391	Motor Vehicle Air-Conditioning Manufacturing
336399	All Other Motor Vehicle Parts Manufacturing
336411	Aircraft Manufacturing
336412	Aircraft Engine and Engine Parts Manufacturing
336413	Other Aircraft Part and Auxiliary Equipment Manufacturing
336414	Guided Missile and Space Vehicle Manufacturing
336415	Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing
336510	Railroad Rolling Stock Manufacturing
336611	Ship Building and Repairing
336612	Boat Building
336991	Motorcycle, Bicycle, and Parts Manufacturing
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing
336999	All Other Transportation Equipment Manufacturing
337110	Wood Kitchen Cabinet and Countertop Manufacturing
337121	Upholstered Household Furniture Manufacturing
337122	Nonupholstered Wood Household Furniture Manufacturing
337124	Metal Household Furniture Manufacturing
337125	Household Furniture (except Wood and Metal) Manufacturing
337127	Institutional Furniture Manufacturing
337129	Wood Television, Radio, and Sewing Machine Manufacturing
337211	Wood Office Furniture Manufacturing
337212	Custom Architectural Woodwork and Millwork Manufacturing
337214	Office Furniture (except Wood) Manufacturing
337215	Showcase, Partition, Shelving, and Locker Manufacturing
337910	Mattress Manufacturing
337920	Blind and Shade Manufacturing

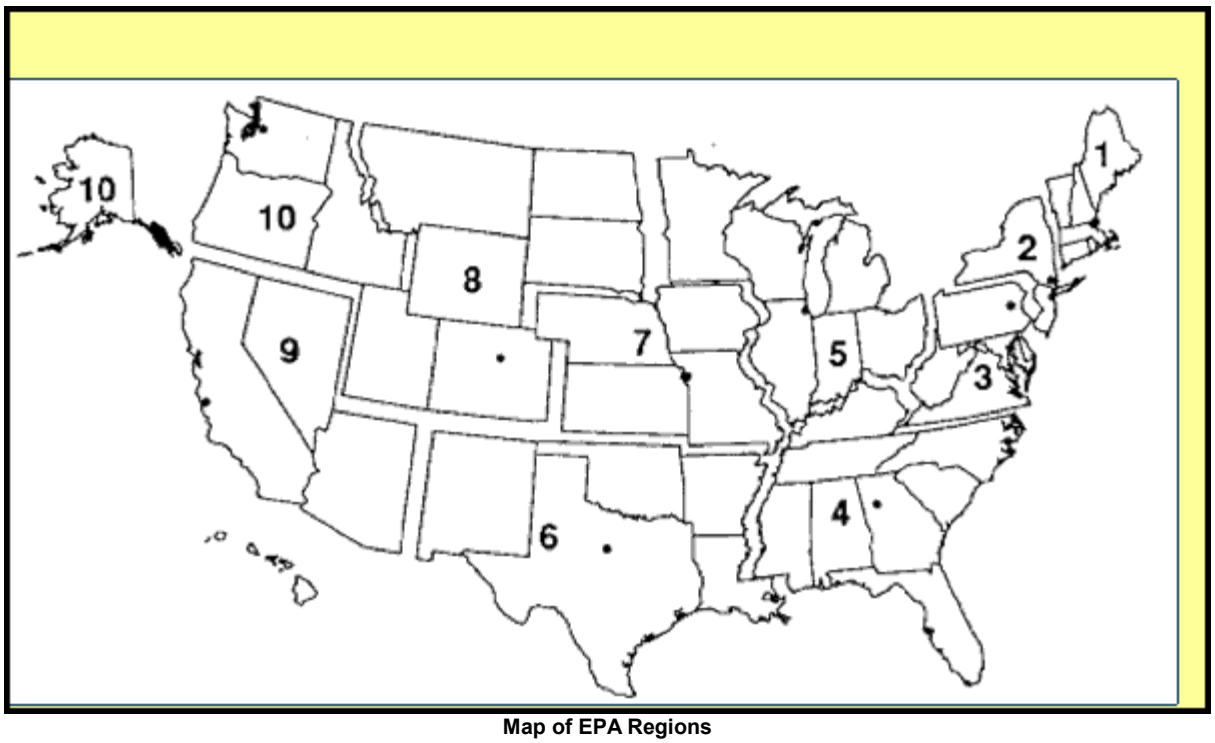
NAICS Codes for TRI Facilities	
NAICS Code	**Description**
339111	Laboratory Apparatus and Furniture Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339113	Surgical and Appliance and Supplies Manufacturing
339114	Dental Equipment and Supplies Manufacturing
339115	Ophthalmic Goods Manufacturing
339911	Jewelry (except Costume) Manufacturing
339912	Silverware and Holloware Manufacturing
339913	Jewelers' Material and Lapidary Work Manufacturing
339914	Costume Jewelry and Novelty Manufacturing
339920	Sporting and Athletic Goods Manufacturing
339931	Doll and Stuffed Toy Manufacturing
339932	Game, Toy, and Children's Vehicle Manufacturing
339941	Pen and Mechanical Pencil Manufacturing
339942	Lead Pencil and Art Good Manufacturing
339943	Marking Device Manufacturing
339944	Carbon Paper and Inked Ribbon Manufacturing
339950	Sign Manufacturing
339991	Gasket, Packing, and Sealing Device Manufacturing
339992	Musical Instrument Manufacturing
339993	Fastener, Button, Needle, and Pin Manufacturing
339994	Broom, Brush, and Mop Manufacturing
339995	Burial Casket Manufacturing
339999	All Other Miscellaneous Manufacturing
424690	Other Chemical and Allied Products Merchant Wholesalers
424710	Petroleum Bulk Stations and Terminals
425110	Business to Business Electronic Markets
425120	Wholesale Trade Agents and Brokers
454311	Heating Oil Dealers

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
454312	Liquefied Petroleum Gas (Bottled Gas) Deal
488390	Other Support Activities for Water Transportation
488490	Other Support Activities for Road Transportation
491110	Postal Service
511110	Newspaper Publishers
511120	Periodical Publishers
511130	Book Publishers
511140	Directory and Mailing List Publishers
511191	Greeting Card Publishers
511199	All Other Publishers
512220	Integrated Record Production/Distribution
512230	Music Publishers
512240	Sound Recording Studios
512290	Other Sound Recording Industries
516110	Internet Publishing and Broadcasting
518210	Data Processing, Hosting, and Related Services
519190	All Other Information Services
522320	Financial Transactions Processing, Reserve, and Clearinghouse Activities
541199	All Other Legal Services
541340	Drafting Services
541350	Building Inspection Services
541370	Surveying and Mapping (except Geophysical)
541410	Interior Design Services
541420	Industrial Design Services
541490	Other Specialized Design Services
541710	Research and Development in the Physical, Engineering, and Life Sciences
541870	Advertising Material Distribution Services

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
541890	Other Services Related to Advertising
541930	Translation and Interpretation Services
541990	All Other Professional, Scientific, and Technical Services
561410	Document Preparation Services
561421	Telephone Answering Services
561422	Telemarketing Bureaus
561431	Private Mail Centers
561439	Other Business Service Centers (including Copy Shops)
561440	Collection Agencies
561491	Repossession Services
561499	All Other Business Support Services
561591	Convention and Visitors Bureaus
561599	All Other Travel Arrangement and Reservation Services
561790	Other Services to Buildings and Dwellings
561910	Packaging and Labeling Services
561920	Convention and Trade Show Organizers
561990	All Other Support Services
562211	Hazardous Waste Treatment and Disposal
562212	Solid Waste Landfill
562213	Solid Waste Combustors and Incinerators
562219	Other Nonhazardous Waste Treatment and Disposal
562920	Materials Recovery Facilities
711310	Promoters of Performing Arts, Sports, and Similar Events with Facilities
711320	Promoters of Performing Arts, Sports, and Similar Events with Facilities
711410	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures
811490	Other Personal and Household Goods Repair
812320	Drycleaning and Laundry Services (except Coin-Operated)

NAICS Codes for TRI Facilities	
NAICS Code	**Description**
812990	All Other Personal Services

EPA Regions



Map of EPA Regions

Region 1	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
Region 2	New Jersey, New York and the territories of Puerto Rico and the U.S. Virgin Islands.
Region 3	Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia.
Region 4	Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.
Region 5	Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.
Region 6	Arkansas, Louisiana, New Mexico, Oklahoma, and Texas.
Region 7	Iowa, Kansas, Missouri, and Nebraska.

Region 8	Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.
Region 9	Arizona, California, Hawaii, Nevada, and the territories of Guam, Northern Mariania Islands, and American Samoa.
Region 10	Alaska, Idaho, Oregon, and Washington.

Media Information

The following table presents the environmental media release codes and descriptions of the associated releases. It also lists which codes can be grouped together to represent categories of reporting as identified in the 2007 Public Data Release. (Note that occasionally facilities report releases to media codes that are not listed in the current TRI Form R or in any previous forms. These releases cannot be modeled, but are reported in pounds-based results.)

Media Information

Release Code	Description of Release	2007 Public Data Release Category in Which Release is Located
1*	Fugitive Air	Fugitive or Nonpoint Air Emissions
2*	Stack Air	Stack or Point Air Emissions
3*	Direct Water	Discharges to Receiving Streams or Water Bodies
6*,**	POTW Transfer	Discharges to Publicly-Owned Treatment Works (POTWs)
400	Underground Injection (All Well Classes); this code is used for data reported from 1988 to 1995	Not Applicable
401	Underground Injection (Class 1); this code is used for data reported in 1996 and later years	Underground Injection on-site to Class I Wells
402	Underground Injection (Class 2); this code is used for data reported in 1996 and later years	Underground Injection on-site to Class II-V Wells
510	Onsite Landfill; this code is used for data reported from 1988 to 1995	Not Applicable
520	Land Treatment/Application/ Farming	Disposal to Land On-site
530	Surface Impoundment	Disposal to Land On-site
540	Other Land Disposal	Disposal to Land On-site

Media Information		
Release Code	**Description of Release**	**2007 Public Data Release Category in Which Release is Located**
560	Other Landfills; this code is used for data reported in 1996 and later years	Disposal to Land On-site
590	RCRA Subtitle C Landfills; this code is used for data reported in 1996 and later years	Disposal to Land On-site
710	Offsite Storage Only	Transfers to Disposal
720	Offsite Recycling (Solvents/ Organics Recovery)	Transfers to Recycling
724	Offsite Recycling (Metals Recovery)	Transfers to Recycling
726	Offsite Recycling (Other Reuse or Recovery)	Transfers to Recycling
728	Offsite Recycling (Acid Regeneration)	Transfers to Recycling
740	Offsite Treatment (Solidification/ Stabilization)	Transfers to Treatment
741	Solidification/Stabilization- metals and metal compounds only	Transfers to Disposal
750*	Offsite Incineration/Thermal Treatment	Transfers to Treatment
754*	Offsite Incineration (No fuel value)	Transfers to Treatment
756	Offsite Energy Recovery	Transfers to Energy Recovery
761	Offsite Wastewater Treatment (Excluding POTW)	Transfers to Treatment
762	Wastewater Treatment (Excluding POTW) - metals and metal compounds only	Transfers to Disposal
763	Surface Impoundment	Transfers to Disposal
764	Other Landfills	Transfers to Disposal
765	RCRA Subtitle C Landfills	Transfers to Disposal
769	Offsite Other Waste Treatment	Transfers to Treatment
771	Offsite Underground Injection	Transfers to Disposal
772***	Offsite Landfill/Surface Impoundment	Transfers to Disposal

Media Information		
Release Code	**Description of Release**	**2007 Public Data Release Category in Which Release is Located**
773	Offsite Land Treatment	Transfers to Disposal
779	Offsite Other Land Disposal	Transfers to Disposal
790	Offsite Other Management	Transfers to Disposal
791	Transfers to Waste Broker; this code is used for data reported from 1988 to 1990	Not Applicable
792	Offsite Transfer to Broker (Energy Recovery)	Transfers to Energy Recovery
793	Offsite Transfer to Broker (Recycling)	Transfers to Recycling
794	Offsite Transfer to Broker (Disposal)	Transfers to Disposal
795	Offsite Transfer to Broker (Waste Treatment)	Transfers to Treatment
799	Offsite (Unknown Treatment/ Disposal)	Transfers to Disposal
* Indicates that full risk modeling is conducted for these release codes. ** Beginning with the 1991 reporting year, releases to POTWs are coded as 8 in Form R. To allow comparisons with earlier years, however, these releases are still coded as 6 in the RSEI Model. *** This code was discontinued in RY 2002 and replaced by codes 763, 764, and 765; however, it is still included in the model for historical reporting.		

Score Category Information

The following table presents the score category codes which describe details related to the media releases, and whether the release can be modeled using environmental fate and transport models.

Score Category Information		
Score Category	**Description**	**If Category is a release, can it be modeled using the environmental fate and transport models?**
0	Unknown Error	No
1	Direct Fugitive Air - Rural	Yes
2	Direct Fugitive Air - Urban	Yes

Score Category Information		
Score Category	**Description**	**If Category is a release, can it be modeled using the environmental fate and transport models?**
3	Direct Point Air - Rural	Yes
4	Direct Point Air - Urban	Yes
5	Direct Water	Yes
6	Onsite Landfill	No
7	POTW Effluent	Yes
8	POTW Volatilization - Rural	Yes
9	POTW Volatilization - Urban	Yes
10	POTW Sludge Landfill	No
11	POTW Sludge Volat - Rural	Yes
12	POTW Sludge Volatilization - Urban	Yes
13	Offsite Incineration - Rural	Yes
14	Offsite Incineration - Urban	Yes
15	Offsite Landfill	No
16	Offsite Volatilization - Rural	No
17	Offsite Volatilization - Urban	No
18	Offsite treatment other	No
19	Cannot place Lat/Long	No
20	Cannot locate facility stream	No
21	Cannot locate POTW stream	No
22	No/Unmodeled treatment code	No
23	Error in CAS Number	No
24	No Toxicity Data	No
25	No POTW Removal Data	No
28	Reach data is suspect	No
29	Unable to find WBAN	No
30	No Incinerator Efficiency Data	No

Score Category Information		
Score Category	**Description**	**If Category is a release, can it be modeled using the environmental fate and transport models?**
31	Internal Error	No
32	Missing Physical-Chemical Data	No
33	Unmodeled - Underground Injection	No
34	Unmodeled - PRD	No
35	Unmodeled - RCRA C Landfill	No
37	POTW Biodegradation	Yes
38	Offsite Incineration Destroyed	Yes
55	Direct Water-Fish Ing. (Rec)	Yes
57	POTW Effluent-Fish Ing. (Rec)	Yes
105	Direct Water-Fish Ing. (Sub)	Yes
107	POTW Effluent-Fish Ing. (Sub)	Yes
205	Direct Water (alt intake)	Yes
207	POTW Effluent (alt intake)	Yes

On-site Chemical Information

The following tables present the maximum on-site and chemical use codes.

Activities and Uses of a Chemical at a Facility	
Category	**Code**
Manufacture (produce or import for on-site use/ processing, for sale/distribution, as a byproduct, or as an impurity)	M
Process (as a reactant, as a formulation component, as an article component, or repackaging)	P
Otherwise Use (as a chemical processing aid, as a manufacturing aid, or for ancillary or other use)	OU
Manufacture and Process	M/P
Manufacture and Otherwise Use	M/OU
Process and Otherwise Use	P/OU

Activities and Uses of a Chemical at a Facility	
Category	**Code**
Manufacture, Process, and Otherwise Use	M/P/OU

Maximum Amount of a Chemical On-site at Any Time During the Calendar Year	
Range	**Code**
0 to 99 lbs	01
100 to 999 lbs	02
1,000 to 9,999 lbs	03
10,000 to 99,999 lbs	04
100,000 to 999,999 lbs	05
1,000,000 to 9,999,999 lbs	06
10,000,000 to 49,999,999 lbs	07
50,000,000 to 99,999,999 lbs	08
100,000,000 to 499,999,999 lbs	09
500,000,000 to 999,999,999 lbs	10
1,000,000,000 lbs or more	11

FIPS Codes

The following table presents presents the FIPS code for each state.

State Federal Information Processing Standard (FIPS) Codes		
Abbreviation	**FIPS**	**State Name**
AK	02	Alaska
AL	01	Alabama
AR	05	Arkansas
AS	60	American Samoa
AZ	04	Arizona
CA	06	California
CO	08	Colorado

State Federal Information Processing Standard (FIPS) Codes		
Abbreviation	**FIPS**	**State Name**
CT	09	Connecticut
DC	11	District of Columbia
DE	10	Delaware
FL	12	Florida
GA	13	Georgia
GU	66	Guam
HI	15	Hawaii
IA	19	Iowa
ID	16	Idaho
IL	17	Illinois
IN	18	Indiana
KS	20	Kansas
KY	21	Kentucky
LA	22	Louisiana
MA	25	Massachusetts
MD	24	Maryland
ME	23	Maine
MI	26	Michigan
MN	27	Minnesota
MO	29	Missouri
MS	28	Mississippi
MT	30	Montana
NC	37	North Carolina
ND	38	North Dakota
NE	31	Nebraska
NH	33	New Hampshire
NJ	34	New Jersey
NM	35	New Mexico

State Federal Information Processing Standard (FIPS) Codes		
Abbreviation	**FIPS**	**State Name**
NV	32	Nevada
NY	36	New York
OH	39	Ohio
OK	40	Oklahoma
OR	41	Oregon
PA	42	Pennsylvania
PR	72	Puerto Rico
RI	44	Rhode Island
SC	45	South Carolina
SD	46	South Dakota
TN	47	Tennessee
TX	48	Texas
UT	49	Utah
VA	51	Virginia
VI	78	Virgin Islands
VT	50	Vermont
WA	53	Washington
WI	55	Wisconsin
WV	54	West Virginia
WY	56	Wyoming

CHAPTER 11
Glossary of Commonly Used Terms

core chemicals
Those chemicals and chemical categories which have been on the TRI List since 1987 and for which there have been no changes in reporting requirements. In RSEI Version 2.3.0, core chemicals are not differentiated from mini-core chemicals, as this version does not contain TRI reporting data for years prior to 1996.

chronic human health
The RSEI model addresses both chronic effects and chronic exposures related to human health. Chronic effects are those that generally persist over a long period of time whether or not they occur immediately after exposure or are delayed. Chronic exposure refers to multiple exposures occurring over an extended period of time, or a significant fraction of an individual's lifetime.

EPCRA
The Emergency Planning and Community Right-to-Know Act of 1986, which is the third part of the Superfund Amendments and Reauthorization Act of 1986, also known as SARA Title III.

exposure modeling
RSEI's risk-related results include a calculated surrogate dose, which is estimated through exposure modeling. Exposure modeling is a way to track a chemical's fate and transport through the environment, until it comes to a point of contact with an exposed person. Exposure modeling includes using standard assumptions about human exposure to contaminants, such as the drinking water, fish ingestion, or air inhalation rate.

exposure pathway
The exposure pathway is the physical course that a chemical takes from its emission by the facility to the exposed individual and is related to the type of release. RSEI models fugitive and stack air releases and fish ingestion and drinking water intake from releases to surface water.

exposed population
The exposed population is the population that is likely to come in contact with a chemical. The population differs depending on the exposure pathway modeled. For instance, the population exposed to chemicals released to air is the population in a circle with radius of 49 km surrounding the facility.

flag
A True/False field in the RSEI databases used to designate chemicals or facilities included in various EPA programs or with certain other characteristics.

Form R
EPA's Toxics Release Inventory (TRI) collects information on chemical releases and transfers from reporting facilities every year. The form these facilities fill out is called Form R. Facilities may also fill out a certification statement, called Form A, which certifies that the facility's use of a specific toxic chemical does not meet the minimum threshold requirement, and so is not subject to Form R reporting.

full trend
A set of RSEI results for TRI Reporting Years 1988-2002. In order for the results to be meaningful, the results only include core chemicals and original industries.

geocoding
Geocoding is the process of assigning latitude and longitude to a point, based on street addresses, city, state and zip code. RSEI uses geocoded data for both on-site and off-site facilities to better locate the facilities on the model grid. Geocoding services are provided by Thomas Computing Services (TCS), using Matchmaker software.

grid cell
An 810m by 810m square defined by the (X,Y) coordinates of its center point. The set of grid cells (the grid system) describes the U.S. and its territories and provides the geographical basis of the RSEI model.

hazard-based
RSEI produces three main types of results: pounds-based, hazard-based, and risk-related. Hazard-based results can be calculated for any set of chemical releases and transfers included in the model, and consist of the pounds released multiplied by the chemical's toxicity weight. Hazard-based results do not include any exposure modeling or population estimates.

health endpoints
An effect of exposure to a toxic chemical, such as carcinogenicity or reproductive toxicity.

indicator element
The building block of the RSEI model. A unique combination of facility, chemical release, year, release pathway, and exposure pathway. Each Indicator Element has a set of results associated with it. If the element cannot be modeled, then the score is zero; if there is no toxicity weight available, then the hazard-based results are also zero.

inhalation unit risk
The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of μg/m3 in air.

MCL
Maximum Contaminant Level, the highest concentration allowed by the federal government in drinking water. MCLs are set using the best available treatment technology and taking cost into consideration.

media
Path through which a chemical is released into the environment, such as direct water, POTW transfer, fugitive air, etc. See Media Information for a full list of the media included in the RSEI model.

mini core
Those chemicals and chemical categories which have been on the TRI List since 1995 and for which there have been no changes in reporting requirements. In RSEI Version 2.3.0, core chemicals are not differentiated from mini-core chemicals, as this version does not contain TRI reporting data for years prior to 1996.

mini trend
A set of RSEI results for TRI reporting years 1995-2002. In order for the results to be meaningful, the results only include mini core chemicals and original industries.

modeled media
The media for which full risk-related modeling is conducted in the RSEI model. These media include the following: 1-Fugitive Air, 2-Stack Air, 3-Direct Water, 6-POTW Transfer, 750-Offsite Incineration/Thermal Treatment, and 754-Offsite Incineration (No fuel value).

modeled hazard
The number of modeled pounds multiplied by the toxicity weight for the appropriate exposure pathway (e.g. inhalation toxicity weight for an air release).

modeled pounds
Pounds reported by the facility that are modeled and accounted for in the risk score. Reasons that pounds may not be modeled include gaps in toxicity data, data needed for exposure modeling, data for the releasing facility, or other data necessary for modeling.

NAICS codes
North American Industry Classification System codes (NAICS) are used by business and government to classify facilities that use the same production processes. NAICS codes are designed to replace SIC codes, and TRI first required facilities to report NAICS codes instead of SIC codes in RY 2006. See NAICS codes for a list of codes and descriptions.

normalization
In the RSEI model, it is possible to express the results normalized to 1988, the first year of data collected by TRI. Reported TRI pounds cannot be normalized.

off-site
Off-site facilities (or receiving facilities) receive transfers of chemicals from TRI on-site (or reporting) facilities. Types of off-site facilities include waste brokers, publicly-owned treatment works (POTWs), recycling facilities, landfills, and hazardous waste facilities. Transfers to off-site facilities are reported by the on-site facility transferring them.

on-site
On-site facilities (also called reporting facilities) report directly to TRI, and include

manufacturing facilities, metal and coal mines, electric utilities, chemical waste facilities, chemical wholesalers, and petroleum bulk stations and terminals. Almost 50,000 on-site facilities have reported to TRI since reporting was required in 1988.

oral slope factor

The Oral Slope Factor represents the upper-bound (approximating a 95% confidence limit) estimate of the slope of the dose-response curve in the low-dose region for carcinogens. The units of the slope factor are usually expressed as (mg/kg-day) -1.

original industries

Those industries which were required to report to TRI beginning in Reporting Year 1988, SIC codes 20 through 39.

POTW

Publicly-owned treatment works (POTWs) are public wastewater treatment facilities that receive wastewater, usually through a pipe system, from facilities using toxic chemicals. Because of the unique treatment system, POTWs are modeled separately from other off-site facilities.

pounds-based

RSEI produces three main types of results: pounds-based, hazard-based, and risk-related. Pounds-based results are simply the amount of pounds released or transferred by TRI facilities.

reach

A reach is an unbranched linear segment of a water body with fairly constant hydrological characteristics. A reach can be part of a stream, creek, river, pond, or lake.

RfC

The Reference Concentration is an estimate (with uncertainty spanning perhaps an order of magnitude) of continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious noncancer effects during a lifetime.

RfD

The Reference Dose is an estimate (with uncertainty spanning perhaps an order of magnitude) of daily exposure [RfD] to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious noncancer effects during a lifetime.

risk-related

RSEI produces three main types of results: pounds-based, hazard-based, and risk-related. Risk-related results combine surrogate dose with toxicity weight and population estimate, producing a unitless value proportional to risk-related impact. Risk-related results (or scores) are not independently meaningful and should only be used comparatively in relation to other model results.

RY

The Reporting Year corresponds to the calendar year (January 1 to December 31) for which

facilities report release and other waste management activities in their Form Rs.

score

A score is the numerical value in RSEI's risk-related results, combining surrogate dose, toxicity, and population estimates. Scores are not independently meaningful and should only be used comparatively in relation to other model results.

selection statement

A selection statement is used to select releases to analyze, in the **Select Elements...** screen. It consists of at least one bracket statement and one condition statement.

SIC codes

Standard Industrial Classification codes classify a business or facility according to its primary kind of activity, such as chemical manufacturing or electricity generation. Two-digit codes are the most general, four-digit codes are the most specific (although some unofficial sources use codes up to eight digits); RSEI uses two-digit and four-digit codes.

stream path

The course taken by a chemical release from its release point (an effluent pipe from a facility or POTW) to the point where it is no longer modeled (up to 300 km).

surrogate dose

A surrogate dose is specific to a combination of facility, chemical release, media, release pathway and exposure pathway. It is calculated in several steps. First, exposure and release pathway-specific chemical release volumes are combined with physicochemical properties and site-specific characteristics in models to estimate an ambient concentration in the environmental medium of concern. The ambient media concentration is then combined with standard human exposure assumptions (for adults and children) to estimate the magnitude of the dose.

toxicity weight

This weight is a proportional numerical weight applied to a chemical based on its toxicity. The toxicity of a chemical is assessed using EPA-established standard methodologies. For each exposure route, chemicals are weighted based on their single, most sensitive adverse chronic human health effect (cancer or the most sensitive noncancer effect). In the absence of data, the toxicity weight for one pathway is adopted for the other pathway. The range of toxicity weights is approximately 0.02 to 500,000,000.

trend

Any set of RSEI results across two or more years. In the RSEI model, users can use the chemical flags (Core, Mini Core, and 1998 Core) to select the appropriate chemicals for the full trend (1998 through 2007), the mini trend (1995 through 2002) or the trend for 1998 through 2002. The chemical flags automatically exclude reports for chemicals for which reporting requirements have changed over the relevant time period. Because RSEI Version 2.3.0 includes TRI data for 1996-2007 only, the Core flag (full trend) produces the same results as the Mini Core (mini trend).

TRI

The Toxics Release Inventory is a publicly-available EPA database that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups and federal facilities. The RSEI model uses annually updated TRI data.

WOE

Weight of evidence category. Based on the quality and adequacy of data on carcinogenicity, EPA places a chemical in one of the following five weight of evidence categories, as specified in 51 FR 33996:

A		Carcinogenic to humans
B		Probable carcinogen
	•B1	Indicates limited human evidence
	•B2	Indicates sufficient evidence in animals and inadequate or no evidence in humans
C		Possible carcinogen
D		Not classifiable
E		Evidence of non-carcinogenicity

CHAPTER 12
References

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RSEI Technical Appendices
(Available on RSEI Installation Disk and at www.epa.gov/oppt/rsei):

Technical Appendix A. Listing of All Toxicity Weights for TRI Chemicals and Chemical Categories.

Technical Appendix B. Physicochemical Properties for TRI Chemicals and Chemical Categories.

Technical Appendix C. Derivation of Model Exposure Parameters.

Technical Appendix D. Locational Data for TRI Reporting Facilities and Off-site Facilities.

Technical Appendix E. Derivation of Stack Parameter Data.

Technical Appendix F. Summary of Differences Between RSEI Data and the TRI Public Data Release.