



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

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SUBJECT: Technical Release of EPA's Risk-Screening Environmental Indicators (RSEI) -
Version 2.1

Dear RSEI User:

EPA is pleased to send you the newest version of the Risk-Screening Environmental Indicators (RSEI) Version 2.1. The Office of Pollution Prevention and Toxics (OPPT) has acted upon comments received from the first and second beta tests of the revised RSEI Chronic Human Health Model, and is providing RSEI Version 2.1 to you as part of its technical user audience. RSEI Version 2.1 contains the 13 years of Toxics Release Inventory (TRI) reporting data from 1988 through 2000, but it *does not* contain the 2001 TRI reporting data.

RSEI Version 2.1 contains many improvements over Version 1.02, which has been available since 1999. Attached to this letter are: a description of new features available in RSEI Version 2.1 (Attachment 1), an introduction to the new model for previous users that discusses operational differences between Versions 1.02 and 2.1 (Attachment 2), and instructions for installing the software program on the hard drive of your computer (Attachment 3).

RSEI is a screening-level tool for evaluating releases of toxic chemicals to the environment and their potential risk-related impact on chronic human health. The model considers the pounds of chemicals released, their relative toxicity, the degree to which people are potentially exposed to these chemicals, and the estimated size of the exposed general population. The risk-related scores that it calculates can serve a variety of comparative purposes, including the examination of trends for measuring change, the ranking and prioritization of chemicals and industry sectors for strategic planning, the conduct of risk-related targeting, the support of community-based environmental protection projects, and the investigation of environmental justice issues.

RSEI Version 2.1 provides a risk-related perspective for air and water releases (including those from certain off-site transfers), as well as providing other valuable perspectives for all release pathways and other waste management activities at industrial facilities, such as pounds of release and pounds of release weighted by toxicity (for a hazard-based perspective). Results can be viewed at many levels of aggregation, including: national, EPA Regional, state, county, city and zip code. U.S. population data (including subpopulations by age and gender) and yearly demographic changes in population density are reflected in the model; appropriate exposure factors are applied to relevant subpopulations. A user-friendly *Easy RSEI* interface allows you to

quickly display graphs or tables of information related to many of your questions, and the *RSEI Welcome Screen* provides tutorials to teach you how to use the *Advanced RSEI* model (which employs GIS mapping of facilities and releases). Users unfamiliar with this updated version of RSEI are strongly encouraged to work through the three tutorials (these are also found in the User's Manual).

If you have any problems with loading the model, using it or interpreting RSEI results, please contact one of the OPPT RSEI team members listed below. The installation CD-ROM includes the RSEI 2.1 model with the *Easy RSEI* and *Advanced RSEI* interfaces, RSEI data bases, the User's Manual, and other supporting information. Help screens are available in the model itself. We thank you for your previous support of our development efforts and hope you find the revised RSEI model meets your needs and expectations.

Sincerely,

OPPT's RSEI Project Team

Attachments:

Attachment 1 - New Features in RSEI Version 2.1

Attachment 2 - A Discussion for Previous Users of Operational Differences Between RSEI Versions 1.02 and 2.1

Attachment 3 - Installation Instructions for RSEI Version 2.1 CD-ROM

RSEI Version 2.1 CD-ROM Installation Disk (under separate cover)

RSEI Version 2.1 FACT Sheet (under separate cover)

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Attachment 1

EPA's Risk-Screening Environmental Indicators

New Features in RSEI Version 2.1

New or improved features have been added to the Risk-Screening Environmental Indicators (RSEI) Chronic Human Health model since the release of Version 1.02 in 1999. These improvements have been based upon recommendations from users, collaborators and/or modeling development partners. Some of the major changes are the addition of a user-friendly interface for the model called "*Easy RSEI*," incorporation of additional years of TRI reporting data (now 1988-2000; but not the recently released 2001 data), modeling of the water medium in addition to the air medium, correction of locational data for on-site and off-site facilities, and use of 1990 and 2000 block-level population data from the U.S. Census. The following listing describes these and other features in greater detail:

Operating System and Display

- 32-bit operating system (Windows 95/98/2000/XP/NT4)
[RSEI will not function using the Windows 3.1 or earlier operating systems.]
- GIS display (scalable mapping of on- and off-site facilities, major roads, significant waterways, tribal lands, etc.)
- new *Easy RSEI* interface quickly displays graphs and tables (based on user questions) regarding ranked model results and trends for on-site releases at several geographic scales

Exposure Modeling

- geographic area for air modeling increased from 10 km (in Version 1.02) to 50 km in each cardinal direction of the compass from facilities to accommodate the tall stacks associated with certain new reporting industries (modeled releases now include transfers to off-site incineration)
- highly detailed air modeling of center grid cell
- facility- and SIC-specific *stack diameters* added as air modeling parameter
- "on-the-fly" air plume modeling (facility/chemical-specific air concentrations by grid cell, as well as aggregated, risk-related results by grid cell for small geographic areas)
- facility-specific data used for electric power plants (coal burning)
- facility-specific air modeling parameters for ~15-20% of facilities, nationwide
- geocoding and address matching (coupled with QA/QC review) for all on-site and off-site facilities to provide accurate location coordinates (lat/long)
- risk-related modeling of water release pathways (direct surface water and POTWs)
[Stream reach information used by RSEI is only available for the Continental U.S. Therefore, the risk-related perspective for water releases is not available for Alaska, Hawaii and U.S. Territories (pounds- and hazard-based perspectives are available).]
- unique database of recreational & subsistence fish ingestion populations by stream reach (based on county-level fishing data) developed to model water exposure pathways

- mapping of stream path (up to 200 km downstream)
- hand-matching of important Publicly Owned Treatment Works (POTWs) to National Pollutant Discharge Elimination System (NPDES) database (to insure correct identification of stream reach for water releases)
- use of harmonic mean stream flows (Version 1.02 used arithmetic mean stream flows)
- Maximum Containment Level (MCL) constraint applied to drinking water intakes
- exposure modeling adjustment factors for water and land used in Version 1.02 have been removed from RSEI

Population Information

- Northern Mariana Islands Protectorate added to U.S. Trust Territories
[Risk-related perspective is not available for American Samoa, Guam, and the Northern Mariana Islands Protectorate, since stream reach locations and weather station data used by RSEI are not available (release information for facilities - six are currently reporting - can be viewed from pounds-based and hazard-based perspectives).]
- tribal lands are mapped (indexed to facilities located within their boundaries)
- year-by-year, block-level population adjustments for population using linear interpolation of 1990 and 2000 U.S. Census data (with back extrapolation to 1988)
- modeling of U.S. population by age and gender (block and block group) using subpopulation-specific exposure factors
- mapping of subpopulations within 50 km of facilities
- risk-related results for total population, children (ages <10 and 10-17), men or women of reproductive age (ages 18-44) and the elderly (ages ≥ 65)

Toxicity Information

- revised toxicity weighting methodology, incorporating more pathway-specific toxicity data
- hierarchy of toxicity value sources modified by addition of ATSDR and Cal-EPA final published toxicity data
- toxicity weights updated (new weights for some metals, several chemical categories, and certain new chemicals for 2000 TRI reporting)

Databases

- physical/chemical properties updated
- air hydrolysis rates added to fate and decay data
- many new databases available for review and use outside the model
[User Tag Fields cannot be created within the model; but the Chemical Database (Chemical.db - a Paradox file) can be modified directly to create User Tag Fields. These can be used like other Flag Fields for selection and custom table generation.]

Data Queries

- greatly improved query language with many more logic operators (using Boolean logic)
- extensive filtering of cross tab data for complex display of information
- no limits on number of parameters or variables chosen for analysis

Miscellaneous Features

- Help is supported in the model (including three graphical tutorials on the RSEI Welcome screen and in the User's Manual, to train new users)
- improved export of model results and data displays to many databases, spreadsheets, word processors, etc.
- much faster run times for queries (typically, several minutes for state and local analyses, or simple national analyses)
- thematic mapping summaries for states & counties based on "selected" facilities and indicator elements
- summary trends for total RSEI results (pounds and risk-related results) based on "selected" facilities and indicator elements
- summary results (pounds and risk-related results) based on "selected" facilities and indicator elements - displayed by year for individual media, and as a chemical ranking, facility ranking or county ranking

Attachment 2

EPA's Risk-Screening Environmental Indicators

A Discussion for Previous Users of Operational Differences Between RSEI Versions 1.02 and 2.1

The Risk-Screening Environmental Indicators (RSEI) Version 2.1 has greatly expanded capabilities compared to RSEI Version 1.02 (an “update” of the original release, Version 1.0). To accommodate these many new features, the design of the new model has been significantly altered. Although the operation of the model is, in many respects, quite similar to Version 1.02, there are a number of changes in how one accomplishes certain tasks. This comparison addresses the most significant differences to minimize any confusion for users of the previous version.

All of the former model functionality remains, enhanced in many ways. (The new model has two interfaces (*Easy RSEI* and *Advanced RSEI*); it is the *Advanced RSEI* interface that is comparable to the older model and discussed in this attachment.) New capabilities have also been added. Perhaps the most noticeable improvement is the geographic nature of this multi-media model. The map function has become a central feature of RSEI. You can locate facilities on it, graph populations and air concentrations, map surface water receiving streams, and even use the map to select facilities in the chosen viewing area. Displayed locations of state and county boundaries, and major water bodies and interstate highways aid in orienting the map.

Another obvious change is in generating cross-tab tables. In Version 1.02, you used the **New Query** button to select a subset of releases, and also to select the row and column variables for the cross-tab table. In Version 2.1, these two actions are completely separated. You now use the **Select** button to choose a “subset” of releases - this is now referred to as making a selection. The ability to select releases is greatly enhanced. You can make a selection using any choice of variables in the model, and combine different criteria using Boolean-logic qualifiers. Once you select a set of releases, this set becomes the basis for all of the functions in the model. The “Selected Facilities Browser” (analogous to Version 1.02’s “Facility Browser”) and all of the pre-formatted “summary tables” and “thematic maps” show only the releases in your selection.

Once you have made a selection, you can then, in a separate step, create a cross-tab table using the **Custom Table** button. The set of releases used in the creation of this table is the one that you selected using the **Select** button. You can now identify an unrestricted number of variables (to be displayed as multiple rows and columns), and you can still graph the results or display sorted tables. However, you can now substantially modify the table within the model, expanding and collapsing rows/columns, and use a filter to display only specific values of row/column variables.

There are several advantages to separating the selection process from the creation of the cross-tab table. One is time. Whereas it used to take 30-60 minutes to subset and create a table, it can take as little as a few minutes now, depending on how big your selection set is and how complicated your table is. Creating several tables using the same selection of releases, also saves time.

Because the design of Version 2.1 is different, you may wonder where to find desired functions. To assist you, we have provided the following section, which compares the main feature buttons of Version 1.02 with those in the new version. Major differences between how the functions operate are also described.

Version 1.02 Button

Location of Function in Version 2.1

Load and Load from CD

You can now load tables using the **Load Table** button, which is found by clicking on the **Custom Tables** button. Because the “Selection” that the loaded table is based on may be different than that currently being used by the model, the table name appears on the screen, and you can click on it to see what the underlying selection was. You should note, however, that the rest of the model, outside of the **Custom Tables** functions, will continue to use the currently selected set of facilities, rather than the set used by the loaded table. If you have any doubt as to what set the rest of the model is currently using, click on the text in the upper right corner of the screen (the display of the number of selected elements, releases and facilities), and a screen will appear identifying the underlying selection.
NOTE: Many pre-run queries are available using *Easy RSEI*.

New Query

This function is split between the **Select** button and the **Custom Tables** button. What was previously a single operation for performing queries is now a two-step process.

Inspect and Links

This function previously found in the Facilities Browser can now be found under the **Selected Facilities Browser** button. In the list at the top of the screen, you will find all of the facilities in your selected set along with their reported release information (releases matching the selection criteria are highlighted). A new feature links the selected facilities to a map of the U.S., so you can click on any facility and see where it is located on the map. You can also toggle between viewing selected facilities and all facilities. The functions that were previously located under the **Links** button are also found here. Now you can also show population subgroups, as well as total population, around facilities or for any local area on the map (by grid cell). Similarly, you can display estimated air concentrations for a specific air release from a single facility, or you can show the combination of all air releases in your selection set for local areas on the map. You are also able to map surface water receiving streams for the reporting facility or waste receiving facility.

Data

There is also a **Data** button in Version 2.1. However, in addition to showing chemical, census, weather, and stream data, this button allows you to view supporting information for all of the databases used by the model.

Attachment 3

EPA's Risk-Screening Environmental Indicators

Installation Instructions for RSEI Version 2.1 CD-ROM

System Requirements

To install and run the Risk-Screening Environmental Indicators (RSEI) Version 2.1 requires approximately 2 gigabytes of free hard disk space. At least 128 Mbytes of RAM is recommended. Users must also have Internet Explorer Version 3.0 or later installed on their computer to use the RSEI Help feature. RSEI Version 2.1 will operate on Windows 95, 98, 2000, XP or NT4. It will not work on earlier operating systems, such as Windows 3.1.

Installing RSEI

The previous version of the RSEI model could be run from the CD without an installation on the user's hard drive. For Version 2.1, extensive data enhancements have increased the size of the databases so it is no longer possible to run it from a CD. Consequently, all users must perform the full hard drive installation

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

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.

Steps for installing RSEI are the following: 1. Close all Programs and log out from any Local Area Network (LAN). Put the RSEI Installation Disk in the CD-ROM 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 CD-ROM drive is labeled other than 'D.' Click 'OK.' 3. Follow the prompts in the installation process. 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 Welcome Screen** will appear. Here, to enter RSEI, you can click on **Easy RSEI, Advanced RSEI** or **RSEI Tutorial**. **Easy RSEI** is a simplified mode of operation that provides users with rankings and trend analyses at the level of the whole nation, an EPA region, or a single state. *Easy RSEI* is a quick and simple way to access some of the most commonly-used data in RSEI. It is also a great introduction to the kinds of information RSEI can provide. After the first launch, you can access *Easy RSEI* again by double clicking the RSEI icon

on your Windows desktop or by clicking the Start button at the bottom left corner of your Windows screen, then 'Programs,' 'RSEI,' then 'RSEI.' When you are ready, you can try **Advanced RSEI**. A good introduction to the many functions in *Advanced RSEI* is the three RSEI Tutorials. They can be found in Chapter 3 of the User's Manual, or by clicking on the **RSEI Tutorial** button on the *RSEI Welcome* screen. When you want to try *Advanced RSEI* yourself, click on the **Advanced RSEI** button on the *RSEI Welcome* screen. The model will then display 'Important Characteristics of RSEI.' Click 'Continue,' and the *Advanced RSEI* interface will open. *Advanced RSEI* allows users broad freedom to customize their use of RSEI using maps, crosstab tables, sorted tables, filters, and graphs. Users 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 4 through 9 of the User's Manual. Once you're comfortable with *Advanced RSEI*, you may want to click on the button in the bottom left of the *RSEI Welcome* screen that says, 'In the future, start RSEI in Advanced Mode.' Then, whenever you start RSEI, *Advanced RSEI* will automatically open. If you ever want to go back to *Easy RSEI* or the *RSEI Tutorial*, simply click on the **Switch to Welcome Screen** button at the bottom left of the **Welcome to Advanced RSEI** screen.

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 following string of commands: Start→Settings→Control Panel→Display→Settings. On the right-hand side of the 'Settings' screen, slide the lever under 'Display area' to the right one notch.

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 any tables you have created will be saved for you to copy elsewhere) or the Borland Database Engine with its associated RSEI settings. You can delete these manually if desired. You do not need the CD-ROM to do this. 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, open 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.