

INTERTRAN2

Transportation Risk Assessment Package

User's Guide

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Foreword

The INTERTRAN2 programme is developed by the AMC Konsult AB under contract with the Swedish Nuclear Power Inspectorate.

INTERTRAN2 was developed within the IAEA Coordinated Research Program on “The Probabilistic Safety Techniques Related to the Safe Transport of Radioactive Material”, it was rewritten for Windows within the Coordinated Research Programme on “Development of Relevant Accident Data for Quantifying Risks Associated with the Transport of Radioactive Materials”.

The Authors would like to thank all the participants of these Coordinated Research Programmes for their help with testing and commenting on the INTERTRAN2 package during the development.

We also would like to thank Mr. S. Ludwig from the Oak Ridge National Laboratories for his valuable help with the final testing of the programme and his valuable comments on the User Guide.

1 INTRODUCTION

1.1 General

The INTERTRAN2 Transportation Risk Assessment Package represents the culmination of efforts begun in 1989 to improve the INTERTRAN package (first available in 1983), under The Coordinated Research Programme on Probabilistic Safety Techniques Related to The Safe Transport of Radioactive Materials. INTERTRAN2 handler was originally developed for the DOS operating system on PC's, but has now been changed for use with Windows 95/98/2000 and Windows NT.

This User's Guide is one in a series of documents describing the INTERTRAN2 package.

The INTERTRAN2 Package includes:

- INTERTRAN2, a handling program to assemble and manage input databases, construct input files for INTERTRAN2-RT4, and execute INTERTRAN2-RT4 cases.
- INTERTRAN2-RT4, based on RADTRAN4.019IOSI (date January 20, 2000), an SI-unit version of RADTRAN4.019. In the INTERTRAN2-RT4, the RADTRAN4.019IOSI has been modified and compiled for PC use.
- TRANSAT, An Atmospheric dispersion model.
- TICLD, Individual Dose calculation Program.
- LHS, Latin Hypercube sampling Program.

Note: TICLD and LHS are not included in the standard version of INTERTRAN2, but may be downloaded separately.

TICLD and LHS are not required for general transportation risk assessments, but are useful for more detailed analyses by experienced analysts.

Documentation supporting the INTERTRAN2 package:

- INTERTRAN2 Transportation User's Guide (this document)
- Advisory Material for the INTERTRAN2 computer program
- RADTRAN4, Technical Manual and User's Guide
- TRANSAT User's Guide

The User's Guide for the INTERTRAN2 handler, this document, provides information to permit the user to construct and manage input databases and prepare input files for INTERTRAN2-RT4, and execute INTERTRAN2-RT4 cases.

The development of the INTERTRAN2 handler has been carried out within the IAEA Coordinated Research Programme on "Probabilistic Safety Assessment Techniques Related to the Safe Transport of Radioactive Materials".

The first version of the handler, at that time a dos programme, was introduced at the Coordinated Research meeting in Paris 1991. Since then the software has been rewritten for Windows.

INTERTRAN2 was developed to enable IAEA Member States ability to perform transportation risk assessments, in a stand-alone, PC based environment. The INTERTRAN2 Windows version represents a significant upgrade to the previous INTERTRAN2, both by use of the Windows operating environment for input management and program execution as well as providing the ability for users to assemble risk assessment inputs as a collection of previously developed databases.

The INTERTRAN2 handler is developed using CA-Visual Objects, a 32-bit fully object oriented language for Windows 95/98/2000 and NT. The INTERTRAN2 handler contains a database handling system where the user can input and store data for different package types, package contents, Pasquill data, accident data, link data etc. INTERTRAN2 is a menu driven program and the INTERTRAN2-RT4 input file is created interactively. It is possible to combine available data sets in any way to produce a INTERTRAN2-RT4 input file.

Because the accuracy of risk assessment calculations are completely dependent on the validity of the input data provided by the user, INTERTRAN2 has only limited capabilities to verify the accuracy of the input variables provided. INTERTRAN2 input handler does not contain a complete quality control of all the input data. The INTERTRAN2, however, checks the consistency of the selected input data files. Input errors are checked by INTERTRAN2-RT4 during its execution, the user is provided feedback in the output file identifying the erroneous data.

The INTERTRAN2 handler can also be a valuable tool to an expert user. Previously developed databases containing information on different routes, link segments, modes and packages, can easily be combined by the user to analyse many different problems, just by selecting different combinations of database records.

Observe!! Although the INTERTRAN2 handler has received extensive testing, it was not developed under a rigorous Quality Assurance regime. It is important that, whatever method is used to construct the INTERTRAN2-RT4 input file, the user verifies the input separately either before running INTERTRAN2-RT4 or by reference to the INTERTRAN2-RT4 output file which contains an echo of the input data.

1.2 Definitions of Certain Transportation Risk Assessment Expressions

This section provides a description of certain transportation risk assessment terms to assist the user in preparing input using INTERTRAN2.

CASE - The term CASE is used to identify a combination of input values selected from the INTERTRAN2 databases.

DATABASE - The term DATABASE is used to identify a unique group of input data assembled to define a risk assessment characteristic. For example, one database is used to identify information about a package, and a second database provides detailed information about the isotopic contents of the package. In this way, the user is permitted to assemble combinations of data to perform series of risk assessment.

Aggregate mode - used to make a calculation in which route related data, such as population densities and accident rates, are normalized over three sets designated as rural, suburban and urban population density zones covering the entire shipment route. The user must enter route related data for each zone, the total fraction of travel in each zone and the total distance of travel. (See Section 4.9 of the RADTRAN 4 User Guide.)

Link mode - used to make a calculation in which the route is split up into as many as 40 link segments each having unique characteristics. The user must enter route related data for each link, the distance travelled in each link, and the total distance travelled. Not all route related data can be entered on a link by link basis, some data are contingent on specific assumptions rural, suburban and urban population zones. The user must therefore specify whether a link segment is either rural, suburban or urban. (See Section 4.10 of the RADTRAN 4 User Guide.)

Exclusive use - Exclusive use is defined in SS6¹. It refers to the sole use of a vehicle, by a single consignor, for the transport of radioactive material; all initial, intermediate, and final loading must be carried out in accordance with the directions of the consignor or consignee.

Minimum stop time (link option) - Gives the stop time per link and not for the whole trip.

TI - transport index (see SS6).

TRANSAT - An atmospheric dispersion model for the INTERTRAN 2 package.

¹Regulations for the Safe Transport of Radioactive Material, Safety Series No 6, IAEA. 1985 Edition (As Amended 1990)

2. THE INTERTRAN2 PROGRAM

2.1 Introduction to the Program

The INTERTRAN2 Package is provided on either CD-ROM, 3.5” diskettes, or available by download from the internet at <http://www.amckonsult.se>.

System requirements: Windows 95/98, Windows NT, or Windows 2000. Approximately 15 MB of disk space is required for the initial installation. Additional space is required as the user adds information to the INTERTRAN2 databases. The system must allow “long” filenames, (more than 8 characters), eg. 32-bit file handling.

2.2 Installation

Three different options exist for installation of the INTERTRAN2 package – CD-ROM, 3.5” diskettes, or internet download. In all cases, the package is provided in compressed format, which must be installed to properly configure the package for operation.

2.2.1 From CD-ROM

To install INTERTRAN2 from CD-ROM, insert the INTERTRAN2 CD into the CD drive. Automatically (using the AUTORUN.INF file), the following screen should be presented:



The user should then use their mouse to click the INSTALL INTERTRAN2 button. The user will be presented with options for installation drive and directory (using the defaults presented is recommended).

Caution: Some CD-ROM drives are not configured to auto-start the installation routine. In this case, the user should find and double-click LAUNCH.EXE to initiate the screen noted above, or double-click SETUP.EXE if the user wants to proceed directly with INTERTRAN2 installation.

Note: Installation from CD-ROM results in all files being installed as **read-only**, which will cause a fatal error during startup of the INTERTRAN2 program. To correct this condition, the may do one of two things:

(1) using Explorer, select all files in the INTERTRAN2 subdirectory, and then right-click the mouse to bring up the pull down menu, then select the “Properties” item for these files and de-select the read-only function for these files, or

(1) go to the MS-DOS Prompt, and execute the following command:

```
ATTRIB -R c:\intertran2\*.* (assuming the drive/directory names are as chosen)
```

2.2.2 From 3.5” diskettes

To install the INTERTRAN2 package for 3.5” diskette, insert Diskette 1 into the appropriate drive (typically Drive A:). Using Windows Explorer, double click SETUP.EXE. The user will be prompted to insert successive diskettes. The user will be prompted for selection of installation drive and directory.

2.2.3 From download

Using your web browser (Netscape or Internet Explorer), download the INTERTRAN2 package from:

<http://www.amckonsult.se>

The user should download the file to a temporary folder on their hard disk. Using Explorer, locate the downloaded self-installing EXE-file called INTERTRAN2.EXE and double-click to initiate the unzipping process. Locate the file SETUP.EXE and double-click to initiate the installation process. The user will be prompted for selection of installation drive and directory.

2.2.4 TICLD and LHS

TICLD and LHS are not provided with the standard installation package of INTERTRAN2. Both these programs are intended for use by experienced risk analysts to perform more complicated assessments. TICLD and LHS may be downloaded from <http://www.amckonsult.se>. Both software packages are provided in compressed (ZIP-file) format, and must be uncompressed using the WinZIP or PKZIP utility, which is available free over the internet.

2.3 Program Operation

The user may initiate an INTERTRAN2 session in two different ways:

From the Windows Start button, Programs menu, AMC Applications, choose the Intertran2 application, or

From Windows Explorer, locate the INTERTRAN2 directory and double-click on INTERTRAN2.EXE. For convenience, the user may wish to copy a shortcut to INTERTRAN2 and place the shortcut on their Windows desktop. To do this, this user should locate the INTERTRAN2.EXE file with their mouse, depress a mouse button and drag the file to their desktop.

The INTERTRAN2 Opening Dialogue screen is then displayed (see below). The user presses OK to begin using INTERTRAN2.



Figure x1. INTERTRAN2 – Opening Dialogue

Pressing OK then begins an INTERTRAN2 session and presents the INTERTRAN2 Main Menu.



Figure x2. INTERTRAN2 – Main Menu

For more details on each program please consult the User Guide for that specific program.

2.4 Starting the Program

The Main Menu contains the following choices:

Database Maintenance - to enter or edit, data in the databases (see Chapter 2.6)

View/Edit Cases - to assemble an input file from data in the databases (see Chapter 2.7)

Calculations - to make a calculation with INTERTRAN2-RT4 (see Chapter 2.8)

System - to reindex databases or define the default input/output folder (see Chapter 2.9)

Window - windows handling

Help - On-line help

Note: When either the database maintenance or view/edit functions is selected, an additional main menu option appears called Edit.

2.5 General Functions

The INTERTRAN2 system is menu driven, using pull down menus selected from the main menu. Selecting an option will then open a data window.

All data windows are scalable and respond to the options Cascade and Tile. At the top of a data window there is a set of buttons, these correspond to the functions available under the Menu item - Edit. Functions not available are inactive (i.e. "greyed" out).

Note: In some machines, the button bar is hidden when a new data window is opened. To overcome this condition, the user must either "stretch" the window, or toggle the maximize/minimize feature of that window to correct this condition. This "quirk" does not affect the operation of INTERTRAN2.

The functions are the following:

New	Add a new record/case
Open	Edit the record/case highlighted
Copy Record	Copy the highlighted record to a new record
Save Input file	Save the present case to a INTERTRAN2-RT4 input file
Delete	Delete the highlighted record
Cut	Cut to clipboard
Copy	Copy to clipboard
Paste	Paste from clipboard
Go Top	Go to the top of the table
Previous	Go to the previous record
Next	Go to the next record
Go Bottom	Go to the end of the table

2.6 Database Maintenance

The primary function of INTERTRAN2 is to serve as the input processor and database manager for assembling risk assessment data that is needed to perform transport risk assessments.

INTERTRAN2 uses a series of "database" files that when edited by the user, store information about the shipment, and assumptions (probabilities and severities) of the shipment experiencing an accident. The user then creates risk assessment "cases", "generates" input files, and performs "calculations" using the INTERTRAN2-RT4 programme.

More experienced risk analysts may use the TRANSAT programme to model complicated atmospheric dispersion conditions which could then be utilized automatically within the risk assessment calculation. However, less experienced users may wish to use typical Pasquill data included with the code as default data.

All the "database" windows are edited by first selecting a database from the pull down menu, then clicking the "open" button on that window. Using the mouse to locate the pointer to data entry field, the user may begin to enter data values. An observant user will note that upon the first clicking each new entry data field, an explanation of the purpose of that field (and applicable units) is displayed in the lower left corner of the INTERTRAN2 window. This explanation will disappear after a few seconds, but may be redisplayed by clicking another field and the click the desired field again.

After completing entry of data, the user may press **OK** to save the changes, or **Cancel** to discard changes.

It is very important that the data sets in the databases are correct and adjusted to be consistent with data in other data sets if these are to be combined to make an input file (i.e. case).

Great care in setting up your data sets is needed!

A data set may occupy just one line in the database or several, in which case each line will include the data set name.

All names of the parameters in the databases have the same name as the corresponding parameters in the RADTRAN 4 User Guide. The only difference is for arrays where the number of the array-element is added to the parameter name. If any specific question of the meaning or content of any parameter arises, and the HELP information is not satisfactory, the documentation of the RADTRAN 4 code may be consulted.

To active the database maintenance function, click the "Database Maintenance" entry on the INTERTRAN2 main menu.

The various databases that the user can edit are described in the following sections.

2.6.1 Accident Data

If Accident Data is selected a sub-menu containing “**Accident Rates for Population Zones**” and “**Fractions of Each Severity in Accident**” will be displayed.

Both these databases relate to accident data which are different for most countries. For more information on how to establish these data, consult Section 1 of the DATA COLLECTION CHAPTER of the Advisory Document or the CRP report on DATA COLLECTION.

Accident data must be entered by the user. There are two databases; accident rates for the different population zones are entered into the accident database, the fraction of accidents in each severity category are saved in the severity data database. Corresponding data sets in the two databases should be given the same data set name. The accident data is then selected by the user simply by entering this name. The selected data set must contain data for all transport modes being assessed and for the number of severity categories (NSEV) specified in the case parameter data set selected and the severity data set must contain data for each population zone being assessed, otherwise input file generation will be aborted.

2.6.1.1 Accident Rates for Population Zones

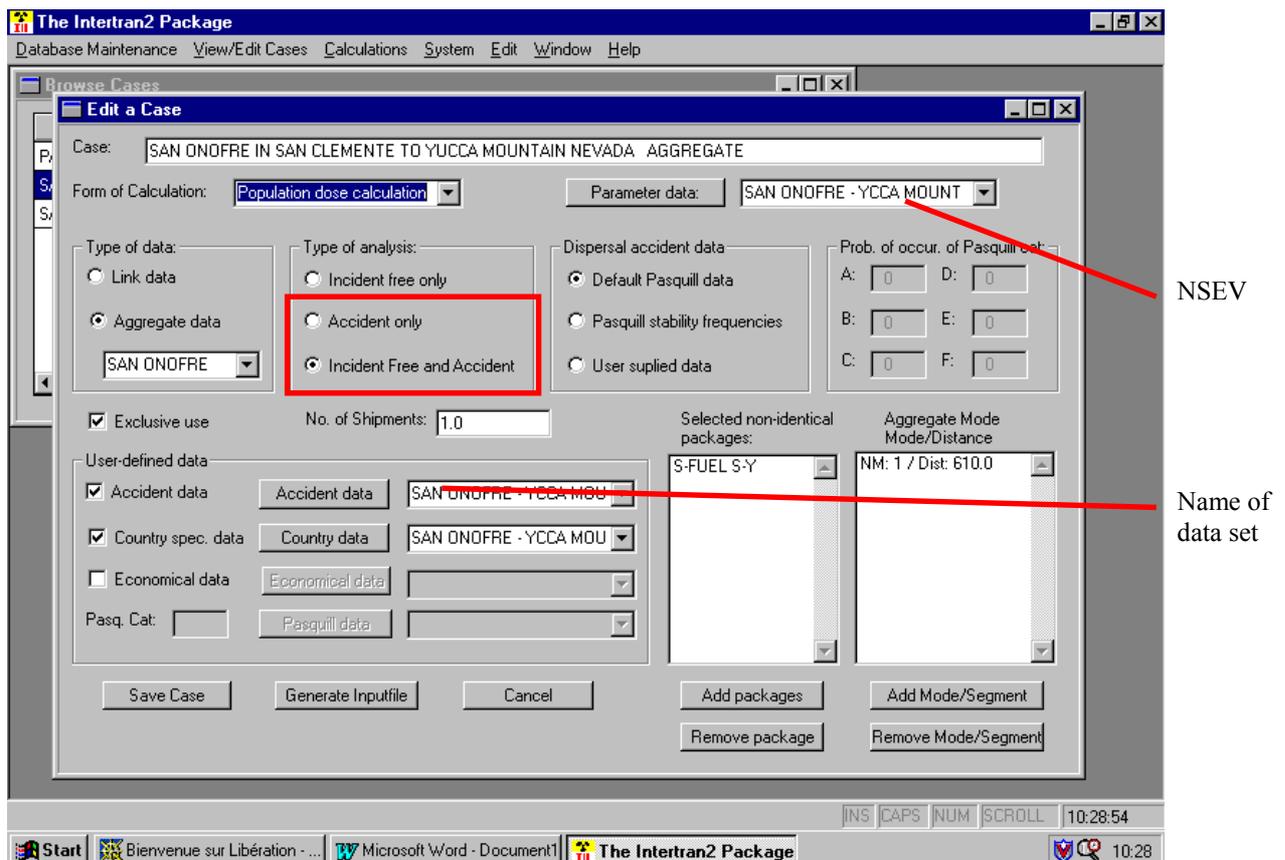


Figure 1. Accident rates for population zones

This database includes the following parameters:

- NMODE - transportation mode of the data set
- Name - name of the data set
- Description - description of the data set
- ARATMZ[K] - accident rates for each population zone (accidents/km)

A data set will comprise one line of data for each transportation mode to be assessed.

2.6.1.2 Fractions of Each Severity in an Accident

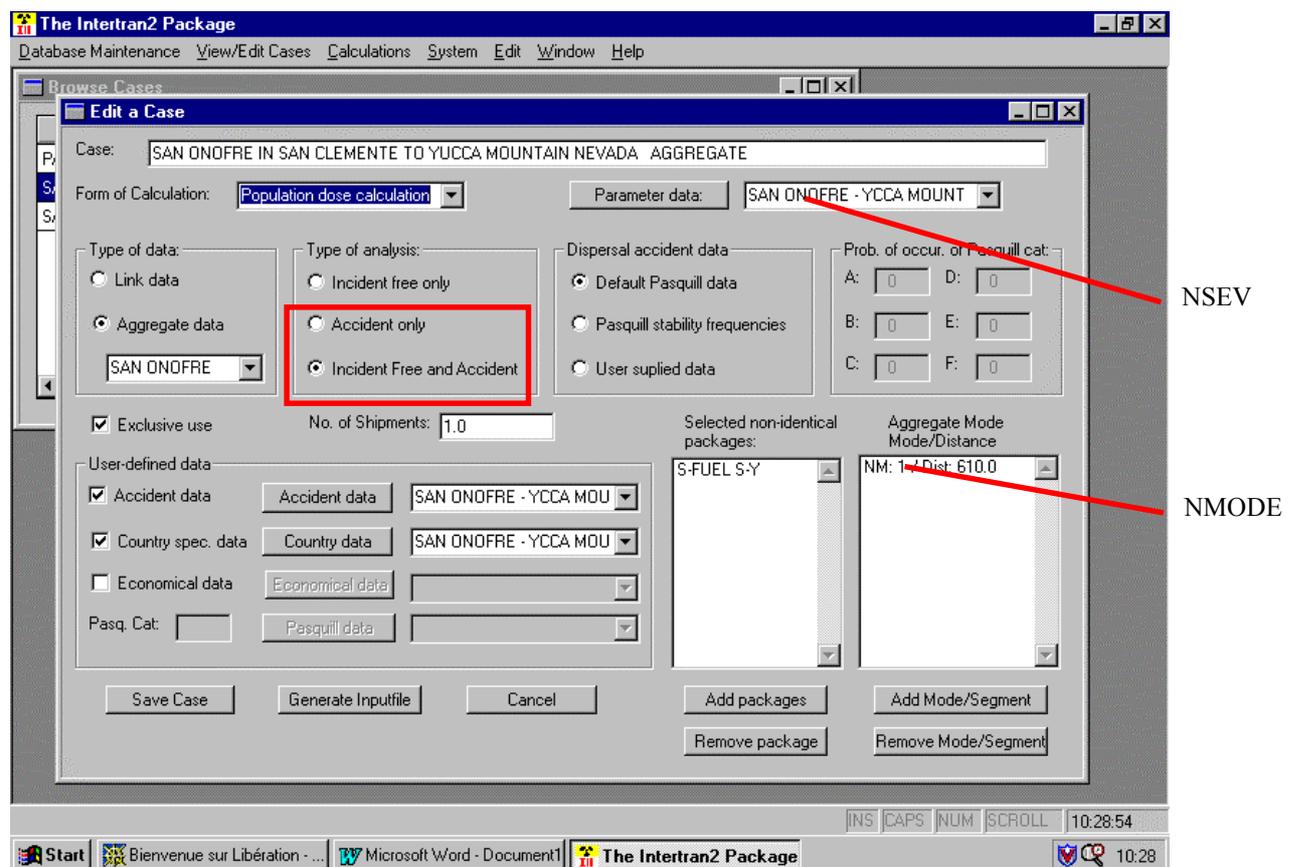


Figure 2, Fraction of each severity in accident

This database includes the following parameters:

- NMODE - transportation mode of the data set
- NPOP - number of the population zone
- Name - name of the data set
- NSEV - number of severity categories for this data set
- SEVFRC[M] - severity fraction for each severity category

A data set will comprise one line of data for each transportation mode and each population zone to be assessed.

2.6.2 Atmospheric Dispersion Data (TRANSAT)

If this option is selected the Atmospheric Dispersion Data menu is displayed. This menu gives the user opportunity to load an ASCII file from a TRANSAT run into the Pasquill Database or to view or edit the database directly.

These data are only used when the user wants to use user defined Pasquill tables in an accident calculation.

Note: This option is only to be used by really experienced users, when dealing with really complicated weather situations

2.6.2.1 Update Pasquill Data

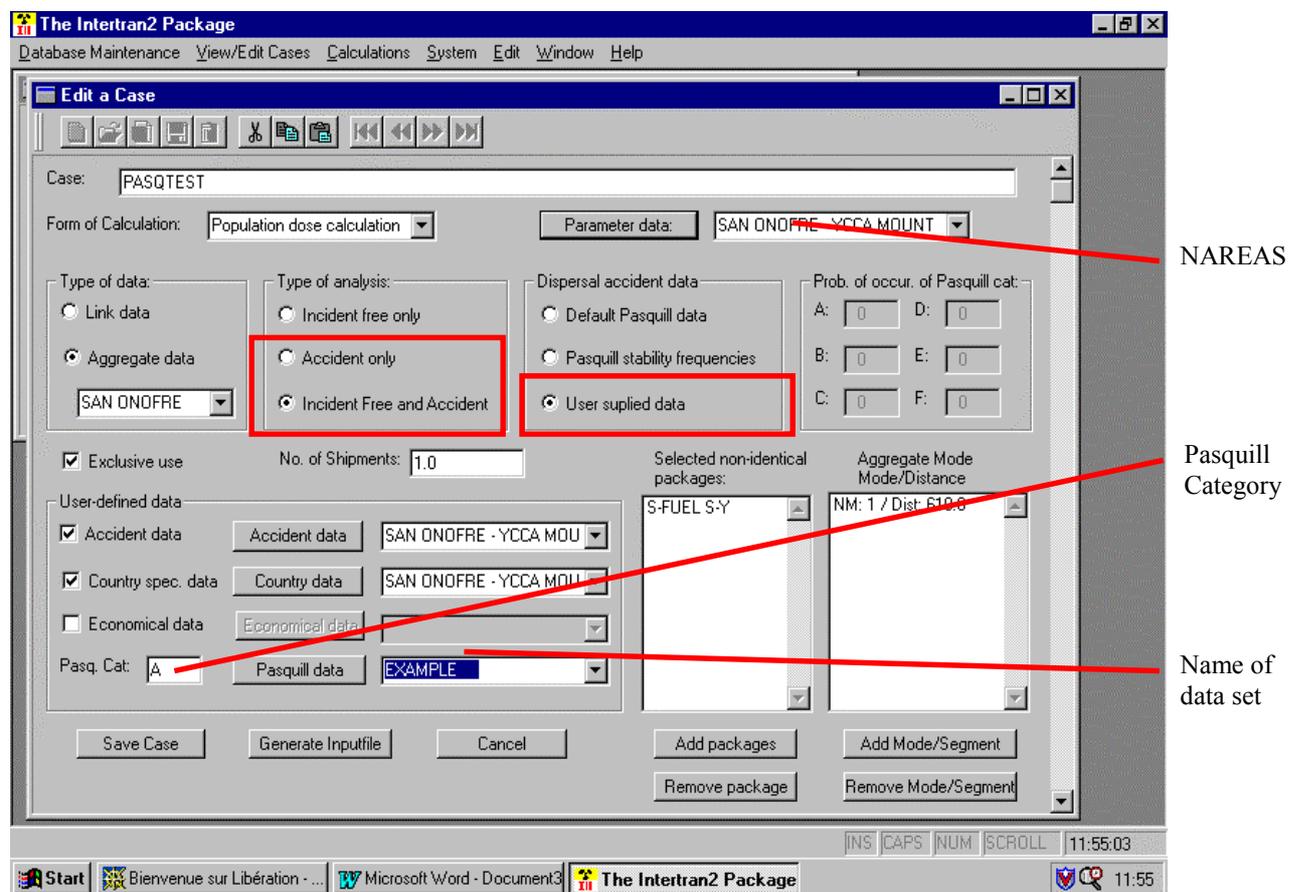


Figure3, Pasquill data sets

Selecting this menu option allows the user to view or edit the pasquill database. This database includes the following parameters:

- Name - name of the data set
- Category - Pasquill category
- Release height - release height used in the TRANSAT run (not used in the INTERTRAN2-RT4 calculation)
- NAREAS - number of areas used for this data set

AREADA - dispersal accident isopleth area (m²)
DFLEV - time-integrated concentration in the area

The data set for each category consists of NAREAS lines of data, one line for each area in increasing AREADA order.

When generating a case, it is important that the number of NAREAS used in the selected data set corresponds to the parameter NAREAS in the selected Parameter data set; otherwise the input file generation will be aborted.

2.6.2.2 Run TRANSAT

TRANSAT is started by selecting: Database Maintenance - Atmospheric Dispersion Data - Run TRANSAT. The program will then ask for parameters. Enter the parameters and press OK.

To run the program three parameters **MUST** be given. The first parameter is the input file, extension .TST, the second parameter is the output file, extension .OUT, and the third parameter are the dialogue file, extension .LOG.

To make a calculation with the input data file **TRAN0.TST**, do the following:

Enter parameters:

TRAN0.TST TRAN0.OUT TRAN0.LOG [OK]

The result will be presented as **TRAN0.OUT**.

It is also possible to use the console for interactive input. Do the following:

Enter parameters:

CON CON CON [Enter]

For more details on running the TRANSAT code, see the user guide for TRANSAT.

2.6.2.3 Load Pasquill Tables from TRANSAT Run

This function requires that an ASCII file has been produced as a result of running the TRANSAT code. For more information about TRANSAT, check the documentation on TRANSAT in the INTERTRAN2 package.

An "Open File" window will displayed. Select the input file to load and press OK.

The program will then ask for a name to give this date set. If OK is pressed the program will update the Pasquill database automatically.

2.6.3 Country Specific Data

Data that are specific to a particular country is kept in this database. More than one set of data, for example both data representative of a country and of smaller areas, to increase the accuracy of the calculations, may be kept in the database. Each data set should be given a unique name. The data included in this data set are mainly those defined by the RADTRAN 4 keyword OTHER, but some of the parameters from NORMAL which are country dependent are included.

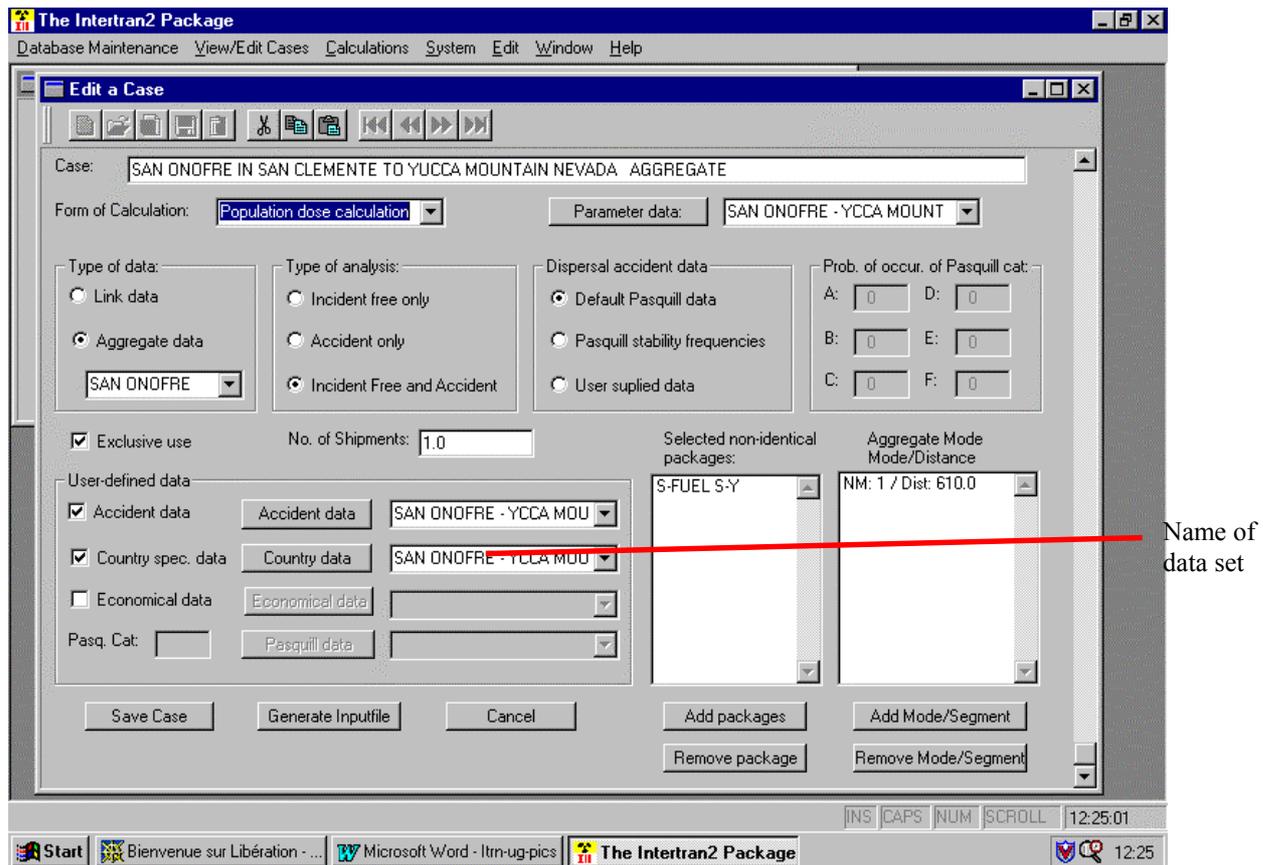


Figure 4, Country specific data.

This database includes the following parameters:

Name	- name of the data set
Description	- description of the data set
POPDEN[1-3]	- population density for each population zone (people/km ²)
RPD	- ratio of pedestrian density
RR	- shielding effectiveness factor (rural area)
RS	- shielding effectiveness factor (suburban area)
RU	- shielding effectiveness factor (urban area)
FNOATT	- number of flight attendants on commercial passenger flights
ITRAIN	- flag to select rail crew exposure factor
PKGSIZ1	- threshold dimension for packages handled by forklifts (m)
PKGSIZ2	- threshold dimension for packages handled by cranes (m)
BDF	- building dose factor

XFARM	- fraction of land under cultivation
CULVL	- clean-up level (Bq/m ²)
BRATE	- breathing rate of persons exposed to aerosol releases (m ³ /s)
EVAC	- evacuation time (days)

All of these data, except ITRAIN, have default data in the INTERTRAN2-RT4 code. To view the default data, check the RADTRAN 4 User Guide.

If data other than the default data is to be used for any of these parameters, the desired data should be entered into a data set for the specific country or area. Using a user defined Country data set will override the default settings of the parameters included in the selected data set.

2.6.4 Economic Data Sets

This database includes the following parameters:

Name	- name of the actual data set
Description	- description of the data set
NSEV	- number of severity categories for this data set
ECONF	- economic factor to account for inflation
ONSCST[1-4]	- on scene clean-up costs
EMRCST[M]	- emergency clean-up cost for each severity category

The default value of these parameters is 0. Data must be entered if the user wishes to calculate cost estimates. ECONF may be set to 1 to produce results in US\$1980, but it may also be used to upwardly adjust the results to present day values.

When generating a case, it is important that the number of severity fractions (NSEV) in the selected data set corresponds to the number in the selected PARAMETER data set; otherwise the case generation will be aborted.

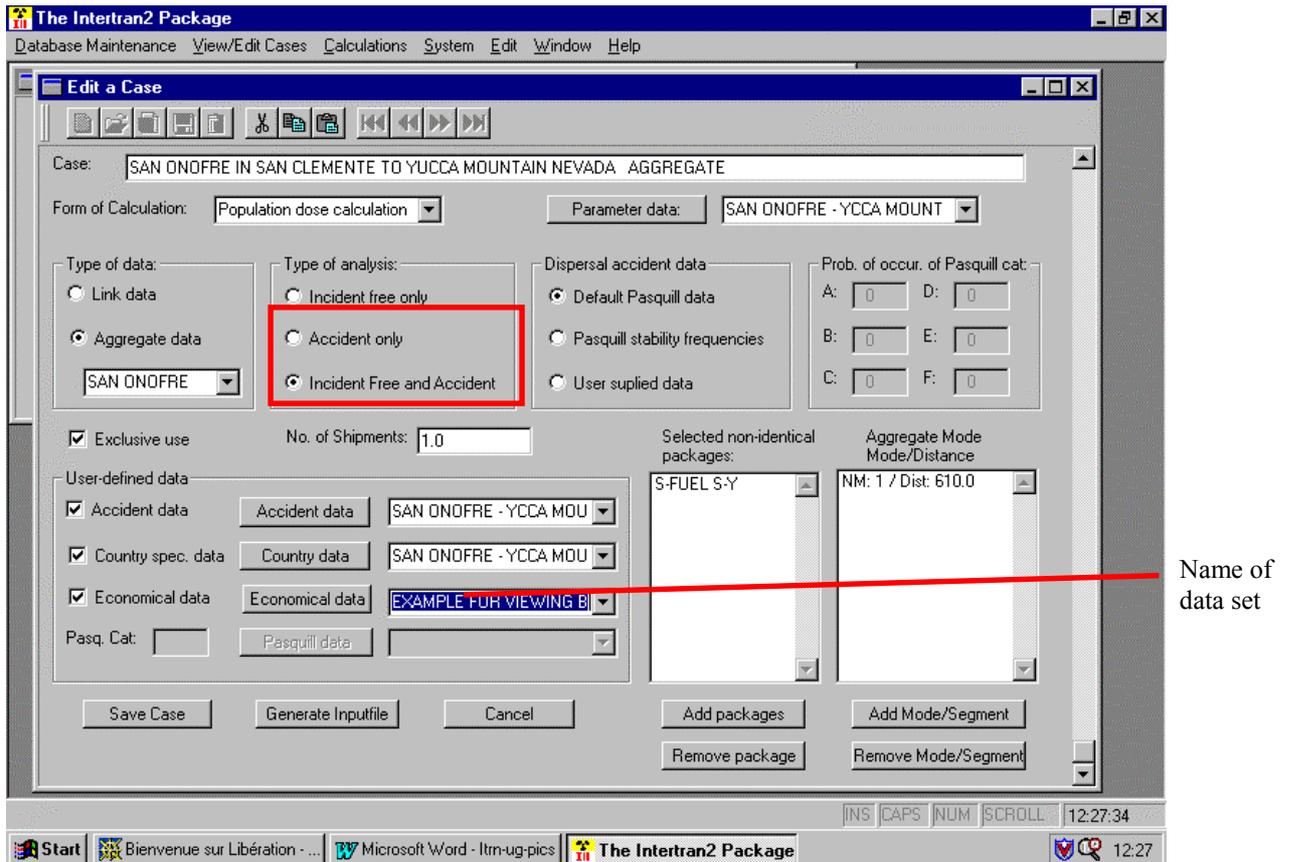


Figure 5, Economic data sets.

2.6.5 Isotopic Data (Define)

This data includes the following parameters:

ISONAM	- name of isotope
ACCDNT(1)	- half life of isotope (days)
ACCDNT(2)	- photon energy (MeV)
ACCDNT(3)	- cloud shine-dose factor (Sv-m ³ /Bq-s)
ACCDNT(4)	- effective dose equivalent for inhalation (Sv/Bq inhaled)
ACCDNT(5)	- effective dose equivalent for ingestion (Sv/Bq ingested)
ACCDNT(6)	- food transfer factor (Bq ingested/Bq incorporated in food)
ACCDNT(7)	- soil transfer factor (Bq ingested/Bq deposited on food)
ACCDNT(8)	- deposition velocity of aerosol (m/s)
ACCDNT(9)	- numerical designator assigning acute pulmonary dose response curve
ACCDNT(10)	- one-year inhalation dose to lung (Sv/Bq inhaled)
ACCDNT(11)	- one-year inhalation dose to marrow (Sv/Bq inhaled)

There is a large library in the INTERTRAN2-RT4 code for the most used isotopes, check the RADTRAN 4 documentation. If an isotope is not included in the INTERTRAN2-RT4 library the user may create a new ISONAM and provide characteristics

The user may also use this feature to modify the characteristics of an already defined isotope in the INTERTRAN2-RT4 library.

If data is included in this database the INTERTRAN2 will automatically include this in the input data file if the isotope name is included in any of the Material data sets selected (see below).

Observe !!! The INTERTRAN2 will always use the data in the “isotope Data (DEFINE)” database preferentially over an isotope listed in the INTERTRAN2-RT4 database. The user will **NOT** be notified in advance. It is possible though to see the redefinition in the input data file. For this reason, it is recommended that the user gives a distinct name to each user defined isotope (that is different to the name used in the INTERTRAN2-RT4 library) if there may be a requirement in the future to use the INTERTRAN2-RT4 default data.

2.6.6 Link segment data

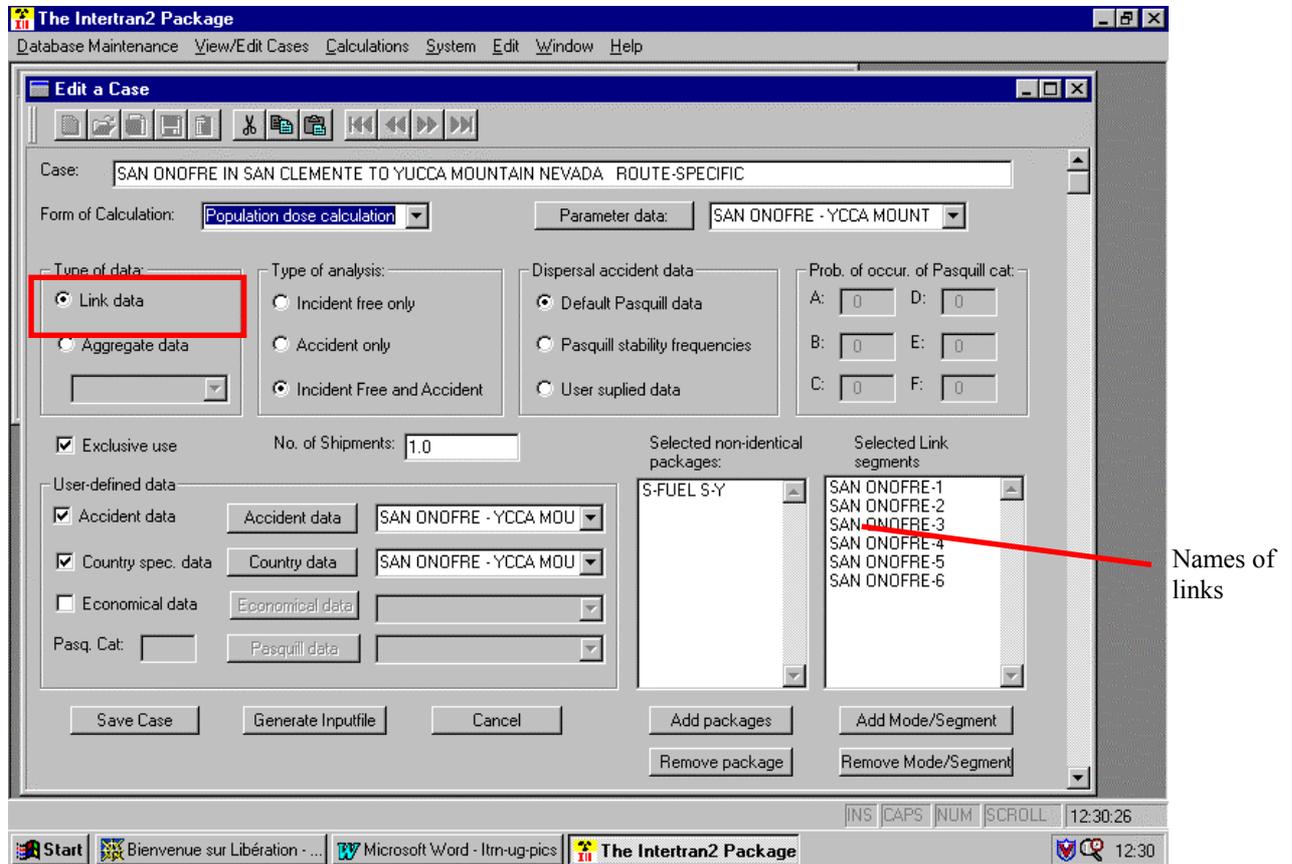


Figure 6, Link segment data.

This database includes the following parameters:

- | | |
|-------------|---|
| Name | - name of the link segment data set |
| Description | - description of the data set |
| LMODE | - transportation mode |
| LDIST | - distance travelled for this link segment (km) |

LSPED	- speed of vehicle on this link segment (km/h)
LPOPD	- population density along this link segment (persons/km ²)
LVDEN	- one-way vehicle density on this link segment (vehicles/h)
LARAT	- accident rate on this link segment (accidents/km)
LZONE	- population zone type
LTYPE	- link type designator

Data for one link segment is stored in one line in the Link database. It is possible to select any combination of link segments when putting a case together.

When generating a case, it is important that the transportation modes in the selected data sets correspond to the transportation modes in the selected accident data sets; otherwise the case generation will be aborted.

2.6.7 Aggregate Data sets

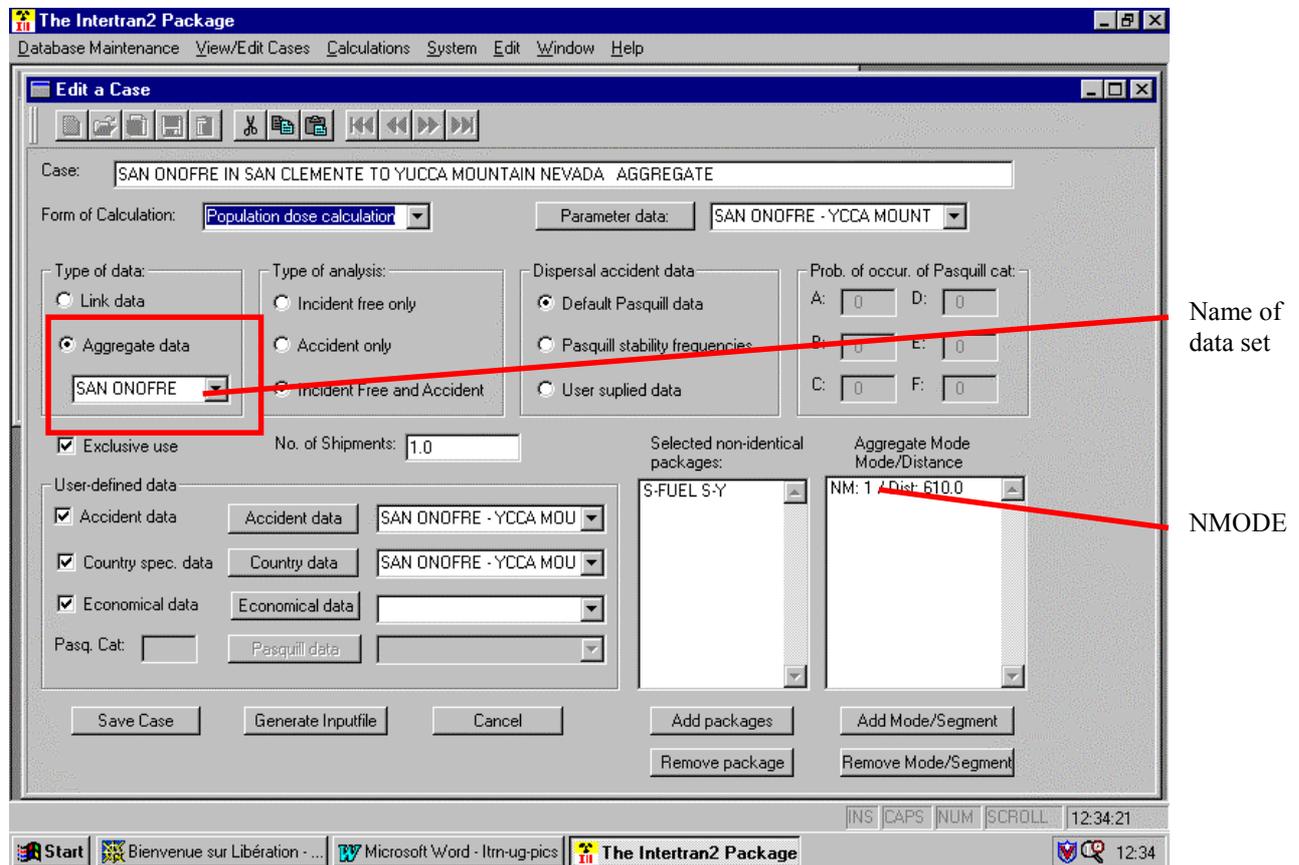


Figure 7, Aggregate data sets.

This database includes the following parameters:

Name	- name of the aggregate data set
NMODE	- mode for the data set
Description	- description of the data set

FTZNR	- fraction of travel in rural zone
FTZNS	- fraction of travel in suburban zone
FTZNU	- fraction of travel in urban zone
VELR	- velocity in rural zone (km/h)
VELS	- velocity in suburban zone (km/h)
VELU	- velocity in urban zone (km/h)
CREWNO	- number of crew on a shipment
ADSTCW	- average distance from radiation source to crew during shipment (m)
HANDNP	- number of handlings per shipment
STOPTIM	- stop time for shipment (h)
TIMZR	- distance-independent stop time per trip, rail mode only, (h)
FMINCL	- minimum number of rail inspections or classifications
PDST	- number of persons exposed during shipment
RST	- average exposure distance when stopped (m)
DTSTOR	- storage time per shipment (h)
PDSTOR	- number of persons exposed during storage
RSTOR	- average exposure distance during storage (m)
PPV	- number of persons per vehicle sharing the transport link
FRSHR	- fraction of urban travel during rush hour
FCTST	- fraction of urban travel on city streets
FTLFWY	- fraction of rural and suburban travel on freeways
TCNTPR	- One-way traffic count in rural zones (vehicle/h)
TCNTPS	- One-way traffic count in suburban zones (vehicle/h)
TCNTPU	- One-way traffic count in urban zones (vehicle/h)

If aggregate mode is selected the INTERTRAN2 prompts the user for the modes and distances of travel in each mode, it will then automatically select the appropriate data sets for the selected modes from the AGGREGATE database. All chosen transportation modes **must** have a corresponding data set in the Aggregate database; otherwise generation of the input file will be aborted.

It is possible to have several data sets for a single transportation mode in the Aggregate database, but each data set must have a unique data set "name".

2.6.8 Packages-Release Data

Selecting this option will display five submenu items. This option is used to put all data relating to a package together. It is important to understand the concept of packages. Check the RADTRAN 4 User Guide for further information.

Materials are specified in ways to describe their quantity, dispersibility, and physical and chemical characteristics.

The basic principle for handling information in the INTERTRAN2 is to define one or more packages. The information on the package/s is contained in the main Package Data database. Each data set in this database is related to the Materials database, which contains information on the contents of the packages, by a label for a specific material. The Materials

database lists all isotopes contained in a specific "material". Each material has a number for the dispersibility group and every isotope has a label for its physical/chemical group (ICPGRP). These labels connect the isotopes contained in the material with the Release Fraction database, the Aerosol Fraction database and the Respirable Fraction database.

It is important that the user builds a correct set of typical materials, which can be contained in different packages, to be able to use the full potential of the INTERTRAN2. If these databases are handled incorrectly the INTERTRAN2 will never deliver meaningful data.

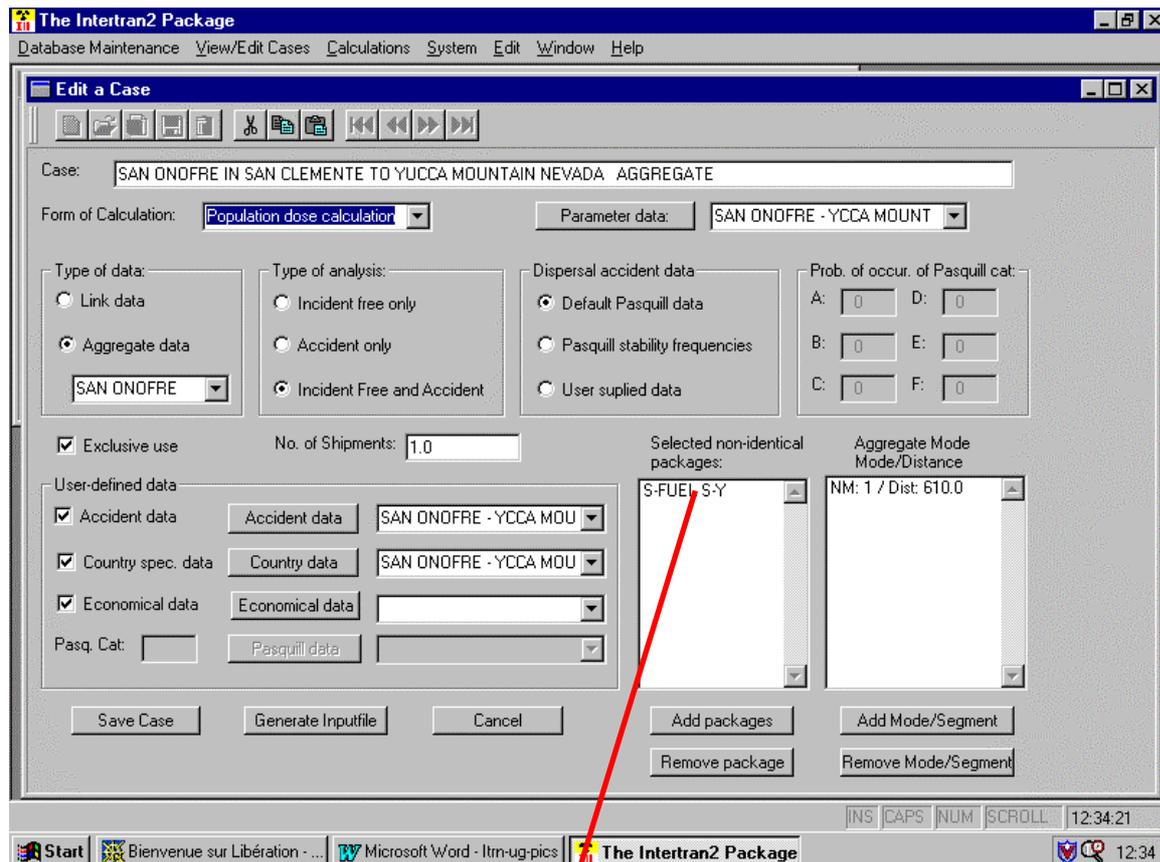
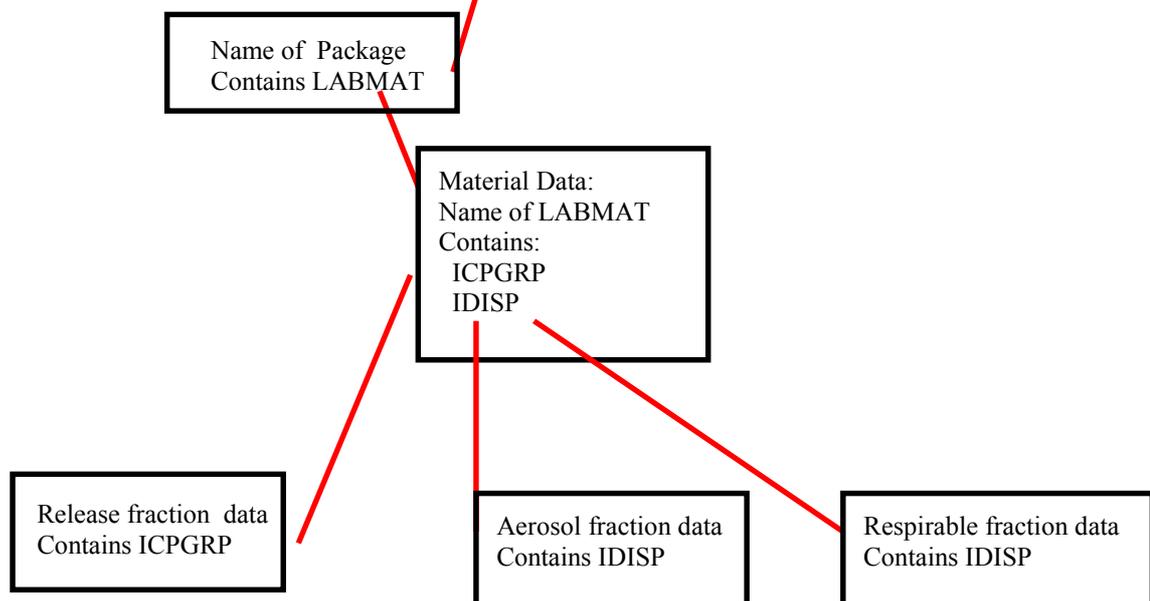


Figure 8, Packages-Release data.



2.6.8.1 Main Package Data

This database includes the following parameters:

Package	- name of the package data set
Description	- description of the data set
LABMAT	- label of the user-defined material
PKGSHP	- number of identical packages
TIPKG	- TI, package dose at 1m (mSv/h)
FRGAMA	- fraction of effective dose that is gamma radiation
FRNEUT	- fraction of effective dose that is neutron radiation (1 - FRGAMA)
PKGSIZ	- characteristic package dimension (m)

The data in the Package database will be a collection of different shipments of material which are considered typical. Different records may contain the same material but with different TI, size and/or number of identical packages as long as the name of the "Package" is different.

The material label LABMAT **must** correspond to one or several lines of different isotopes with the same LABMAT in the Material database; otherwise the generation of the input file will be aborted.

2.6.8.2 Material Data (Content)

This database includes the following parameters:

LABMAT	- label of user-defined material
Description	- description of data set
LIBSAV	- isotope name eg (CO60)
IPCGRP	- physical-chemical group label
CIPKG	- activity for this isotope in this material (Bq)
IDISP	- dispersibility category
RPCVAL[Q] inhaled	- factors to determine dose to eight organs per unit of radioactivity inhaled
INGVAL[Q] ingested	- factors to determine dose to eight organs per unit of radioactivity ingested

The RPCVAL and INGVAL data are used only when NONUNIT is selected. View the RADTRAN 4 User Guide for more information.

The data in the Material database will be a collection of different typical materials. Data for different material labels is stored on several lines, one line per isotope in the material label. All isotope names specified by the array variable LIBSAV **must** either exist in the INTERTRAN2-RT4 library or be added using the Define database.

When constructing an input file, release fraction data sets, aerosol fraction data sets and respirable fraction data sets are automatically selected by the program on the basis of the number of severity categories specified in the Case Parameter data set selected and the

ICPGRP and IDISP values in the material data set selected. If compatible data sets are not available the program alerts the user. If two sets of compatible data are available the program will normally select the first set; the user should avoid this.

2.6.8.3 Release Fractions for different IPCGRP

This database includes the following parameters:

IPCGRP	- physical/chemical group label for the data set
NSEV	- number of severity categories for this data set
RFRAC[M]	- release fraction for each severity category

It is important that there is a data set for each IPCGRP that is going to be used and that the number of severity fractions (NSEV) corresponds to the number in the selected PARAMETER data set; otherwise the input file generation will be aborted.

2.6.8.4 Aerosol Fractions for different IDISP

This database includes the following parameters:

IDISP	- dispersibility category for the data set
NSEV	- number of severity categories for this data set
AERSOL[M]	- aerosolisation fraction for each severity category

The definition of different dispersibility categories is given in the RADTRAN 4 User Guide. It is important that there is a data set for each IDISP that is going to be used and that the number of severity fractions (NSEV) corresponds to the number in the selected PARAMETER data set; otherwise input file generation will be aborted.

2.6.8.5 Respirable Fractions for Different IDISP

This database includes the following parameters:

IDISP	- dispersibility category for the data set
NSEV	- number of severity categories for this data set
RESP[M]	- respirable fraction for each severity category

It is important that there is a data set for each IDISP that is going to be used and that the number of severity fractions (NSEV) corresponds to the number in the selected PARAMETER data set; otherwise input file generation will be aborted.

2.6.9 Parameter Set Data

The basic parameters for generating an input file (i.e., "case") are kept in this database. It contains the parameters associated with the keywords PARM and DIMEN which are the most frequently changed in the INTERTRAN2-RT4 input file. It is important, when creating an input file, that the data in the selected data set are consistent with user data selected from other database files.

This database includes the following parameters:

Name	- name of the data set
Description	- description of the data set
IRNKC	- flag for placing data on file 6
IUOPT	- shielding option flag
ISEN	- flag for printing sensitivity analysis and input tables
NRAD	- number of radial areas used for nondispersal accident analysis
NSEV	- number of severity categories
NAREAS	- number of areas for user-defined Pasquill data sets

The chosen value of NSEV **must** have corresponding data in all databases where the number of severity categories are included.

NRAD is the number of radial distances used for accidents with "loss of shielding". If this calculation is not wanted the value of NRAD **must** be 0. Otherwise the value of NRAD must correspond to a data set in the Radial Distance database (see section 2.6.10 to specify these distances).

For further information on the rest of the parameters and the default values, check the RADTRAN 4 User Guide.

2.6.10 Radial Distances - Nondispersal Accidents (RADIST)

This database includes the following parameters:

NRAD	- number of radial distances for this data set
NPOP	- number of the population zone
RADIST(NP)	- radii that define the exposure annuli used in the nondispersal accident model (m)

These data are used only for the nondispersal accident model, ie loss of shielding accident. The only way to include these data in your calculation is to give the parameter NRAD in the chosen Parameter data set a value (see section 2.6.9). The NRAD variable value requested **must** correspond to an existing data set in the Radial Distance database, and the number of NRAD data sets **must** be repeated for each requested population density zone; otherwise the generation of the input file will be aborted.

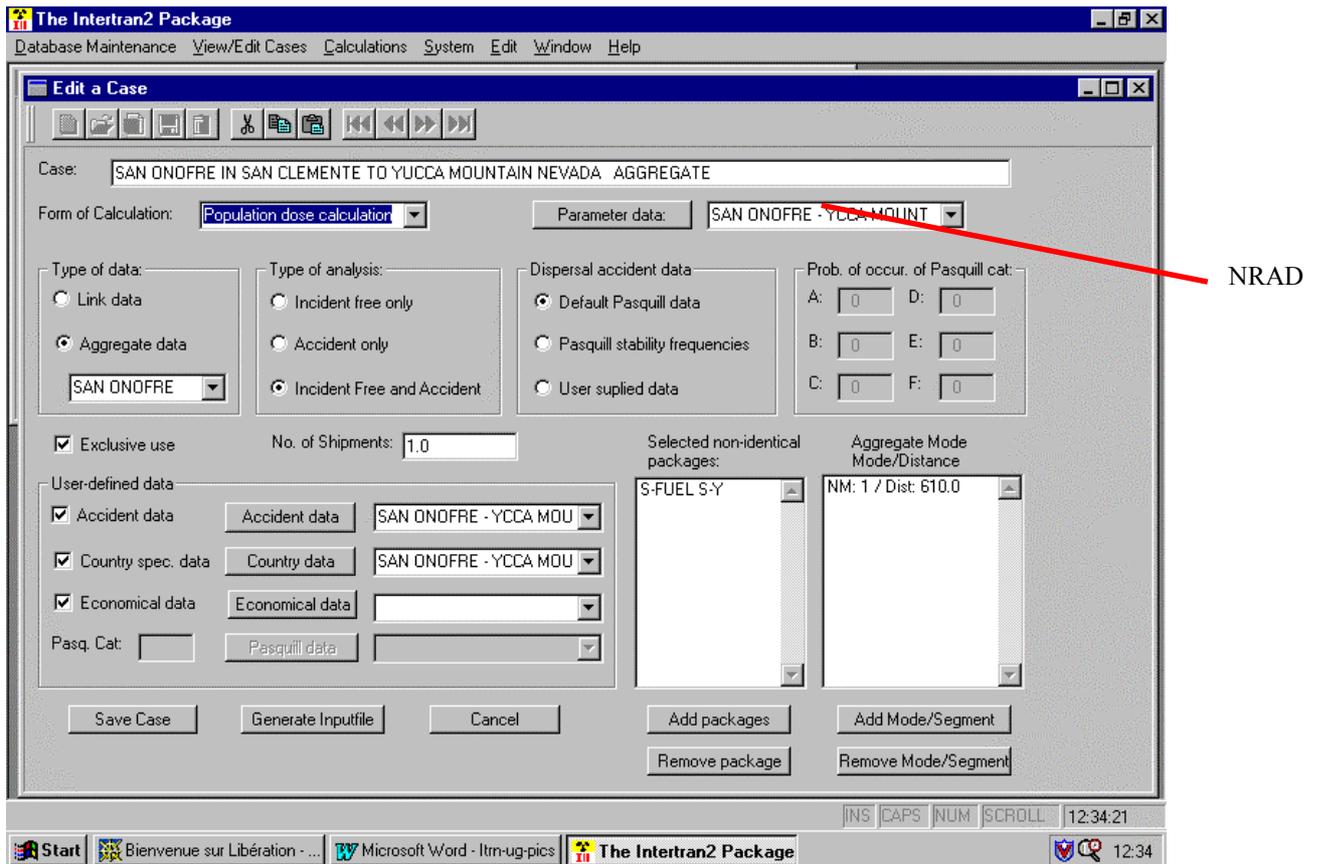


Figure 9, Radial distances, RADIST.

2.7 View/Edit Cases

The “View/Edit Cases” function permits the user to assemble combinations of INTERTRAN2 databases into the required risk assessment problem. Selecting this option will display the available cases. From this screen, the user can either edit an existing case or generate a new case. Under the “New” option the user can create a new risk assessment problem for INTERTRAN2-RT4 by selecting different data sets from the INTERTRAN2 databases.

The “New” option requires the user to develop a case from scratch.

However, if the user wishes to build upon previously developed cases, the user should highlight the desired case and choose the “Open” option. The user should then change the “Case” name to a new name, hit the “Save Case” button and then proceed with further edits.

After data sets in the different databases have been selected the program makes a quality control check for inconsistencies in the selection. If there are any errors the program will alert the user.

After the quality control check the program adjusts all data and records and the result is presented to the user on the screen. If the user is satisfied, the selections made can be saved into databases available for this purpose. Then it is possible to generate and later save the results to for INTERTRAN2-RT4.

It is also possible, from this screen, to delete a case that is no longer required.

Some example data and cases have been supplied with the INTERTRAN2 handler so that the users can become familiar with the system before creating their own files.

Observe !!! The user should not use the example cases as default data for his own analysis. The data is country and package specific and the user must use data appropriate to his own circumstances. Refer to Section 1 of the DATA COLLECTION CHAPTER of the Advisory Document for advice on collecting data.

2.7.1 New (Case)

The “New” button enables the user to create a INTERTRAN2-RT4 input file by selecting data sets from the databases and other options.

To generate a new case press the “New” button.

The main input screen will then be displayed.

Enter the name for the new case.

Select the form of the Calculation. The alternatives are “population dose calculation” (UNIT) or ”health effects calculation” (NONUNIT).

Observe !!! The methodology for calculating health effects used in INTERTRAN2-RT4 has been superseded. It is recommended that these calculations should only be used to determine whether any very high doses are likely and not used quantitatively.

The next step is to select the basic parameters for the case. The drop box will show all existing parameter data sets. Select the appropriate data set by clicking on the name in the drop box. To view the different data sets in the parameter database press the “Parameter data” button . It is possible to view, update or add information in the database (and all the databases with the exception of the isotopic data and aggregate mode databases). See Chapter 2.6.9 for further details on parameter data sets.

The next question is whether the program should use Aggregate or Link mode for the route. Mark the appropriate check box. If Aggregate mode is selected, the name of the corresponding data set should be selected. Select the appropriate data set by clicking on the name in the drop box. If no name is selected default data will be used.

The next step is to select the type of analysis. The options are:

- Incident free only
- Accident only
- Incident free and Accident

Mark the appropriate check box. Depending on the choice, the number of fields it is possible to access will differ. If Incident-free analysis is chosen, only the relevant options for this analysis will be accessible.

Next, the Dispersal accident data must be entered. (Not valid in the case of incident-free analysis.) The options are:

Default Pasquill data for stability frequencies and concentrations

Pasquill stability frequencies for preset dilution factors, default values for concentration

User supplied data (from Pasquill databases/TRANSAT), user defined stability frequencies and concentrations.

Mark the appropriate check box.

If “Default Pasquill data” is selected the program will clear the fields where it is possible to enter the probability for the different Pasquill categories in percent. **Observe that the total must be 100%.**

If “User supplied data” is selected the name of the user defined Pasquill table and the Pasquill category for calculation should be entered (currently INTERTRAN2-RT4 can only accept data for one user defined Pasquill category at a time). See Chapter 2.6.2 for further details on Pasquill databases. Select the appropriate data set by clicking on the name in the drop box. To view the different data sets in the parameter database press the “Pasquill data” button . It is possible to view, update or add information in the database.

If the transport will be exclusive use, mark the Exclusive Use check box.

Enter the number of shipments to be analysed for the case.

The next step is to enter the different packages to be included in the calculation. Press the “Add packages” button to get the content of the Main Package database. Select the appropriate packages by marking them, one at the time, and press the “Select” button. It is possible to update a package by pressing the “Edit” button. To edit the content of the packages, the Database Maintenance must be used. See Chapter 2.6.8 for further information on the package release databases. After selection of packages, close the “Select Packages” window.

The selected packages will be shown in the New Case window. To remove a package, mark the appropriate package in the “Select non-identical packages” box and press “Remove package”.

If Link Mode has been selected the window at the right bottom will say “Selected Link segments”. Press the “Add Mode/Segment” button to get the content of the Link database. Select the appropriate Links by marking them, one at the time, and press the “Select” button. It is possible to update a Link by pressing the “Edit” button. See Chapter 2.6.6 for further information on the Link database.

If Aggregate Mode has been selected the window at the right bottom will say “Aggregate Mode, Mode/Distance”. Press the “Add Mode/Segment” button to get a window where the Mode and the distance of transportation can be added. If a specific Aggregate data set is specified, the Mode will then be selected from the database. It is possible to make calculations for shipments involving more than one transport mode in the same INTERTRAN2-RT4 run, although there is a limitation on the combination of number of modes and number of different packages that can be used. See Chapter 2.6.7 for further information on the Aggregate database.

The next question is whether User Defined Data is to be used. If the check box “Accident data” is marked the program will use the data in the Accident Database, otherwise the program will use the default data in INTERTRAN2-RT4. If the check box is marked, the drop box will show all existing accident data sets. Select the appropriate data set by clicking on the name in the drop box. To view the different data sets in the accident database press the “Accident data” button. It is possible to view, update or add information in the database. See Chapter 2.6.1 for further details on accident data sets.

Observe !!! Accident data are different in different countries, the user should use their own accident data wherever possible (see Section 1 of the DATA COLLECTION CHAPTER of the Advisory Document).

If the user wants to use Country Specific Data, the check box “Country spec. data” must be marked. Then the program will use the data in the Country Database, otherwise the program will use the default data in INTERTRAN2-RT4. If the check box is marked, the drop box will show all existing accident data sets. Select the appropriate data set by clicking on the name in the drop box. To view the different data sets in the accident database press the “Country data” button. It is possible to view, update or add information in the database. See Chapter 2.6.3 for further details on country data sets.

The next step is to specify whether an Economic Calculation should be performed. (Not valid for incident-free analysis.) If the check box “Economical data” is marked the program will use the data in the Economical Database. If the check box is marked, the drop box will show all existing accident data sets. Select the appropriate data set by clicking on the name in the drop box. To view the different data sets in the economical database press the “Economical data” button. It is possible to view, update or add information in the database. See Chapter 2.6.4 for further details on economic data sets.

To save the case, press the button “Save Case”. This will save all the case data into the internal case handling databases.

Pressing “Cancel” will close the window and all data will be disregarded.

To generate an input file for INTERTRAN2-RT4, press the “Generate Input file” button.

If there are any serious problems with the combination of chosen data or any problems in the databases the program will inform the user of the problem. The problems are normally solved by changing the Parameter data set or changing the information in the relevant database.

If everything is correct the generated input file will be displayed on a new screen. If the result is acceptable, press the “Save file” button. Pressing this button will open a save file dialogue. The window will start in the “Default Input/Output directory”, (see Chapter 2.6.4 for further details). Enter the desired name of the input file with the extension **.INP**.

2.7.2 Open (Case)

To modify or copy an old case press the button “Open”.

The main input screen will then be displayed with the selections of the old case as a default. Then proceed as for a new case, the default selections, may be accepted or changed.

Observe !!! If the Case name is changed, the case will be saved as a new case, the name will not be changed in the existing case.

2.7.3 Delete (Case)

Press the “Delete” button to delete a case that is no longer needed. The highlighted case is deleted from the internal databases. The user will be prompted before actual delete.

Deleting the Case will not result in the deletion of the previously developed INTERTRAN2-RT4 input file used in the INTERTRAN2-RT4 calculation.

2.8 Calculations

2.8.1 Perform Calculation

To make a INTERTRAN2-RT4 calculation select this menu option.

An “Open File” window will be shown, showing all files the extension **.INP**. The user may also navigate to other subdirectories when needed. Click on the appropriate file and press “Open”. The calculation will start and the INT2RT4 window will show "Running" at the bottom line until the calculation is done. The window will also state the mode of calculation. When the calculation has finished, the program will notify the user. Then the user must exit the INTERTRAN2-RT4 window.

A “Save As” window will now be displayed. The result file **must** be saved to be able to view the result later using a word processor or other programme.

The window will suggest the same name as the input file, but with the extension **.OUT**. Save the file with the appropriate name.

2.8.2 How to view the result from a calculation

There is no direct way to view the result of the calculation in INTERTRAN2. This is intentional, since most users prefer their own editor.

To view the result, open the **Windows Explorer** and double-click on the output file. If there is no program associated with the extension **.OUT**, Explorer will ask what program to open the file with. We would recommend to use **WORDPAD** or **NOTEPAD** as the standard viewer, but all other editors can be used. Word or Word Perfect is also possible to use but takes a little longer to load each time.

2.9 System

The menu "System" contains a tool for reindexing the databases and a tool for selecting the "Default Input/Output directory".

2.9.1 Reindex All Files

If the databases behave in an unexpected way or if a lot of data have been deleted, it is a good idea to run the reindex option. This will reindex and pack all database and index all files. When deleting data within the system the data are only marked "deleted" in the database files, packing moves data forward to use the disk space the "deleted" files occupy.

A hourglass will be shown during this process.

The reindex function is only active from the main INTERTRAN2 menu, with all other windows closed.

2.9.2 Set Default Input/Output directory

The input and output files will automatically be directed to the "Default Input/Output directory". The directory can always be changed to any directory at the time of saving.

To set or change the default directory, select this menu option. Click on the desired default directory and press "OK".

"Cancel" will not change anything.

The default directory set at installation is the same as the directory chosen for Intertran2.

3. THE INTERTRAN2, TECHNICAL DESCRIPTION AND PROGRAMMER'S MANUAL

This chapter contains a description of the basic structure of the INTERTRAN2 handler.

3.1 Basic Structure

The INTERTRAN2 is written in CA Visual Objects and is only run able under Windows 95/98, Windows NT or Windows 2000. The databases are of XBASE type. All executable files, database files and system files are contained in the chosen installation directory.

The databases can be directly accessed using the CLIPPER DBU utility. Changing data directly is not, however, recommended. Failure to correctly handle changes may destroy the data in the database files. The INTERTRAN2 handler is designed to adjust and handle all data from within the system.

All database structures, where user data are maintained, and the index keys, are presented in Appendix 1. A full description of the databases and how they are used is given in Chapter 2.

3.2 Case Handling

To be able to keep track of previously saved data selections (or "cases") the program uses several databases. The main database is MAIN.DBF. This database contains the basic selections for each saved case. Multiple selections of data, like different packages, link, and modes, are saved in the databases MAINPACK.DBF, MAINLINK.DBF and MAINNORM.DBF. These databases are connected to the MAIN.DBF database.

When saving a case or deleting a case, these databases are automatically updated.

3.3 Registry

The Windows registry is used to keep track of the installation directory and the Default I/O directory.

Observe !!! The registry of the installation directory is only updated the first time the program is ran after installation. **If the files in the original installation directory is changed, the registry **must** be updated manually (or reinstalled).**

To do this: Press the Windows Start button and select Run... Select the C:\Windows\Regedit.exe program and press "OK". The key to change is found under:

HKEY_CURRENT_USER\Software\ComputerAssociates\CA-Visual Objects Applications\
Intertran2\Directories

Double click on the key "ITRNdirectory" and enter the new correct path.

3.4 Uninstallation

To uninstall the INTERTRAN2 program, Select “My Computer” - “Control Panel” - “Add/Remove Programs”. Mark INTERTRAN, and press the “Add/Remove” button. Select INTERTRAN2 and press OK.

OBSERVE!!! The registry keys are not removed, if the program is installed again in another directory the registry must be changed manually. (See Chapter 3.3)

3.5 Version number

The version number can be found under main Menu item: Help, option: About.

3.6 Using non-SI units.

The INTERTRAN2 handler uses SI-units. The previous Radtran4 did not.

The INTERTRAN2-RT4 which is used for calculations and RADTRAN4.019IOSI can handle both. Even if the INTERTRAN2 handler states SI-units it is possible to use the non-SI units. Eg. Ci instead of Bq and rem instead of Sv.

To run the INTERTRAN2 in non SI-mode, the following must be done.

All data must be entered in Ci and rem instead of Bq and Sv, regardless of what is stated on the information line and the documentation. (The CULVL field should be μCi).

In the installation directory, rename the file RT4int.dat to something else, and rename the file RT4int0.dat to RT4int.dat. This will set the SI-switch to non-SI units.

Rename the file RT4iso.dat to something else, and rename the file RT4iso0.dat to RT4iso.dat. This will define the isotope data to non-SI units.

3.7 Bugs

If a “bug” is detected that makes the system to crash, a window will be shown, we recommend that the program should be aborted, and that a reindex is made at next start-up.

Report the bug to AMC Konsult AB, by E-mail: cj@amckonsult.se . Describe the error and attach the file Voerror.log. This file will give a detailed description of the point of failure.

3.8 Using data bases from the previous Intertran2 pre-processor or β -versions

For users wanting to keep data from the Intertran2 pre-processor or .-versions with version-number lower than 0.90.

It is possible to keep some of the data previously put together. The databases MAIN.DBF, NORMAL.DBF have been altered.

CAUTION!!! To use the old databases, copy the database files listed in Appendix 1, **except** NORMAL.DBF, MAIN.DBF, MAINLINK.DBF, MAINNORM.DBF and MAINPACK.DBF to the Intertran2 installation directory. Be aware of that the new program uses **SI-units** and older versions not!! All fields containing previous non SI-units **must** be edited and recalculated.

Be careful with the NORMAL.DBF, if this is to be copied, the field NORMNAME MUST be added according to the file description in Appendix1. This can be done using DBU.EXE.

If the cases is to be kept the MAIN.DBF must be updated. The field NORMNAME MUST be added according to the file description in Appendix1. This can be done using DBU.EXE. After updating of MAIN.DBF the files: MAINLINK.DBF, MAINNORM.DBF and MAINPACK.DBF should be copied to the Intertran2 installation directory.

REINDEX at the start of the program!

WARNING!!! Erratic changes and copying may cause the program to stop working. In such case, uninstall the program and install again. (See Chapter 3.4)

3.9 Saving/Moving data in the databases

To move the content or save the content (Backup) in the databases, all files with the extension **.DBF** must be copied to another folder than the folder where INTERTRAN2 is installed.

To do this, open Explorer, it is possible to sort by extension pressing the TYPE column header. Highlight all files with the extension **.DBF** right klick and copy to the buffer.

Move to the target folder and right klick to paste.

Alternatively go to the MS-DOS Prompt, and execute the following command:

```
COPY c:\intertran2\*.dbf targetdrive:\ targetdirectory (assuming the  
drive/directory names are as chosen)
```

To restore data into the INTERTRAN2, copy the moved/saved files into the folder where INTERTRAN2 is installed.

OBSERVE! At startup after copying files into the INTERTRAN2 folder, Reindex **MUST** be ran.

Appendix 1.

Database structures.

File Structures

Name	FIELD	Type	Len	Dec	Description
------	-------	------	-----	-----	-------------

** File Name: AERSOL

AERSOL contents fractions of each isotope for a dispersibility group (LABMAT) released in aerosol form in an accident of each severity.

INDEX1: STR(IDISP,2,0)+STR(NSEV,2,0)

IDISP	N	2	Name of dispersibility group.
NSEV	N	2	Number of severity categories for this group.
AERSOL1	C	10	Fraction for severity category 1.
AERSOL2	C	10	Fraction for severity category 2.
AERSOL3	C	10	Fraction for severity category 3.
AERSOL4	C	10	Fraction for severity category 4.
AERSOL5	C	10	Fraction for severity category 5.
AERSOL6	C	10	Fraction for severity category 6.
AERSOL7	C	10	Fraction for severity category 7.
AERSOL8	C	10	Fraction for severity category 8.
AERSOL9	C	10	Fraction for severity category 9.
AERSOL10	C	10	Fraction for severity category 10.
AERSOL11	C	10	Fraction for severity category 11.
AERSOL12	C	10	Fraction for severity category 12.
AERSOL13	C	10	Fraction for severity category 13.
AERSOL14	C	10	Fraction for severity category 14.
AERSOL15	C	10	Fraction for severity category 15.
AERSOL16	C	10	Fraction for severity category 16.
AERSOL17	C	10	Fraction for severity category 17.
AERSOL18	C	10	Fraction for severity category 18.
AERSOL19	C	10	Fraction for severity category 19.
AERSOL20	C	10	Fraction for severity category 20.

File Structures

Name	FIELD	Type	Len	Dec	Description
------	-------	------	-----	-----	-------------

** File Name: ARATMZ

ARATMZ contents accident rates for the three population densities.

INDEX1: NM+ACCNAME

NM	C	2			Mode.
ACCNAME	C	12			Name of accident data set.
ARATMZ1	C	10			Accident rate for RURAL zone.
ARATMZ2	C	10			Accident rate for SUBURBAN zone.
ARATMZ3	C	10			Accident rate for URBAN zone.

File Structures

Name	FIELD Type	Len	Dec	Description
** File Name: COUNTRY				
COUNTRY contents all country specific data.				
INDEX1: COUNNAME				
COUNNAME	C	12		Name of parameter set.
DESCRIP	C	25		Description of data set.
POPDEN1	C	10		Rural population density (people/km ²).
POPDEN2	C	10		Suburban population density (people/km ²).
POPDEN3	C	10		Urban population density (people/km ²).
RPD	C	10		Ratio of pedestrian density to residential population density in suburban areas.
RR	C	10		Building shielding factor for rural zones.
RS	C	10		Building shielding factor for suburban zones.
RU	C	10		Building shielding factor for urban zones.
FNOATT	C	10		Number of flight attendants for commercial passenger-air mode.
PKGSIZ1	C	10		First package-size threshold.
PKGSIZ2	C	10		Second package-size threshold.
ITRAIN	C	10		Rail mode factor.
Values are:				
1 - General freight				
2 - Dedicated rail				
BDF	C	10		Building dose factor.
XFARM	C	10		Fraction of rural land under cultivation.
CULVL	C	10		Cleanup level following an accident (. Bq/m ²)
BRATE	C	10		Breathing rate (m ³ /s)
EVAC	C	10		Evacuation time (days)

File Structures

Name	FIELD Type	Len	Dec	Description
** File Name: DEFINE				
DEFINE contents user defined isotope data.				
INDEX1: ISONAM				
ISONAM	C	10		Name of isotope.
ACCDNT1	C	10		Half-life of isotope (days).
ACCDNT2	C	10		Photon energy (MeV).
ACCDNT3	C	10		Cloud-shine dose factor (Sv-m ³ /Bq-s).
ACCDNT4	C	10		Effective dose equivalent for inhalation (Sv/Bq inhaled).
ACCDNT5	C	10		Effective dose equivalent for ingestion (Sv/Bq ingested).
ACCDNT6	C	10		Food transfer factor (Bq ingested/Bq incorporated in food).
ACCDNT7	C	10		Soil transfer factor (Bq ingested/Bq deposited on food).
ACCDNT8	C	10		Deposition velocity of aerosol (m/s).
ACCDNT9	C	10		Numerical designator for acute pulmonary dose-response curve.

Values are:

- 1 - Short half-life (<365 days)
- 2 - Long half-life, low LET
- 3 - Long half-life, high LET

ACCDNT10	C	10		One-year inhalation dose to lung (Sv/Bq inhaled).
ACCDNT11	C	10		One-year inhalation dose to marrow (Sv/Bq inhaled).

File Structures

Name	Type	Len	Dec	Description
** File Name: ECONOMIC				
ECONOMIC contents all economy specific data.				
INDEX1: ECONNAME+STR(NSEV,2,0)				
ECONNAME	C	12		Name of economy data set.
DESCRIP	C	25		Description of data set.
NSEV	N	2		Number of severity categories for this data set.
ECONF	C	10		Economic factor to account for inflation.
ONSCST1	C	10		Cost associated with transport link restoration.
ONSCST2	C	10		Cost associated with transport link restoration.
ONSCST3	C	10		Cost associated with transport link restoration.
ONSCST4	C	10		Cost associated with transport link restoration.
EMRCST1	C	10		Immediate response cost for severity category 1.
EMRCST2	C	10		Immediate response cost for severity category 2.
EMRCST3	C	10		Immediate response cost for severity category 3.
EMRCST4	C	10		Immediate response cost for severity category 4.
EMRCST5	C	10		Immediate response cost for severity category 5.
EMRCST6	C	10		Immediate response cost for severity category 6.
EMRCST7	C	10		Immediate response cost for severity category 7.
EMRCST8	C	10		Immediate response cost for severity category 8.
EMRCST9	C	10		Immediate response cost for severity category 9.
EMRCST10	C	10		Immediate response cost for severity category 10.
EMRCST11	C	10		Immediate response cost for severity category 11.
EMRCST12	C	10		Immediate response cost for severity category 12.
EMRCST13	C	10		Immediate response cost for severity category 13.
EMRCST14	C	10		Immediate response cost for severity category 14.
EMRCST15	C	10		Immediate response cost for severity category 15.
EMRCST16	C	10		Immediate response cost for severity category 16.
EMRCST17	C	10		Immediate response cost for severity category 17.
EMRCST18	C	10		Immediate response cost for severity category 18.
EMRCST19	C	10		Immediate response cost for severity category 19.
EMRCST20	C	10		Immediate response cost for severity category 20.

File Structures

Name	FIELD	Description
Type	Len Dec	

** File Name: LINK

LINK contents data for each user defined route segment.

INDEX1: LINKNAME+LMODE

LINKNAME	C	12	Name of route segment.
DESCRIP	C	25	Description of route segment.
LMODE	C	2	Mode for segment.
LDIST	C	10	Length of route segment.
LSPED	C	10	Speed of vehicle on route segment (km/h).
LPOPD	C	10	Population density along route segment (persons/km ²).
LVDEN	C	10	One-way vehicle density on route segment (vehicles/h).
LARAT	C	10	Accident rate on route segment (accidents/km).
LZONE	C	10	Zone type for route segment.

Values are:

R - Rural
 S - Suburban
 U - Urban

LTYPE	C	10	Link type designator for route segment.
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Values are:

1 - Freeway
 2 - Non freeway
 3 - Other

File Structures

Name	FIELD Type	Len	Dec	Description
** File Name: MAIN				
MAIN contents data for saved cases.				
INDEX1: TITLE				
TITLE	C	74		Name of case.
FORM	C	10		Type of calculation.
				Values are:
				UNIT - population dose calculation
				NONUNIT - Health effects calculation
IANA	N	2		Analysis flag.
				Values are:
				1 - Incident-free only
				2 - Accident only
				3 - Both
IPSQB	N	2		Dispersal accident flag.
				Values are:
				0 - Default
				1 - Preset dilution factors
				Other - User-defined dilution factors
PARANAME	C	12		Name of parameter data set.
LCOUNTRY	C	1		User-defined data is used.
COUNNAME	C	12		Name of country data set.
LUSERACC	C	1		User-defined accident data is used.
LNORMAL	C	1		User-defined normal data set is used.
NORMLINK	C	1		Normal or Link data is used
				Values are:
				N - Normal data is used
				L - Link data is used
NONORLNK	N	2		Number of modes or links.
TABSPY	C	10		Number of shipments.
LECONOMY	C	1		Economic calculation is used.
ECONNAME	C	12		Name of economy data set.
LEXCLUDE	C	1		Exclusive use flag.
PASQNAME	C	12		Name of Pasquill data set.
PASQKAT	C	1		Pasquill category.
PASQPRCA	N	3		Pasquill percentage cat. A.
PASQPRCB	N	3		Pasquill percentage cat. B.
PASQPRCC	N	3		Pasquill percentage cat. C.
PASQPRCD	N	3		Pasquill percentage cat. D.
PASQPRCE	N	3		Pasquill percentage cat. E.
PASQPRCF	N	3		Pasquill percentage cat. F.
NORMNAME	C	12		Name of Normal data set.

File Structures

		FIELD		
Name	Type	Len	Dec	Description

** File Name: MAINPACK

MAINPACK contents data for the packages used in a case.

INDEX1: TITLE+PACKAGE

TITLE	C	74		Name of case.
PACKAGE	C	12		Package used.

File Structures

		FIELD		
Name	Type	Len	Dec	Description
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** File Name: MAINNORM

MAINNORM contents data for the modes used in a case.

INDEX1: TITLE+NM

TITLE	C	74	Name of case.
NM	C	2	Mode used.
DISTKM	C	10	Distance for actual mode.

File Structures

		FIELD		
Name	Type	Len	Dec	Description
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** File Name: MAINLINK

MAINLINK contents data for the links used in a case.

INDEX1: TITLE+LINKNAME

TITLE	C	74	Name of case.
LINKNAME	C	12	Name of Link data set.

File Structures

Name	Type	Len	Dec	Description
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** File Name: MATERIAL

MATERIAL contents isotopes for a user defined material label.

INDEX1: LABMAT+IPCGRP

LABMAT	C	10		Name of material label.
DESCRIP	C	25		Description of material label
LIBSAV	C	10		Name of isotope in material label.
IPCGRP	C	10		Name of physical-chemical group.
CIPKG	C	10		Curies per package.
IDISP	N	2		Dispersability category.
RPCVAL1	C	10		Dose factor inhaled to lung (1-year).
RPCVAL2	C	10		Dose factor inhaled to marrow (1-year).
RPCVAL3	C	10		Dose factor inhaled to gonads.
RPCVAL4	C	10		Dose factor inhaled to large lower intestine.
RPCVAL5	C	10		Dose factor inhaled to thyroid.
RPCVAL6	C	10		Dose factor inhaled to bone (50-year).
RPCVAL7	C	10		Dose factor inhaled to lung (50-year).
RPCVAL8	C	10		Dose factor inhaled to marrow (50-year).
INGVAL1	C	10		Dose factor ingested to lung (1-year).
INGVAL2	C	10		Dose factor ingested to marrow (1-year).
INGVAL3	C	10		Dose factor ingested to gonads.
INGVAL4	C	10		Dose factor ingested to large lower intestine.
INGVAL5	C	10		Dose factor ingested to thyroid.
INGVAL6	C	10		Dose factor ingested to bone (50-year).
INGVAL7	C	10		Dose factor ingested to lung (50-year).
INGVAL8	C	10		Dose factor ingested to marrow (50-year).

File Structures

Name	FIELD Type	Len	Dec	Description
** File Name: NORMAL				
NORMAL contents user defined normal data.				
INDEX1: NORMNAME+NM				
NM	C	2		Mode.
DESCRIP	C	25		Description of data set.
FTZNR	C	10		Fraction of travel in rural zone.
FTZNS	C	10		Fraction of travel in suburban zone.
FTZNU	C	10		Fraction of travel in urban zone.
VELR	C	10		Velocity in rural zone.
VELS	C	10		Velocity in suburban zone.
VELU	C	10		Velocity in urban zone.
CREWNO	C	10		Number of crew.
ADSTCW	C	10		Average distance from radiation source to crew (m).
HANDNO	C	10		Number of handlings.
STOPTIM	C	10		Stop time (h/km).
MINST	C	10		Minimum stop time (h).
TIMZR	C	10		Distance-independent stop time per trip (h).
FMINCL	C	10		Minimum number of rail inspections or classifications.
PDST	C	10		Number of persons exposed during shipment.
RST	C	10		Average exposure distance when stopped during shipment (m).
DTSTOR	C	10		Storage time per shipment (h).
PDSTOR	C	10		Number of persons exposed during storage.
RSTOR	C	10		Average exposure distance when shipment is stored (m).
PPV	C	10		Number of persons per vehicle sharing the transport link.
FRSHR	C	10		Fraction of urban travel during rush hour.
FCTST	C	10		Fraction of urban travel on city streets.
FTLFWY	C	10		Fraction of rural and suburban travel on freeways.
TCNTPR	C	10		One-way traffic count in rural zones (vehicles/h).
TCNTPS	C	10		One-way traffic count in suburban zones (vehicles/h).
TCNTPU	C	10		One-way traffic count in urban zones (vehicles/h).
NORMNAME	C	12		Name of data set

File Structures

		FIELD		
Name	Type	Len	Dec	Description

** File Name: PACKAGE

PACKAGE contents data for a user defined package.

INDEX1: PACKAGE

PACKAGE	C	12		Name of package.
DESCRIP	C	25		Description of package
LABMAT	C	10		Material label defining the content of the package.
PKGSHP	C	10		Number of identical packages.
TIPKG	C	10		Package dose rate at 1 m (mSv/h)
FRGAMA	C	10		Fraction of effective dose rate that is gamma radiation.
FRNEUT	C	10		Fraction of effective dose rate that is neutron radiation.
PKGSIZ	C	10		Characteristic package dimension.

File Structures

Name	FIELD Type	Len	Dec	Description
** File Name: PARAM				
PARAM contents all values for PARM.				
INDEX1: PARANAME				
PARANAME	C	12		Name of parameter set.
DESCRIP	C	25		Description of data set.
IRNKC	N	2		Flag for placing data on file 6.
				Values are:
				1 - Yes (Default)
				Other - No
IUOPT	N	2		Shielding option flag.
				Values are:
				1 - Persons in buildings fully shielded
				2 - Persons in buildings exposed at reduced level (Default)
				3 - No shielding is considered
ISEN	N	2		Flag for printing sensivity analysis and input tables.
				Values are:
				1 - Incident-free and accident output tables
				2 - As 1 plus early effects and ground contamination tables
				>=3 - As 2 plus sensivity and consequence tables (Default)
NRAD	N	2		Number of radial areas used for nondispersal accident analysis.
				Maximum = 15 (No Default)
NSEV	N	2		Number of severity categories.
NAREAS	N	2		
GAMMA	C	10		Not used
NEUTRON	C	10		Not used

File Structures

Name	FIELD	Type	Len	Dec	Description
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** File Name: PASQUIL

PASQUIL contents data for user defined pasuill data tables.

INDEX1: PASQNAME+PASQKAT+RELHEIGT

PASQNAME	C	12			Name of pasquill table.
PASQKAT	C	1			Pasquill category.
RELHEIGT	C	3			Release height for pasquill table.
NAREAS	N	2			Number of areas used in dispersion calculation.
AREADA	C	10			Area of each isodose area (m ²).
DFLEV	C	10			Time-integrated concentration of radionuclide in aerosol.

File Structures

		FIELD		
Name	Type	Len	Dec	Description

** File Name: RADIST

RADIST defines the exposure anulii used in nondispersal accident model.

INDEX1: STR(NOAREAS)+NPOP

NORADAREA	N	2		Value of NRAD
NPOP	C	1		Population zone.
RADIST1	C	10		Radial distance for area 1.
RADIST2	C	10		Radial distance for area 2.
RADIST3	C	10		Radial distance for area 3.
RADIST4	C	10		Radial distance for area 4.
RADIST5	C	10		Radial distance for area 5.
RADIST6	C	10		Radial distance for area 6.
RADIST7	C	10		Radial distance for area 7.
RADIST8	C	10		Radial distance for area 8.
RADIST9	C	10		Radial distance for area 9.
RADIST10	C	10		Radial distance for area 10.
RADIST11	C	10		Radial distance for area 11.
RADIST12	C	10		Radial distance for area 12.
RADIST13	C	10		Radial distance for area 13.
RADIST14	C	10		Radial distance for area 14.
RADIST15	C	10		Radial distance for area 15.

File Structures

Name	FIELD		Description
	Type	Len Dec	

** File Name: RESP

RESP contents fractions of each aerosolized isotope for a dispersibility group (LABMAT) respirable in an accident of each severity.

INDEX1: STR(IDISP,2,0)+STR(NSEV,2,0)

IDISP	N	2	Number of dispersibility group.
NSEV	N	2	Number of severity categories for this group.
RESP1	C	10	Fraction for severity category 1.
RESP2	C	10	Fraction for severity category 2.
RESP3	C	10	Fraction for severity category 3.
RESP4	C	10	Fraction for severity category 4.
RESP5	C	10	Fraction for severity category 5.
RESP6	C	10	Fraction for severity category 6.
RESP7	C	10	Fraction for severity category 7.
RESP8	C	10	Fraction for severity category 8.
RESP9	C	10	Fraction for severity category 9.
RESP10	C	10	Fraction for severity category 10.
RESP11	C	10	Fraction for severity category 11.
RESP12	C	10	Fraction for severity category 12.
RESP13	C	10	Fraction for severity category 13.
RESP14	C	10	Fraction for severity category 14.
RESP15	C	10	Fraction for severity category 15.
RESP16	C	10	Fraction for severity category 16.
RESP17	C	10	Fraction for severity category 17.
RESP18	C	10	Fraction for severity category 18.
RESP19	C	10	Fraction for severity category 19.
RESP20	C	10	Fraction for severity category 20.

File Structures

Name	Type	Len	Dec	Description
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** File Name: RFRAC

RFRAC contents fractions of each material group (LABMAT) released in an accident of each severity.

INDEX1: ICPGRP+STR(NSEV,2,0)

ICPGRP	C	10		Name of physical-chemical group.
NSEV	N	2		Number of severity categories for this group.
RFRAC1	C	10		Fraction for severity category 1.
RFRAC2	C	10		Fraction for severity category 2.
RFRAC3	C	10		Fraction for severity category 3.
RFRAC4	C	10		Fraction for severity category 4.
RFRAC5	C	10		Fraction for severity category 5.
RFRAC6	C	10		Fraction for severity category 6.
RFRAC7	C	10		Fraction for severity category 7.
RFRAC8	C	10		Fraction for severity category 8.
RFRAC9	C	10		Fraction for severity category 9.
RFRAC10	C	10		Fraction for severity category 10.
RFRAC11	C	10		Fraction for severity category 11.
RFRAC12	C	10		Fraction for severity category 12.
RFRAC13	C	10		Fraction for severity category 13.
RFRAC14	C	10		Fraction for severity category 14.
RFRAC15	C	10		Fraction for severity category 15.
RFRAC16	C	10		Fraction for severity category 16.
RFRAC17	C	10		Fraction for severity category 17.
RFRAC18	C	10		Fraction for severity category 18.
RFRAC19	C	10		Fraction for severity category 19.
RFRAC20	C	10		Fraction for severity category 20.

File Structures

Name	FIELD Type	Len	Dec	Description
** File Name: SEVFRC				
SEVFRC contents fraction of accident for a certain mode and population zone.				
INDEX1: NMODE+NPOP+ACCNAME				
NMODE	N	2		Mode.
NPOP	C	1		Population zone.
Values are:				
1 - Rural				
2 - Suburban				
3 - Urban				
ACCNAME	C	12		Name of accident data set.
NSEV	N	2		Number of severity categories for this data set.
SEVFRC1	C	10		Fraction of accidents in severity category 1.
SEVFRC2	C	10		Fraction of accidents in severity category 2.
SEVFRC3	C	10		Fraction of accidents in severity category 3.
SEVFRC4	C	10		Fraction of accidents in severity category 4.
SEVFRC5	C	10		Fraction of accidents in severity category 5.
SEVFRC6	C	10		Fraction of accidents in severity category 6.
SEVFRC7	C	10		Fraction of accidents in severity category 7.
SEVFRC8	C	10		Fraction of accidents in severity category 8.
SEVFRC9	C	10		Fraction of accidents in severity category 9.
SEVFRC10	C	10		Fraction of accidents in severity category 10.
SEVFRC11	C	10		Fraction of accidents in severity category 11.
SEVFRC12	C	10		Fraction of accidents in severity category 12.
SEVFRC13	C	10		Fraction of accidents in severity category 13.
SEVFRC14	C	10		Fraction of accidents in severity category 14.
SEVFRC15	C	10		Fraction of accidents in severity category 15.
SEVFRC16	C	10		Fraction of accidents in severity category 16.
SEVFRC17	C	10		Fraction of accidents in severity category 17.
SEVFRC18	C	10		Fraction of accidents in severity category 18.
SEVFRC19	C	10		Fraction of accidents in severity category 19.
SEVFRC20	C	10		Fraction of accidents in severity category 20.

File Structures

Name	FIELD		Description
	Type	Len Dec	
** File Name: CASTEMP			Systemfile
** File Name: IANA			Systemfile
** File Name:IDISP			Systemfile
** File Name:MODE			Systemfile
** File Name: FORM			Systemfile