Issued by Sandia National Laboratories, operated for the United States Department of Energy by Sandia Corporation.

NOTICE: This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government, any agency thereof or any of their contractors or subcontractors. The views and opinions expressed herein do not necessarily state or reflect those of the United States Government, any agency thereof or any of their contractors.

Printed in the United States of America. This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from
Office of Scientific and Technical Information
PO Box 62
Oak Ridge, TN 37831

Prices available from (615) 576-8401, FTS 626-8401

Available to the public from
National Technical Information Service
US Department of Commerce
5285 Port Royal Rd
Springfield, VA 22161

NTIS price codes
Printed copy: A04
Microfiche copy: A01

Distribution Category
UC-604

SAND90-7022
Unlimited Release
November 1990

SAND--90-7022

DE91 006435

DOCUMENTATION FOR RISKIN:
A RISK INTEGRATION CODE FOR MACCS OUTPUT

Judith A. Rollstin
GRAM, Inc.
1709 Moon NE
Albuquerque, New Mexico 87112

Kou-John Hong
Environmental Assessment
and Information Sciences Division
Argonne National Laboratories
Argonne, Illinois 60439

Sandia Project Monitor: Robert M. Cranwell
Work Performed Under Sandia Contract No. 05-9361

ABSTRACT

This document has been prepared as a user's guide for the computer program RISKIN developed at Sandia National Laboratories. The RISKIN code generates integrated risk tables and the weighted mean risk associated with a user-selected set of consequences from up to five output files generated by the MELCOR Accident Consequence Code System (MACCS). Each MACCS output file can summarize the health and economic consequences resulting from up to 60 distinct severe accident source terms. Since the accident frequency associated with these source terms is not included as a MACCS input parameter, a postprocessor is required to derive results that must incorporate accident frequency. The RISKIN code is such a postprocessor. RISKIN will search the MACCS output files for the mean and peak consequence values and the complementary cumulative distributive function (CCDF) tables for each requested consequence. Once obtained, RISKIN combines this data with accident frequency data to produce frequency weighted results. A postprocessor provides RISKIN an interface to the proprietary DISSPLA plot package. The RISKIN code has been written using ANSI Standard FORTRAN 77 to maximize its portability.

MASTER

Table of Contents

	Page
1.0 INTRODUCTION	1
2.0 USER'S GUIDE	2
2.1 Input Parameters	2
2.1.1 Site Name	2
2.1.2 Number of MACCS Output Files to be Included	3
2.1.3 Offsite vs Onsite File Specification	3
2.1.4 Reactor Type	3
2.1.5 Number and Names of Consequences for which Output is Requested	4
2.1.6 Information Associated with the Requested Consequences	5
2.1.7 Frequency Associated with Each Source Term Included in Each MACCS Run	6
2.2 Printing Options	6
2.2.1 Subset of Consequences to be Included in the Table of Mean Values	7
2.2.2 Subset of Consequences for which Integrated Risks are Calculated	8
2.2.3 Set of Exceedence Frequencies for which Associated Interpolated Consequence Values are Requested	8
2.3.4 Subset of Consequences for which Integrated Risk Curves are Requested	8
3.0 PROGRAM OVERVIEW	9
3.1 Modular Structure	9
3.2 Subprogram Components of RISKIN	10
3.3 Subprogram Descriptions	11
4.0 SAMPLE PROBLEM OUTPUT	13
4.1 Sample Input File to be Used by RISKIN.....	15
4.2 Sample Command File to be Used with RISKIN and PLOT.....	17
4.3 Sample Output from RISKIN	23
4.4 Sample Output File to be Used By DISSPLA	29
4.5 Sample Command File to be Used with PLOT	35
4.6 Sample FORTRAN Program (PLOT) to be Used with DISSPLA.....	37
4.7 Sample of Exceedence Frequency (Integrated Risk) Curves from the Execution of DISSPLA	47

ACKNOWLEDGEMENT

The authors would like to express their appreciation to Ken Evans Jr. (ANL) and Bruce Biwer (ANL) for their useful comments and insights during the development of the RISKIN code and to Jeremy L. Sprung (SNL) and David I. Chanin (Technadyne Engineering Consultants, Inc.) for their helpful review of a draft version of this report.

1.0 INTRODUCTION

This document provides an introduction to the RISKIN code. This code was developed for Argonne National Laboratory to be used as a postprocessor for results calculated by the MACCS (MELCOR Accident Consequence Code System) code during the generation of results for the New Production Reactor Environmental Impact Statement.

Each MACCS output file can summarize the health and economic consequences resulting from up to 60 severe accident source terms. Since the accident frequency associated with each of these source terms is not a MACCS input parameter, a postprocessor is required to derive results that incorporate frequency. RISKIN is such a postprocessor. RISKIN generates integrated risk tables and the associated weighted mean risk for a user-defined set of consequences from up to five MACCS output files. The number of consequences for which these measurements can be evaluated is currently limited only by the output specifications of Argonne National Laboratory. These limitations and the tasks required to expand the current capabilities will be discussed in Section 2.2.

For each user-specified consequence, the RISKIN code will search MACCS output files for mean and peak consequence values and the complementary cumulative distribution function (CCDF) table. The weighted mean risk and a single integrated risk table is derived for each specified consequence.

To enhance the RISKIN code, a plotting capability for the integrated risk tables is provided by a postprocessor called PLOT. PLOT utilizes the proprietary DISSPLA software package. A copy of the PLOT program has been included in this document.

Two files comprise the output from RISKIN: (1) a primary output file containing a complete record of the calculations that were performed, and (2) a secondary output file consisting solely of numeric values to be used by the postprocessor PLOT to obtain graphs of the integrated risk tables using DISSPLA.

The remainder of this document will describe the capabilities, limitations, and structure of the RISKIN code. Section 2 is a user's guide that describes the capabilities and limitations of the code. In addition, Section 2 gives guidance concerning the changes required to obtain specific types of output. Section 3 is an overview of the structure of the RISKIN code. Finally, a sample of the output currently obtainable from the RISKIN code can be found in Section 4.

2.0. USER'S GUIDE

In its current form, the RISKIN code incorporates considerable output flexibility. On the other hand, the formatting of output has resulted in a number of output limitations. In this section, both of these aspects of the code will be addressed and instructions that allow the flexibility of the code to be maximized will be discussed.

Flexibility is obtained in the RISKIN code primarily via user input. This input is supplied both via an input file and by making changes to actual coding. The current version of the RISKIN code is run using a command file, and will calculate the results for a single MACCS output file or the combined results for up to five MACCS output files.

Where flexibility has been planned for, but must be incorporated by making changes to coding, the code sections requiring changes have been clearly marked within the body of the code. These code sections are indicated by boxes of asterisks, and are labelled within the code as INPUT DATA. These input sections can be found in the Main Program of RISKIN as well as in the Subroutine PRINTA. In addition, PARAMETER statements must be updated and made consistent in the Main Program of RISKIN as well as in the following subprograms: GETDAT, SETPT1, RD1CAT, SETPT2, ENDSTM, RD1TBL, ADJTBL, GETRSK, PRINTA, and LEADPG.

The following discussion begins with the input parameters and then considers the flexibility and limitations of output options.

2.1 Input Parameters

2.1.1 Site Name

The site name is used for output identification. The number of sites is currently limited to four: Savannah River, Idaho, and both Site 1 and Site 2 at Hanford. The identification of the site being considered is read from the input file as a two-letter mnemonic SITEID.

The name of the site is then stored in SITENM. To change or enhance the sites currently being considered requires making changes in the Main Program of the RISKIN code beginning at line 126 and ending at line 135. Both the allowed mnemonics and the assignment of the site name to SITENM must be changed.

2.1.2 Number of MACCS Output Files to be Included

The number of MACCS output files to be included must be incorporated as hard-wired input to the RISKIN code. This parameter, TOTFIL, is included in a PARAMETER statement that must be changed in the Main Program of RISKIN and in each of the following subprograms:

```
GETDAT  
SETPT1  
RD1CAT  
SETPT2  
ENDSTM  
RD1TBL  
ADJTBL  
GETRSK  
PRINTA
```

Up to five MACCS output files can be included in the RISKIN calculations to derive a single set of combined results.

2.1.3 Offsite vs Onsite File Specification

The RISKIN program reads from the input file a character that indicates if the MACCS output file being considered is for offsite or onsite results. The character is stored in OFFID and then used to assign a logical value to the variable OFFSIT. The character Y indicates an offsite file and N indicates an onsite file.

2.1.4 Reactor Type

A three-letter mnemonic, TYPID, is read from the input file that indicates the type of reactor being considered. TYPID is then used to assign a character string description to the variable PLNTYP.

The RISKIN code presently contains identifying character strings for heavy water reactors, light water reactors, and high temperature gas reactors. To change this limitation, code beginning at line 289 in the main program must be adapted to the user's needs.

2.1.5 Number and Names of Consequences for Which Output is Requested

Within the MACCS output file, each consequence is identified by a two-component name. The first component identifies the broad category of consequences to which the consequence of interest belongs, such as HEALTH EFFECTS CASES, POPULATION DOSE (SV), etc. The second component identifies a specific consequence within that broad category. For example, within the broad category of HEALTH EFFECT CASES are consequences such as ERL FAT/TOT 0-80.5 KM, ERL FAT/TOT 0-805 KM, CAN FAT/TOT 0-80.5 KM, etc. Because of this naming convention, the input required to identify the requested consequences for RISKIN involves both the broad category and the specific names of the consequences.

The RISKIN code must be supplied with the following information:

- (1) the number of broad categories within which the requested consequences will be found, TOTCAT, and
- (2) the total number of consequences being requested, TOTEFF.

These parameter values, TOTCAT AND TOTEFF, are established in the same PARAMETER statements in which the parameter value for TOTFIL discussed in Section 2.1.2 above is established, and therefore must also be changed in both the Main Program and in each of the following subprograms:

```
GETDAT
SETPT1
RD1CAT
SETPT2
ENDSTM
RD1TBL
ADJTBL
GETRSK
PRINTA
```

The search process for data in each MACCS output file is based on both the number of consequences being considered and on the names of those consequences used in the MACCS output listing. A name must be provided for each of the TOTCAT broad categories and for each of the TOTEFF consequences. These names must be provided in the order in which they are found within any section of output in the listing of the MACCS output file associated with a single source term.

(Note: During the execution of MACCS, each source term is considered independently. All calculations of the consequences resulting from each distinct severe accident source term are completed and all results written to the output file in such a way that the results for each source term appears in its own distinct and separate section of the listing of the MACCS output file. Any two of these distinct sections within the listing of the MACCS output file are separated by a page filled with x's. The section of the MACCS output file associated with any specific

source term is identical in format and content to every other section associated with every other source term. The names of the consequences to be considered by RISKIN must be given in the order in which they appear within any section of the MACCS output file associated with a single distinct source term.

Within the Main Program of RISKIN in the INPUT DATA 2 section, the consequence names provided will be stored in the arrays CATNAM and EFFNAM. Each broad category name must be 40 characters long and each consequence name must be 37 characters long, and all names must be exactly as found on the listing of the MACCS output file. Within a comment line preceding each of these input sections, a guide to the required length of that variable has been provided to help avoid errors. If an error is made in the definition of the names, the RISKIN code will make the interpretation that the particular consequence with the misspelled name is missing from the results of the specific execution of MACCS.

NOTE: To avoid difficulties, the user is STRONGLY urged to USE EXTREME CARE IN DEFINING BOTH THE NAMES OF THE BROAD CATEGORIES AND THE CONSEQUENCE NAMES.

2.1.6 Information Associated with the Requested Consequences

In addition to the number and names of each broad category and consequence, the RISKIN code requires additional information to find the data to be located in the MACCS output file. Specifically, RISKIN requires:

1. the number of consequences being considered that are included within each of the broad categories, which is stored by RISKIN in the array NUMEFF, and
2. the "cohort number" associated with each of the broad categories, which is stored by RISKIN in the array COHNUM. A cohort is a group of people who have similar exposure patterns and for whom either early, chronic, or total consequences are being calculated. When considering the early effects of an accidental release, various cohorts arise when several distinct emergency response scenarios, such as evacuation and/or sheltering, are considered. Within the listing of the MACCS output file, each of these cohorts is associated with a number, and it is this number that is stored in the array COHNUM.

These array values will be supplied by the user to the INPUT DATA 2 section of the Main Program.

2.1.7 Frequency Associated with Each Source Term for Each MACCS Run

The RISKIN code will read from the input file the frequency associated with each source term incorporated into each MACCS calculation being treated by RISKIN.

2.2 Printing Options

The output from the RISKIN code is composed of two parts: (1) a primary output file containing a complete record of the calculations performed, and (2) a secondary output file formatted as input to the postprocessor PLOT that interfaces with DISSPLA to obtain plots of the integrated risk tables.

A consistent naming convention has been used for both output files from RISKIN. The general format used for the names is

* = (TYPID)_(SITID)_(OFF/ON)_(C/S)

The C/S designation indicated whether the file is for results for a single MACCS run (S) or are the combined results calculated for multiple MACCS output files (C). The file identifiers are *.RISK for the primary output file and *.CDF for the secondary output file. As a result of using a command file to run both RISKIN and PLOT, a temporary output file, RPLOT.OUT, is created by RISKIN which contains the name (*) to be used by PLOT to identify its input file, *.CDF.

The primary output file contains the following:

1. a summary page detailing any consequences for which the required data was not found in the MACCS output file,
2. a set of summary tables that include for a user-defined subset of consequences,
 - a) the mean consequence value for each source term included in the execution of the MACCS code,
 - b) a description of each of the source terms, and
 - c) a weighted mean consequence value for each examined consequence.

(Note: a separate table is provided for each MACCS output file.),

3. a set of integrated risk tables for a user-defined subset of all consequences calculated,
4. a table containing interpolated consequence values associated with a user-selected set of exceedence frequencies, and
5. a table of the weighted mean risk values.

Within the USER INPUT # 1 section of the Subroutine PRINTA, the user can select the output desired. In addition, the user may customize the output by making changes in the following options:

1. the subset of consequences to be included in the table of mean values,
2. the subset of consequences for which integrated risks are to be calculated, and
3. the set of exceedence frequencies for which interpolated consequence values are requested
4. the subset of consequences for which integrated risk curves are requested.

2.2.1 Subset of Consequences to be Included in the Table of Mean Values

Within the USER INPUT # 2 section of the Subroutine PRINTA, the user can define the number of consequences to be included in the table of mean values as well as the number of consequences for which the integrated risk tables are to be printed for either offsite or onsite results. The associated data statements are also filled with the "number" associated with each consequence. This "number" is the address of that consequence within the array EFFNAM. The "numbers" are entered in the data statement in the same order as the consequences are to appear in the output tables.

Integrated risk tables will be printed for all consequences for which the tables have been requested. There is no limit to the number of consequences for which an integrated risk table can be requested. However, if a table has been requested for any consequence for which the CCDF tables were not present in at least one of the MACCS output files, the table header will be printed for that consequence but the table will be filled with blanks.

The table of weighted mean values will include all consequences included in the array EFFNAM. However, the coding of RISKIN allows only 7 consequences from an offsite file and 6 consequences for an onsite file to be included in the table of mean values. The consequences currently specified are:

Offsite file:

HEALTH EFFECT CASES
ERL FAT/TOT 0-80.5 KM
ERL FAT/TOT 0-805 KM
CAN FAT/TOT 0-80.5 KM
CAN FAT/TOT 0-805 KM

Onsite file:

HEALTH EFFECT CASES
ERL FAT/TOT 0-80.5 KM
ERL FAT/TOT 0-805 KM
CAN FAT/TOT 0-80.5 KM
CAN FAT/TOT 0-805 KM

Offsite file (cont'd):
POPULATION DOSE (PERSON-SV)
EDEWBODY TOT LIF 0-80.5 KM
EDEWBODY TOT LIF 0-805 KM
ECONOMIC COST MEASURES
TOTAL ECONOMIC COST 0-805 KM

Onsite file (cont'd):
POPULATION DOSE (PERSON-SV)
EDEWBODY TOT LIF 0-80.5 KM
EDEWBODY TOT LIF 0-805 KM

If the user wishes to change this set of output, it is necessary not only to change the value assigned to the variables NTBLOF or NTBLON, which are defined in the USER INPUT #2 section of the Subroutine PRINTA, and the associated data statement, but it is also necessary to change the format statement for the columnar headings (i.e., format statement 160 for offsite file output or format statement 170 for onsite file output).

2.2.2 Subset of Consequences for which Risks are Calculated

As previously stated, the number of consequences for which the integrated risk tables can be printed is limited to those consequences for which the CCDF table was requested during the execution of the MACCS. The variable NCDFOF or NCDFON must be initialized to the number of tables requested and the data statements for ID2 or ID4 must be filled with the address within the array EFFNAM of the consequences for which the tables are being requested. These variables and data statements are found in the User Input #2 section of the Subroutine PRINTA.

2.2.3 Set of Exceedence Frequencies for which Associated Interpolated Consequence Values are Requested

Within the USER INPUT DATA #3 section of the Subroutine PRINTA, the user can define the number of exceedence frequency values, NVAL, to be included in the table and an associated data statements defining those values. In addition, the user defines the number of consequences to be included, INUMOF or INUMON, and an associated data statement listing, in order, the "numbers" of the consequences to be included. Recall, these "numbers" correspond to the address of the consequence within the array EFFNAM.

2.2.4 Subset of Consequences for which Integrated Risk Curves are Requested

An integrated risk curve (i.e., exceedence frequency curve) will be drawn for each consequence for which an integrated risk table has been requested.

3.0 PROGRAM OVERVIEW

3.1 Modular Structure

The RISKIN code is composed of four modules, GETDAT, ADJTBL, GETRSK, and PRINTA, with each module performing a distinct function.

The first module, GETDAT, fetches and stores the required data from the MACCS output file(s). The stored data includes the mean and peak consequence value and the CCDF table for each user-requested consequence. This data is fetched for each source term included in each execution of the MACCS code, and is stored in the arrays MEANS, PEAKS, and CCDFS, respectively.

The second module, ADJTBL, establishes a single universal scale of consequence values over all source terms for each consequence being considered. This scale is based on the maximum peak consequence value found for that consequence over all source terms in all MACCS output files included. Each CCDF table for that consequence is then adjusted to conform to the new scale and stored in the array NUCCDF. For each consequence considered, the new scale is established in the following manner.

1. The new scale will retain several features of the CCDF tables found in the MACCS output file(s). These features are:
 - a. each table will consist of a range of consequence values spanning 10 orders of magnitude,
 - b. the real parts of the consequence values used will follow the sequence 1.0, 2.0, 3.0, 5.0, and 7.0 for each order of magnitude, and
 - c. each CCDF table will consist of a total of 46 data points.
2. For the consequence being considered, the largest peak consequence value over all source terms in all MACCS files is placed in the appropriate location within the last 6 rows of the 46 rows of the new scale.
3. The remainder of the revised scale values and their location on the new scale are then established conditional on the magnitude and location of the maximum peak consequence value.

Once the new scale has been established, the exceedence probability associated with each consequence value is then moved onto the new repositioned CCDF table, NUCCDF.

The third module, GETRSK, interactively fetches the frequency associated with each source term examined by each of the MACCS runs. It then calculates the integrated risk values and weighted mean risk values for each consequence being considered. The integrated risk values are in

The modular structure of RISKIN is visually depicted in the following calling structure charts.

which these components appear within the RISKIN code. Each of the subprograms is a subroutine unless otherwise indicated.

RISKIN
GETDAT
SETPT1 - LOGICAL FUNCTION
RD1CAT
SETPT2 - LOGICAL FUNCTION
ENDSTM - LOGICAL FUNCTION
RD1TBL
ADJTBL
EQUAL - LOGICAL FUNCTION
GETRSK
PRINTA
LEADPG
PRNTBL
BLOG1 - FUNCTION

3.3 Subprogram Descriptions

A summary description of each of the subprograms has been included to facilitate an understanding of the interaction of the parts of the RISKIN code. Each subprogram is presented in alphabetical order and the summary description includes the following information:

1. a statement of the purpose of the subprogram,
2. a listing of the subprograms called by that subprogram, and
3. a listing of the subprograms by which that subprogram is called.

Name: ADJTBL

Purpose: Establishes a single universal scale of consequence values to be used for all CCDF tables for that consequence (each consequence has a CCDF table for each source term in each MACCS output file included). Restructures the CCDF tables read from the MACCS output file so they are superimposed onto the new universal scale created for that consequence.

Called by: RISKIN

Calls: EQUAL

Name: BLOG1

Purpose: Performs a linear interpolation on log scales.

Called by: PRINTA

Calls: None

Name: ENDSTM
 Purpose: While searching the data associated with the first source term on a MACCS output file, checks each record in turn to determine if any requested data is missing.
 Called by: RD1CAT, SETPT1, SETPT2
 Calls: None

Name: EQUAL
 Purpose: Determines if the computer representations of two real numbers are approximately equal.
 Called by: ADJTBL, GETRSK, PRINTA
 Calls: None

Name: GETDAT
 Purpose: Controls the fetching and storing of the data desired from the MACCS output file(s).
 Called by: RISKIN
 Calls: RD1CAT, SETPT1, SETPT2

Name: GETRSK
 Purpose: Fetches interactively from the user the frequency associated with each source term included in the MACCS run(s).
 Calculates the weighted mean risk consequence value for each consequence being considered.
 Calculates the integrated risk tables for each of the consequences being considered.
 Called by: RISKIN
 Calls: EQUAL

Name: LEADPG
 Purpose: Prints out a summary page describing any user-requested data that was found to be missing from the MACCS output file (this summary page is printed before any other output is printed).
 Called by: PRINTA
 Calls: None

Name: PRINTA
 Purpose: Controls all output processing.
 Called by: RISKIN
 Calls: EQUAL, LEADPG, PRNTBL

Name: PRNTBL

Purpose: Prints a single line of the table of mean consequence values in such a way that if a particular consequence is missing from the MACCS output the column of mean values for that consequence will be left blank.

Called by: PRINTA

Calls: None

Name: RD1CAT

Purpose: Reads the mean and peak consequence values for all consequences within each broad category of consequences in the general result section of a MACCS output file.

Called by: GETDAT

Calls: ENDSTM

Name: RD1TBL

Purpose: Reads the CCDF table for each user-defined consequence.

Called by: GETDAT

Calls: None

Name: SETPT1

Purpose: Sets the pointer at the appropriate position in the general result section of the MACCS output file during the search process.

Called by: GETDAT

Calls: ENDSTM

Name: SETPT2

Purpose: Sets the pointer at a position in the MACCS output file where a needed CCDF table begins.

Called by: GETDAT

Calls: ENDSTM

4.0 SAMPLE PROBLEM OUTPUT

Included in this section are the following:

- a sample of the input file to be used by RISKIN
- a sample of the command file currently used to run RISKIN and/or PLOT
- a sample of the output from the RISKIN code
- a sample of the output file produced by RISKIN to be used by the post-processor PLOT
- a sample of the command file used to run PLOT
- a sample of the FORTRAN code PLOT
- a sample of the exceedence frequency curves resulting from the execution of DISSPLA

4.1 Sample Input File for RISKIN

* SITE: SR=SAVANNAH RIVER, ID=IDAHO, RL=HANFORD
SR
* OFFSITE VS ONSITE: Y=OFFSITE, N=ONSITE
Y
* REACTOR TYPE: HWR=HEAVY WATER, LWR=LIGHT WATER, MHT = HIGH-TEMP GAS
LWR
* NAME OF FIRST MACCS OUTPUT FILE
LWR SR OFF P
* FIRST MACCS OUTPUT FILE FREQUENCIES --- SOURCE TERM 1
5.0E-8
* SOURCE TERM 2
2.0E-7
*
*
***** ADD NAMES AND FREQUENCIES FOR OTHER MACCS OUTPUT FILES*****

4.2 Sample Command File Currently Used to Run RISKIN and/or PLOT

```
$! ***** RISKIN VAX PROCEDURE *****
$!
$ SET NOVERIFY
$! SET VERIFY
$!
$ SET DEF UD3:[JAROLLS.RISKIN]
$!
$ ON WARNING THEN CONTINUE          ! ERROR HANDLING
$!
$!
$! TO EXECUTE PROCEDURE:
$!
$! @RISKIN N FILNM1 [FILNM2 FILNM3 FILNM4 FILNM5] INPDAT [PLOT/RISK/ ]
$!
$!
$! ALL FILE NAMES GIVEN WITHOUT EXTENSIONS
$!
$!
$! SYSS$OUTPUT - TERMINAL OUTPUT PRINTS THE SEARCH PROGRESS THROUGH THE
$!                MACCS OUTPUT FILES (NOT NECESSARY)
$!
$! TABLE OF INPUT DEFINITIONS:
$!   N  NUMBER OF MACCS OUTPUT FILES TO BE INLCUDED
$!   PLOT/RISK  PLOT = RUN PLOT ONLY
$!               RISK = RUN RISKIN ONLY
$!               "BLANK" = RUN BOTH PLOT AND RISKIN
$!
$! TABLE OF FILE DEFINITIONS:
$!   1 FIRST MACCS INPUT FILE
$!   2 SECOND MACCS INPUT FILE
$!   3 THIRD MACCS INPUT FILE
$!   4 FOURTH MACCS INPUT FILE
$!   5 FIFTH MACCS INPUT FILE
$!   6 TEMP FILE FOR MACCS OUTPUT FILE BEING PARSED
$!   7 OUTPUT FILE OF GENERAL RESULTS FROM RISKIN
$!   OUPUT FILE FROM DISSPLA
$!   8 OUTPUT FILE FROM RISKIN USED AS INPUT TO GRAPHICS CODE
$!   9 RISKIN USER INPUT FILE
$!
$! ***** BLANK OUT ANY TRANSFERS NOT REQUIRED*****
$!
$ NFILS == P1                      ! TRANSFER P1 TO NFILS
$ FILNM1 := 'P2'                   ! TRANSFER P2 TO FILE1
$ FILNM2 := 'P3'                   ! TRANSFER P3 TO FILE2
$ FILNM3 := 'P4'                   ! TRANSFER P4 TO FILE3
$ FILNM4 := 'P5'                   ! TRANSFER P5 TO FILE4
$ FILNM5 := 'P6'                   ! TRANSFER P6 TO FILE5
```

```

$ INPDAT := 'P7'                                ! TRANSFER P7 TO INPDAT
$ WHATDO := 'P8'                                ! TRANSFER P8 TO WHATDO
$!
$!
$ IF FILNM1 .EQS. "" THEN GOTO ERR1
$   MACCS1 := 'FILNM1'.OUT
$   IF F$SEARCH(MACCS1) .EQS. "" THEN GOTO ERR4
$!
$ IF INPDAT .EQS. "" THEN GOTO ERR3
$   RISKIN := 'INPDAT'.INP
$   IF F$SEARCH(RISKIN) .EQS. "" THEN GOTO ERR9
$!
$ IF NFILS .GE. 2
$   THEN
$     IF FILNM2 .EQS. "" THEN GOTO ERR2
$     MACCS2 := 'FILNM2'.OUT
$     IF F$SEARCH(MACCS2) .EQS. "" THEN GOTO ERR5
$     IF NFILS .GE. 3
$       THEN
$         IF FILNM3 .EQS. "" THEN GOTO ERR2
$         MACCS3 := 'FILNM3'.OUT
$         IF F$SEARCH(MACCS3) .EQS. "" THEN GOTO ERR6
$         IF NFILS .GE. 4
$           THEN
$             IF FILNM4 .EQS. "" THEN GOTO ERR2
$             MACCS4 := 'FILNM4'.OUT
$             IF F$SEARCH(MACCS4) .EQS. "" THEN GOTO ERR7
$             IF NFILS .GE. 5
$               THEN
$                 IF FILNM5 .EQS. "" THEN GOTO ERR2
$                 MACCS5 := 'FILNM5'.OUT
$                 IF F$SEARCH(MACCS5) .EQS. "" THEN GOTO ERR8
$               ENDIF
$             ENDIF
$           ENDIF
$         ENDIF
$       ENDIF
$     ENDIF
$   ENDIF
$!
$ ERRCHK := NO ERROR
$!
$! *** CHECK FOR APPROPRIATE EXECUTABLE CODES AND RUN
$!
$ IF WHATDO .EQS. "RISK"
$   THEN
$     IF F$SEARCH("RISKIN.EXE") .EQS. "" THEN GOTO ERR10
$     ASSIGN 'RISKIN' FOR005
$     RUN RISKIN
$     DEASSIGN FOR005
$     DELE RPL0T.OUT;*
$   ENDIF
$!
$ IF WHATDO .EQS. "PLOT"
$   THEN

```

```

$      IF F$SEARCH("PLOT.FOR") THEN GOTO ERR11
$      @PLOT
$  ENDIF
$!
$  IF WHATDO .EQS. ""
$    THEN
$      IF F$SEARCH("RISKIN.EXE") .EQS. "" THEN GOTO ERR10
$      IF F$SEARCH("PLOT.FOR") THEN GOTO ERR11
$      ASSIGN "RISKIN" FOR005
$      RUN RISKIN
$      DEASSIGN FOR005
$      @PLOT
$      DELE RPLOT.OUT;*
$      WRITE SYS$OUTPUT "", "COMPLETION OF PLOT"
$  ENDIF
$!
$!
$  GOTO SKIP
$!
$! *** ERROR HANDLING ****
$!
$  ERR1:
$    WRITE SYS$OUTPUT ">>> NO MACCS OUTPUT FILES HAVE BEEN DESIGNATED"
$    ERRCHK :== ERROR
$    GOTO CLEAR1
$  ERR2:
$    WRITE SYS$OUTPUT ">>> AN INSUFFICIENT NUMBER OF MACCS OUTPUT FILES"
$    WRITE SYS$OUTPUT " HAVE BEEN DESIGNATED"
$    ERRCHK :== ERROR
$    IF FILNM2 .EQS. "" THEN GOTO CLEAR3
$    IF FILNM3 .EQS. "" THEN GOTO CLEAR4
$    IF FILNM4 .EQS. "" THEN GOTO CLEAR5
$    IF FILNM5 .EQS. "" THEN GOTO CLEAR6
$  ERR3:
$    WRITE SYS$OUTPUT ">>> USER INPUT FILE FOR RISKIN NOT FOUND"
$    ERRCHK :== ERROR
$    GOTO CLEAR2
$  ERR4:
$    WRITE SYS$OUTPUT ">>> THE FIRST MACCS OUTPUT FILE WAS NOT FOUND"
$    ERRCHK :== ERROR
$    GOTO CLEAR2
$  ERR5:
$    WRITE SYS$OUTPUT ">>> THE SECOND MACCS OUTPUT FILE WAS NOT FOUND"
$    ERRCHK :== ERROR
$    GOTO CLEAR4
$  ERR6:
$    WRITE SYS$OUTPUT ">>> THE THIRD MACCS OUTPUT FILE WAS NOT FOUND"
$    ERRCHK :== ERROR
$    GOTO CLEAR5
$  ERR7:
$    WRITE SYS$OUTPUT ">>> THE FOURTH MACCS OUTPUT FILE WAS NOT FOUND"
$    ERRCHK :== ERROR

```

```

$ GOTO CLEAR6
$ ERR8:
$ WRITE SYSS$OUTPUT ">>> THE FIFTH MACCS OUTPUT FILE WAS NOT FOUND"
$ ERRCHK :== ERROR
$ GOTO CLEAR7
$ ERR9:
$ WRITE SYSS$OUTPUT ">>> THE RISKIN INPUT FILE WAS NOT FOUND"
$ ERRCHK :== ERROR
$ GOTO CLEAR3
$ ERR10:
$ WRITE SYSS$OUTPUT ">>> RISKIN.EXE WAS NOT FOUND"
$ ERRCHK :== ERROR
$ IF NFILS .EQ. 1 THEN GOTO CLEAR3
$ IF NFILS .EQ. 2 THEN GOTO CLEAR4
$ IF NFILS .EQ. 3 THEN GOTO CLEAR5
$ IF NFILS .EQ. 4 THEN GOTO CLEAR6
$ IF NFILS .EQ. 5 THEN GOTO CLEAR7
$ ERR11:
$ WRITE SYSS$OUTPUT ">>> PLOT.FOR WAS NOT FOUND"
$ ERRCHK :== ERROR
$ IF NFILS .EQ. 1 THEN GOTO CLEAR3
$ IF NFILS .EQ. 2 THEN GOTO CLEAR4
$ IF NFILS .EQ. 3 THEN GOTO CLEAR5
$ IF NFILS .EQ. 4 THEN GOTO CLEAR6
$ IF NFILS .EQ. 5 THEN GOTO CLEAR7
$!
$! *** CLEAR SYMBOL CHARTS ****
$!
$ SKIP:
$ IF NFILS .EQ. 1 THEN GOTO CLEAR3
$ IF NFILS .EQ. 2 THEN GOTO CLEAR4
$ IF NFILS .EQ. 3 THEN GOTO CLEAR5
$ IF NFILS .EQ. 4 THEN GOTO CLEAR6
$ IF NFILS .EQ. 5 THEN GOTO CLEAR7
$!
$ CLEAR7:
$ DELETE/SYMBOL/GLOBAL MACCS5
$ CLEAR6:
$ DELETE/SYMBOL/GLOBAL MACCS4
$ CLEAR5:
$ DELETE/SYMBOL/GLOBAL MACCS3
$ CLEAR4:
$ DELETE/SYMBOL/GLOBAL MACCS2
$ CLEAR3:
$ DELETE/SYMBOL/GLOBAL RISKIN
$ CLEAR2:
$ DELETE/SYMBOL/GLOBAL MACCS1
$ CLEAR1:
$ DELETE/SYMBOL/GLOBAL NFILS
$ DELETE/SYMBOL FILNM1
$ DELETE/SYMBOL FILNM2
$ DELETE/SYMBOL FILNM3

```

```
$ DELETE/SYMBOL FILNM4
$ DELETE/SYMBOL FILNM5
$ DELETE/SYMBOL INPDAT
$ DELETE/SYMBOL WHATDO
$!
$ WRITE SYS$OUTPUT "", "COMPLETION OF PROCEDURE"
$!
$! SET NOVERIFY
$!
$ EXIT
```


4.3 Sample Primary Output from RISKIN

THE SITE IS: SAVANNAH RIVER

THE OUTPUT FILE NAME IS: LWR_SR_OFF_S

SUMMARY OF INPUT FILES:

FILE 1:

DATE AND TIME OF RUN = MACCS 28-SEP-90 10:45:12 RELEASE VERSION 1.5.11.0, 11/21/89, D. CHANIN
"ATMOS" DESCRIPTION = IN1ARISK.INP, SAMPLE PROBLEM A, ATMOS INPUT
"EARLY" DESCRIPTION = IN2ARISK.INP, SAMPLE PROBLEM A, EARLY INPUT
"CHRONC" DESCRIPTION = IN3ARISK.INP, SAMPLE PROBLEM A, CHRONC

THERE ARE 2 SOURCE TERMS

THERE ARE 3 EMERGENCY RESPONSE STRATEGIES

TABLE OF MEAN CONSEQUENCE VALUES BY SOURCE TERMS AND ASSOCIATED SOURCE TERM DESCRIPTIONS

SITE: SAVANNAH RIVER
OFFSITE FILE: LWR_SR_OFF_P

REACTOR TYPE: LIGHT WATER

SOURCE TERM	FREQUENCY	MEAN EARLY FATALITIES 0-80.5 KM [PERSONS]	MEAN EARLY FATALITIES 0-80.5 KM [PERSONS]	MEAN CANCER FATALITIES 0-80.5 KM [PERSONS]	MEAN CANCER FATALITIES 0-80.5 KM [PERSONS]	MEAN POPULATION DOSE 0-80.5 KM [PERSON-REM]	MEAN POPULATION DOSE 0-80.5 KM [PERSON-REM]	MEAN ECONOMIC COST 0-805 KM [MILLION \$]
1	5.00E-08	1.28E+01	1.28E+01	6.22E+02	4.20E+03	3.53E+06	2.51E+07	1.27E+04
2	2.00E-07	4.57E-03	4.57E-03	1.86E+02	8.63E+02	1.13E+06	5.12E+06	1.51E+03
OVERALL MEAN RISK [/YR]:		6.41E-07	6.41E-07	6.83E-05	3.83E-04	4.03E-01	2.28E-00	9.37E-04

SOURCE TERM DESCRIPTIONS;

SOURCE TERM 1 FREQUENCY = 5.00E-08
SECOND DRAFT 1150, WORST CASE SOURCE TERM FOR EARLY FATALITIES
SOURCE TERM 2 FREQUENCY = 2.00E-07
RELEASE FRACTIONS OF SOURCE TERM 1 REDUCED BY A FACTOR OF TEN

EXCEEDENCE FREQUENCY TABLES FOR COMBINED RESULTS FROM ALL INPUT FILES

EXCEEDENCE FREQUENCIES FOR EFFECT: HEALTH EFFECTS CASES ERL FAT/TOTAL		EXCEEDENCE FREQUENCIES FOR EFFECT: HEALTH EFFECTS CASES CAN FAT/TOTAL		EXCEEDENCE FREQUENCIES FOR EFFECT: POPULATION DOSE (PERSON-REM) EDEWBODY TOT LIF	
0-805 KM		0-805 KM		0-80.5 KM	
1.00E-05	7.48E-08	1.00E-04	5.00E-08	1.00E-01	5.00E-08
2.00E-05	7.48E-08	2.00E-04	5.00E-08	2.00E-01	5.00E-08
3.00E-05	7.48E-08	3.00E-04	5.00E-08	3.00E-01	5.00E-08
5.00E-05	7.48E-08	5.00E-04	5.00E-08	5.00E-01	5.00E-08
7.00E-05	7.37E-08	7.00E-04	5.00E-08	7.00E-01	5.00E-08
1.00E-04	7.20E-08	1.00E-03	5.00E-08	1.00E+00	5.00E-08
2.00E-04	7.04E-08	2.00E-03	5.00E-08	2.00E+00	5.00E-08
3.00E-04	6.97E-08	3.00E-03	5.00E-08	3.00E+00	5.00E-08
5.00E-04	6.37E-08	5.00E-03	5.00E-08	5.00E+00	5.00E-08
7.00E-04	5.91E-08	7.00E-03	5.00E-08	7.00E+00	5.00E-08
1.00E-03	5.51E-08	1.00E-02	5.00E-08	1.00E+01	5.00E-08
2.00E-03	5.13E-08	2.00E-02	5.00E-08	2.00E+01	5.00E-08
3.00E-03	4.93E-08	3.00E-02	5.00E-08	3.00E+01	5.00E-08
5.00E-03	4.63E-08	5.00E-02	5.00E-08	5.00E+01	5.00E-08
7.00E-03	4.33E-08	7.00E-02	5.00E-08	7.00E+01	5.00E-08
1.00E-02	4.17E-08	1.00E-01	5.00E-08	1.00E+02	5.00E-08
2.00E-02	3.75E-08	2.00E-01	5.00E-08	2.00E+02	5.00E-08
3.00E-02	3.59E-08	3.00E-01	5.00E-08	3.00E+02	5.00E-08
5.00E-02	3.34E-08	5.00E-01	5.00E-08	5.00E+02	5.00E-08
7.00E-02	3.24E-08	7.00E-01	5.00E-08	7.00E+02	5.00E-08
1.00E-01	3.08E-08	1.00E+00	5.00E-08	1.00E+03	5.00E-08
2.00E-01	2.62E-08	2.00E+00	5.00E-08	2.00E+03	5.00E-08
3.00E-01	2.47E-08	3.00E+00	5.00E-08	3.00E+03	5.00E-08
5.00E-01	2.31E-08	5.00E+00	5.00E-08	5.00E+03	5.00E-08
7.00E-01	2.20E-08	7.00E+00	5.00E-08	7.00E+03	5.00E-08
1.00E+00	1.99E-08	1.00E+01	5.00E-08	1.00E+04	5.00E-08
2.00E+00	1.66E-08	2.00E+01	5.00E-08	2.00E+04	5.00E-08
3.00E+00	1.52E-08	3.00E+01	5.00E-08	3.00E+04	5.00E-08
5.00E+00	1.32E-08	5.00E+01	5.00E-08	5.00E+04	5.00E-08
7.00E+00	1.15E-08	7.00E+01	5.00E-08	7.00E+04	5.00E-08
1.00E+01	9.90E-09	1.00E+02	4.99E-08	1.00E+05	5.00E-08
2.00E+01	6.80E-09	2.00E+02	4.93E-08	2.00E+05	4.99E-08
3.00E+01	4.62E-09	3.00E+02	4.87E-08	3.00E+05	4.99E-08
5.00E+01	2.75E-09	5.00E+02	4.63E-08	5.00E+05	4.91E-08
7.00E+01	1.67E-09	7.00E+02	4.27E-08	7.00E+05	4.67E-08
1.00E+02	1.05E-09	1.00E+03	3.93E-08	1.00E+06	4.01E-08
2.00E+02	2.91E-10	2.00E+03	3.01E-08	2.00E+06	2.47E-08
3.00E+02	2.30E-10	3.00E+03	2.25E-08	3.00E+06	1.67E-08
5.00E+02	1.56E-10	5.00E+03	1.44E-08	5.00E+06	9.40E-09
7.00E+02	9.55E-11	7.00E+03	8.45E-09	7.00E+06	6.60E-09
1.00E+03	7.30E-11	1.00E+04	4.08E-09	1.00E+07	4.27E-09
2.00E+03	1.42E-11	2.00E+04	1.03E-09	2.00E+07	3.50E-10
3.00E+03	1.42E-11	3.00E+04	2.13E-10	3.00E+07	2.85E-11
5.00E+03	0.00E+00	5.00E+04	5.55E-11	5.00E+07	1.42E-11
7.00E+03	0.00E+00	7.00E+04	0.00E+00	7.00E+07	0.00E+00
1.00E+04	0.00E+00	1.00E+05	0.00E+00	1.00E+08	0.00E+00
2.00E+04	0.00E+00	2.00E+05	0.00E+00	2.00E+08	0.00E+00
3.00E+04	0.00E+00	3.00E+05	0.00E+00	3.00E+08	0.00E+00
5.00E+04	0.00E+00	5.00E+05	0.00E+00	5.00E+08	0.00E+00
7.00E+04	0.00E+00	7.00E+05	0.00E+00	7.00E+08	0.00E+00
1.00E+05	0.00E+00	1.00E+06	0.00E+00	1.00E+09	0.00E+00
2.00E+05	0.00E+00	2.00E+06	0.00E+00	2.00E+09	0.00E+00
3.00E+05	0.00E+00	3.00E+06	0.00E+00	3.00E+09	0.00E+00
5.00E+05	0.00E+00	5.00E+06	0.00E+00	5.00E+09	0.00E+00
7.00E+05	0.00E+00	7.00E+06	0.00E+00	7.00E+09	0.00E+00
1.00E+06	0.00E+00	1.00E+07	0.00E+00	1.00E+10	0.00E+00
2.00E+06	0.00E+00	2.00E+07	0.00E+00	2.00E+10	0.00E+00
3.00E+06	0.00E+00	3.00E+07	0.00E+00	3.00E+10	0.00E+00
5.00E+06	0.00E+00	5.00E+07	0.00E+00	5.00E+10	0.00E+00
7.00E+06	0.00E+00	7.00E+07	0.00E+00	7.00E+10	0.00E+00
1.00E+07	0.00E+00	1.00E+08	0.00E+00	1.00E+11	0.00E+00
2.00E+07	0.00E+00	2.00E+08	0.00E+00	2.00E+11	0.00E+00
3.00E+07	0.00E+00	3.00E+08	0.00E+00	3.00E+11	0.00E+00
5.00E+07	0.00E+00	5.00E+08	0.00E+00	5.00E+11	0.00E+00
7.00E+07	0.00E+00	7.00E+08	0.00E+00	7.00E+11	0.00E+00
1.00E+08	0.00E+00	1.00E+09	0.00E+00	1.00E+12	0.00E+00
2.00E+08	0.00E+00	2.00E+09	0.00E+00	2.00E+12	0.00E+00
3.00E+08	0.00E+00	3.00E+09	0.00E+00	3.00E+12	0.00E+00
5.00E+08	0.00E+00	5.00E+09	0.00E+00	5.00E+12	0.00E+00
7.00E+08	0.00E+00	7.00E+09	0.00E+00	7.00E+12	0.00E+00
1.00E+09	0.00E+00	1.00E+10	0.00E+00	1.00E+13	0.00E+00
2.00E+09	0.00E+00	2.00E+10	0.00E+00	2.00E+13	0.00E+00
3.00E+09	0.00E+00	3.00E+10	0.00E+00	3.00E+13	0.00E+00
5.00E+09	0.00E+00	5.00E+10	0.00E+00	5.00E+13	0.00E+00
7.00E+09	0.00E+00	7.00E+10	0.00E+00	7.00E+13	0.00E+00
1.00E+10	0.00E+00	1.00E+11	0.00E+00	1.00E+14	0.00E+00
2.00E+10	0.00E+00	2.00E+11	0.00E+00	2.00E+14	0.00E+00
3.00E+10	0.00E+00	3.00E+11	0.00E+00	3.00E+14	0.00E+00
5.00E+10	0.00E+00	5.00E+11	0.00E+00	5.00E+14	0.00E+00
7.00E+10	0.00E+00	7.00E+11	0.00E+00	7.00E+14	0.00E+00
1.00E+11	0.00E+00	1.00E+12	0.00E+00	1.00E+15	0.00E+00
2.00E+11	0.00E+00	2.00E+12	0.00E+00	2.00E+15	0.00E+00
3.00E+11	0.00E+00	3.00E+12	0.00E+00	3.00E+15	0.00E+00
5.00E+11	0.00E+00	5.00E+12	0.00E+00	5.00E+15	0.00E+00
7.00E+11	0.00E+00	7.00E+12	0.00E+00	7.00E+15	0.00E+00
1.00E+12	0.00E+00	1.00E+13	0.00E+00	1.00E+16	0.00E+00
2.00E+12	0.00E+00	2.00E+13	0.00E+00	2.00E+16	0.00E+00
3.00E+12	0.00E+00	3.00E+13	0.00E+00	3.00E+16	0.00E+00
5.00E+12	0.00E+00	5.00E+13	0.00E+00	5.00E+16	0.00E+00
7.00E+12	0.00E+00	7.00E+13	0.00E+00	7.00E+16	0.00E+00
1.00E+13	0.00E+00	1.00E+14	0.00E+00	1.00E+17	0.00E+00
2.00E+13	0.00E+00	2.00E+14	0.00E+00	2.00E+17	0.00E+00
3.00E+13	0.00E+00	3.00E+14	0.00E+00	3.00E+17	0.00E+00
5.00E+13	0.00E+00	5.00E+14	0.00E+00	5.00E+17	0.00E+00
7.00E+13	0.00E+00	7.00E+14	0.00E+00	7.00E+17	0.00E+00
1.00E+14	0.00E+00	1.00E+15	0.00E+00	1.00E+18	0.00E+00
2.00E+14	0.00E+00	2.00E+15	0.00E+00	2.00E+18	0.00E+00
3.00E+14	0.00E+00	3.00E+15	0.00E+00	3.00E+18	0.00E+00
5.00E+14	0.00E+00	5.00E+15	0.00E+00	5.00E+18	0.00E+00
7.00E+14	0.00E+00	7.00E+15	0.00E+00	7.00E+18	0.00E+00
1.00E+15	0.00E+00	1.00E+16	0.00E+00	1.00E+19	0.00E+00
2.00E+15	0.00E+00	2.00E+16	0.00E+00	2.00E+19	0.00E+00
3.00E+15	0.00E+00	3.00E+16	0.00E+00	3.00E+19	0.00E+00
5.00E+15	0.00E+00	5.00E+16	0.00E+00	5.00E+19	0.00E+00
7.00E+15	0.00E+00	7.00E+16	0.00E+00	7.00E+19	0.00E+00
1.00E+16	0.00E+00	1.00E+17	0.00E+00	1.00E+20	0.00E+00
2.00E+16	0.00E+00	2.00E+17	0.00E+00	2.00E+20	0.00E+00
3.00E+16	0.00E+00	3.00E+17	0.00E+00	3.00E+20	0.00E+00
5.00E+16	0.00E+00	5.00E+17	0.00E+00	5.00E+20	0.00E+00
7.00E+16	0.00E+00	7.00E+17	0.00E+00	7.00E+20	0.00E+00
1.00E+17	0.00E+00	1.00E+18	0.00E+00	1.00E+21	0.00E+00
2.00E+17	0.00E+00	2.00E+18	0.00E+00	2.00E+21	0.00E+00
3.00E+17	0.00E+00	3.00E+18	0.00E+00	3.00E+21	0.00E+00
5.00E+17	0.00E+00	5.00E+18	0.00E+00	5.00E+21	0.00E+00
7.00E+17	0.00E+00	7.00E+18	0.00E+00	7.00E+21	0.00E+00
1.00E+18	0.00E+00	1.00E+19	0.00E+00	1.00E+22	0.00E+00
2.00E+18	0.00E+00	2.00E+19	0.00E+00	2.00E+22	0.00E+00
3.00E+18	0.00E+00	3.00E+19	0.00E+00	3.00E+22	0.00E+00
5.00E+18	0.00E+00	5.00E+19	0.00E+00	5.00E+22	0.00E+00
7.00E+18	0.00E+00	7.00E+19	0.00E+00	7.00E+22	0.00E+00
1.00E+19	0.00E+00	1.00E+20	0.00E+00	1.00E+23	0.00E+00
2.00E+19	0.00E+00	2.00E+20	0.00E+00	2.00E+23	0.00E+00
3.00E+19	0.00E+00	3.00E+20	0.00E+00	3.00E+23	0.00E+00
5.00E+19	0.00E+00	5.00E+20	0.00E+00	5.00E+23	0.00E+00
7.00E+19	0.00E+00	7.00E+20	0.00E+00	7.00E+23	0.00E+00
1.00E+20	0.00E+00	1.00E+21	0.00E+00	1.00E+24	0.00E+00
2.00E+20	0.00E+00	2.00E+21	0.00E+00	2.00E+24	0.00E+00
3.00E+20	0.00E+00	3.00E+21	0.00E+00	3.00E+24	0.00E+00
5.00E+20	0.00E+00	5.00E+21	0.00E+00	5.00E+24	0.00E+00
7.00E+20	0.00E+00	7.00E+21	0.00E+00	7.00E+24	0.00E+00
1.00E+21	0.00E+00	1.00E+22	0.00E+00	1.00E+25	0.00E+00
2.00E+21	0.00E+00	2.00E+22	0.00E+00	2.00E+25	0.00E+00
3.00E+21	0.00E+00	3.00E+22	0.00E+00	3.00E+25	0.00E+00
5.00E+21	0.00E+00	5.00E+22	0.00E+00	5.00E+25	0.00E+00
7.00E+21	0.00E+00	7.00E+22	0.00E+00	7.00E+25	0.00E+00
1.00E+22	0.00E+00	1.00E+23	0.00E+00	1.00E+26	0.00E+00
2.00E+22	0.00E+00	2.00E+23	0.00E+00	2.00E+26	0.00E+00
3.00E+22	0.00E+00	3.00E+23	0.00E+00	3.00E+26	0.00E+00
5.00E+22	0.00E+00	5.00E+23	0.00E+00	5.00E+26	0.00E+00
7.00E+22	0.00E+00	7.00E+23	0.00E+00	7.00E+26	0.00E+00
1.00E+23	0.00E+00	1.00E+24	0.00E+00	1.00E+27	0.00E+00
2.00E+23	0.00E+00	2.00E+24	0.00E+00	2.00E+27	0.00E+00
3.00E+23	0.00E+00	3.00E+24	0.00E+00	3.00E+27	0.00E+00
5.00E+23	0.00E+00	5.00E+24			

EXCEEDENCE FREQUENCY TABLES FOR COMBINED RESULTS FROM ALL INPUT FILES

EXCEEDENCE FREQUENCIES FOR EFFECT:		EXCEEDENCE FREQUENCIES FOR EFFECT:	
POPULATION DOSE (PERSON-REM)		ECONOMIC COSTS (MILLION \$)	
EDWBODY	TOT LIF	0-805 KM	TOTAL ECONOMIC COSTS
1.00E+00	5.00E-08	1.00E-03	5.00E-08
2.00E+00	5.00E-08	2.00E-03	5.00E-08
3.00E+00	5.00E-08	3.00E-03	5.00E-08
5.00E+00	5.00E-08	5.00E-03	5.00E-08
7.00E+00	5.00E-08	7.00E-03	5.00E-08
1.00E+01	5.00E-08	1.00E-02	5.00E-08
2.00E+01	5.00E-08	2.00E-02	5.00E-08
3.00E+01	5.00E-08	3.00E-02	5.00E-08
5.00E+01	5.00E-08	5.00E-02	5.00E-08
7.00E+01	5.00E-08	7.00E-02	5.00E-08
1.00E+02	5.00E-08	1.00E-01	5.00E-08
2.00E+02	5.00E-08	2.00E-01	5.00E-08
3.00E+02	5.00E-08	3.00E-01	5.00E-08
5.00E+02	5.00E-08	5.00E-01	5.00E-08
7.00E+02	5.00E-08	7.00E-01	5.00E-08
1.00E+03	5.00E-08	1.00E+00	5.00E-08
2.00E+03	5.00E-08	2.00E+00	5.00E-08
3.00E+03	5.00E-08	3.00E+00	5.00E-08
5.00E+03	5.00E-08	5.00E+00	5.00E-08
7.00E+03	5.00E-08	7.00E+00	5.00E-08
1.00E+04	5.00E-08	1.00E+01	5.00E-08
2.00E+04	5.00E-08	2.00E+01	5.00E-08
3.00E+04	5.00E-08	3.00E+01	5.00E-08
5.00E+04	5.00E-08	5.00E+01	5.00E-08
7.00E+04	5.00E-08	7.00E+01	5.00E-08
1.00E+05	5.00E-08	1.00E+02	5.00E-08
2.00E+05	5.00E-08	2.00E+02	5.00E-08
3.00E+05	5.00E-08	3.00E+02	5.00E-08
5.00E+05	5.00E-08	5.00E+02	5.00E-08
7.00E+05	5.00E-08	7.00E+02	5.00E-08
1.00E+06	4.98E-08	1.00E+03	4.95E-08
2.00E+06	4.86E-08	2.00E+03	4.67E-08
3.00E+06	4.61E-08	3.00E+03	4.16E-08
5.00E+06	4.14E-08	5.00E+03	3.24E-08
7.00E+06	3.80E-08	7.00E+03	2.51E-08
1.00E+07	3.28E-08	1.00E+04	1.97E-08
2.00E+07	2.06E-08	2.00E+04	7.65E-09
3.00E+07	1.39E-08	3.00E+04	3.76E-09
5.00E+07	5.80E-09	5.00E+04	1.38E-09
7.00E+07	3.26E-09	7.00E+04	4.75E-10
1.00E+08	1.42E-09	1.00E+05	2.01E-10
2.00E+08	1.69E-10	2.00E+05	1.50E-10
2.33E+08	5.55E-11	2.71E+05	5.55E-11
0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00
OVERALL MEAN	2.29E+00	OVERALL MEAN	9.37E-04
RISK [1/YR]:		RISK [1/YR]:	

CONSEQUENCE VALUES ASSOCIATED WITH SELECTED EXCEEDENCE FREQUENCIES
(LINEAR INTERPOLATION USING LOG-LOG SCALE)

SITE: SAVANNAH RIVER
OFFSITE FILE(S): LWR_SR_OFF_P

REACTOR TYPE: LIGHT WATER

EXCEEDENCE FREQUENCY	POPULATION DOSE 0-80.5KM [PERSON-REM]	POPULATION DOSE 0-805 KM [PERSON-REM]	EARLY FATALITIES 0-805 KM [PERSONS]	CANCER FATALITIES 0-805 KM [PERSONS]	ECONOMIC COST 0-805 KM [MILLION \$]
1.00E-04					
1.00E-05					
1.00E-06					
1.00E-07					
1.00E-08	4.73E+06	3.64E+07	9.76E+00	6.29E+03	1.64E+04
1.00E-09	1.49E+07	1.12E+08	1.03E+02	2.03E+04	5.53E+04
1.00E-10	2.45E+07	2.15E+08	6.78E+02	3.46E+04	2.26E+05
1.00E-11					
1.00E-12					

OVERALL MEAN RISK FOR ALL INPUT FILES FOR ALL CONSEQUENCES BEING CONSIDERED

CONSEQUENCE	OVERALL MEAN RISK
HEALTH EFFECTS CASES	
ERL FAT/TOTAL	6.41E-07
ERL FAT/TOTAL	6.41E-07
CAN FAT/TOTAL	6.83E-05
CAN FAT/TOTAL	3.83E-04
POPULATION DOSE (PERSON-REM)	
EDEWBODY TOT LIF	4.03E-01
EDEWBODY TOT LIF	2.28E+00
POPULATION WEIGHTED RISK	
ERL FAT/TOTAL	8.60E-12
ERL FAT/TOTAL	5.31E-12
ERL FAT/TOTAL	2.25E-12
CAN FAT/TOTAL	4.31E-11
CAN FAT/TOTAL	2.84E-11
CAN FAT/TOTAL	2.35E-10
CAN FAT/TOTAL	5.26E-11
ECONOMIC COSTS (MILLION \$)	
TOTAL ECONOMIC COSTS	9.37E-04

4.4 Sample of RISKIN Output File to be Used by PLOT

5

LWR_SR_OFF_S

HEALTH_EFFECTS_CASES

ERL FAT/TOTAL

0-805 KM

1.00E-05	7.48E-08
2.00E-05	7.48E-08
3.00E-05	7.48E-08
5.00E-05	7.48E-08
7.00E-05	7.37E-08
1.00E-04	7.20E-08
2.00E-04	7.04E-08
3.00E-04	6.97E-08
5.00E-04	6.37E-08
7.00E-04	5.91E-08
1.00E-03	5.51E-08
2.00E-03	5.13E-08
3.00E-03	4.93E-08
5.00E-03	4.63E-08
7.00E-03	4.33E-08
1.00E-02	4.17E-08
2.00E-02	3.75E-08
3.00E-02	3.59E-08
5.00E-02	3.34E-08
7.00E-02	3.24E-08
1.00E-01	3.08E-08
2.00E-01	2.62E-08
3.00E-01	2.47E-08
5.00E-01	2.31E-08
7.00E-01	2.20E-08
1.00E+00	1.99E-08
2.00E+00	1.66E-08
3.00E+00	1.52E-08
5.00E+00	1.32E-08
7.00E+00	1.15E-08
1.00E+01	9.90E-09
2.00E+01	6.80E-09
3.00E+01	4.62E-09
5.00E+01	2.75E-09
7.00E+01	1.67E-09
1.00E+02	1.05E-09
2.00E+02	2.91E-10
3.00E+02	2.30E-10
5.00E+02	1.56E-10
7.00E+02	9.55E-11
1.00E+03	7.30E-11
2.00E+03	1.42E-11
2.78E+03	1.42E-11

0.00E+00 0.00E+00
0.00E+00 0.00E+00
0.00E+00 0.00E+00

HEALTH EFFECTS CASES
CAN FAT/TOTAL

0-805 KM

1.00E-04 5.00E-08
2.00E-04 5.00E-08
3.00E-04 5.00E-08
5.00E-04 5.00E-08
7.00E-04 5.00E-08
1.00E-03 5.00E-08
2.00E-03 5.00E-08
3.00E-03 5.00E-08
5.00E-03 5.00E-08
7.00E-03 5.00E-08
1.00E-02 5.00E-08
2.00E-02 5.00E-08
3.00E-02 5.00E-08
5.00E-02 5.00E-08
7.00E-02 5.00E-08
1.00E-01 5.00E-08
2.00E-01 5.00E-08
3.00E-01 5.00E-08
5.00E-01 5.00E-08
7.00E-01 5.00E-08
1.00E+00 5.00E-08
2.00E+00 5.00E-08
3.00E+00 5.00E-08
5.00E+00 5.00E-08
7.00E+00 5.00E-08
1.00E+01 5.00E-08
2.00E+01 5.00E-08
3.00E+01 5.00E-08
5.00E+01 5.00E-08
7.00E+01 5.00E-08
1.00E+02 4.99E-08
2.00E+02 4.93E-08
3.00E+02 4.87E-08
5.00E+02 4.63E-08
7.00E+02 4.27E-08
1.00E+03 3.93E-08
2.00E+03 3.01E-08
3.00E+03 2.25E-08
5.00E+03 1.44E-08
7.00E+03 8.45E-09
1.00E+04 4.08E-09
2.00E+04 1.05E-09
3.00E+04 2.13E-10
3.87E+04 5.55E-11
0.00E+00 0.00E+00
0.00E+00 0.00E+00

POPULATION DOSE (PERSON-REM)

EDEWBODY TOT LIF 0-80.5 KM

1.00E-01	5.00E-08
2.00E-01	5.00E-08
3.00E-01	5.00E-08
5.00E-01	5.00E-08
7.00E-01	5.00E-08
1.00E+00	5.00E-08
2.00E+00	5.00E-08
3.00E+00	5.00E-08
5.00E+00	5.00E-08
7.00E+00	5.00E-08
1.00E+01	5.00E-08
2.00E+01	5.00E-08
3.00E+01	5.00E-08
5.00E+01	5.00E-08
7.00E+01	5.00E-08
1.00E+02	5.00E-08
2.00E+02	5.00E-08
3.00E+02	5.00E-08
5.00E+02	5.00E-08
7.00E+02	5.00E-08
1.00E+03	5.00E-08
2.00E+03	5.00E-08
3.00E+03	5.00E-08
5.00E+03	5.00E-08
7.00E+03	5.00E-08
1.00E+04	5.00E-08
2.00E+04	5.00E-08
3.00E+04	5.00E-08
5.00E+04	5.00E-08
7.00E+04	5.00E-08
1.00E+05	5.00E-08
2.00E+05	4.99E-08
3.00E+05	4.99E-08
5.00E+05	4.91E-08
7.00E+05	4.67E-08
1.00E+06	4.01E-08
2.00E+06	2.47E-08
3.00E+06	1.67E-08
5.00E+06	9.40E-09
7.00E+06	6.60E-09
1.00E+07	4.27E-09
2.00E+07	3.50E-10
3.00E+07	2.85E-11
3.49E+07	1.42E-11
0.00E+00	0.00E+00
0.00E+00	0.00E+00

POPULATION DOSE (PERSON-REM)

EDEWBODY TOT LIF 0-805 KM

1.00E+00	5.00E-08	2.00E+00	5.00E-08
----------	----------	----------	----------

3.00E+00	5.00E-08
5.00E+00	5.00E-08
7.00E+00	5.00E-08
1.00E+01	5.00E-08
2.00E+01	5.00E-08
3.00E+01	5.00E-08
5.00E+01	5.00E-08
7.00E+01	5.00E-08
1.00E+02	5.00E-08
2.00E+02	5.00E-08
3.00E+02	5.00E-08
5.00E+02	5.00E-08
7.00E+02	5.00E-08
1.00E+03	5.00E-08
2.00E+03	5.00E-08
3.00E+03	5.00E-08
5.00E+03	5.00E-08
7.00E+03	5.00E-08
1.00E+04	5.00E-08
2.00E+04	5.00E-08
3.00E+04	5.00E-08
5.00E+04	5.00E-08
7.00E+04	5.00E-08
1.00E+05	5.00E-08
2.00E+05	5.00E-08
3.00E+05	5.00E-08
5.00E+05	5.00E-08
7.00E+05	4.99E-08
1.00E+06	4.98E-08
2.00E+06	4.86E-08
3.00E+06	4.61E-08
5.00E+06	4.14E-08
7.00E+06	3.80E-08
1.00E+07	3.28E-08
2.00E+07	2.06E-08
3.00E+07	1.39E-08
5.00E+07	5.80E-09
7.00E+07	3.26E-09
1.00E+08	1.42E-09
2.00E+08	1.69E-10
2.33E+08	5.55E-11
0.00E+00	0.00E+00
0.00E+00	0.00E+00
0.00E+00	0.00E+00

ECONOMIC COSTS (MILLION \$)

TOTAL ECONOMIC COSTS

1.00E-03	5.00E-08
2.00E-03	5.00E-08
3.00E-03	5.00E-08
5.00E-03	5.00E-08
7.00E-03	5.00E-08

1.00E-02	5.00E-08
2.00E-02	5.00E-08
3.00E-02	5.00E-08
5.00E-02	5.00E-08
7.00E-02	5.00E-08
1.00E-01	5.00E-08
2.00E-01	5.00E-08
3.00E-01	5.00E-08
5.00E-01	5.00E-08
7.00E-01	5.00E-08
1.00E+00	5.00E-08
2.00E+00	5.00E-08
3.00E+00	5.00E-08
5.00E+00	5.00E-08
7.00E+00	5.00E-08
1.00E+01	5.00E-08
2.00E+01	5.00E-08
3.00E+01	5.00E-08
5.00E+01	5.00E-08
7.00E+01	5.00E-08
1.00E+02	5.00E-08
2.00E+02	5.00E-08
3.00E+02	5.00E-08
5.00E+02	4.99E-08
7.00E+02	4.98E-08
1.00E+03	4.95E-08
2.00E+03	4.67E-08
3.00E+03	4.16E-08
5.00E+03	3.24E-08
7.00E+03	2.51E-08
1.00E+04	1.97E-08
2.00E+04	7.65E-09
3.00E+04	3.76E-09
5.00E+04	1.38E-09
7.00E+04	4.75E-10
1.00E+05	2.01E-10
2.00E+05	1.50E-10
2.71E+05	5.55E-11
0.00E+00	0.00E+00
0.00E+00	0.00E+00
0.00E+00	0.00E+00

4.5 Sample of Command File to Run PLOT

```
$! *** COMMAND FILE FOR PLOT.FOR
$ SET NOVERIFY
$! SET VERIFY
$ SET DEF [JAROLLS.RISKIN]
$ DISS PLOT.FOR TAL
$ RUN STRIP
$ OPEN/READ INFILE STRIP.OUT
$ READ INFILE FILENM
$ CLOSE INFILE
$ RENAME FOR077.DAT 'FILENM.GRF'
$ DELE PLOT.EXE;*
$ DELE PLOT.OBJ;*
$ DELE FOR099.DAT;*
$ DELE STRIP.OUT;*
$! SET NOVERIFY
$ EXIT
```

4.6 Sample FORTRAN Program to be Used with DISSPLA

```
      PROGRAM PLOT
C
C JUDY ROLLSTIN 3/1/90
C
      PARAMETER(MAXLEV=46,MAXPTS=100,MAXCSQ=10)
C
C MAXLEV=MAX LEVELS
C MAXPTS=MAX NUMBER POINTS PLOTTED
C NUMCSQ=NUMBER OF CONSEQUENCES
C
      CHARACTER*15 FILENM
C
      CHARACTER LINE*132
      DIMENSION XP(MAXPTS),YP(MAXPTS),
*              X(MAXLEV),Y(MAXLEV),XLEV(5),
*              RSKCDF(MAXCSQ,2,MAXLEV)
C
      LOGICAL IEND,ISTOP,BELOW,EQUAL
C
      DIMENSION TITLE(3)
C
      CHARACTER*40 LABEL
      DIMENSION LABEL(10,2)
C
      DATA XLEV /1., 2., 3., 5., 7./
C
C
C      OPEN(UNIT=10,FILE='RPLOT.OUT',STATUS='OLD')
C
      READ(10,1000) FILENM
1000  FORMAT(A15)
C
      OPEN(UNIT=6, FILE = FILENM,
*        DEFAULTFILE='UD17:[JAROLLS.RISKIN].CDF',READONLY,
*        STATUS='OLD')
C
C READ NUMBER OF CONSEQUENCES AND NAME OF CONSEQUENCES
C
      READ(6,100) NTOT
100  FORMAT(1X,I1/)
C
      DO 110 I = 1,NTOT
        READ(6,120)(LABEL(I,J),J=1,2)
120  FORMAT(1X,A40/1X,A40)
        DO 130 J = 1,MAXLEV
          READ(6,140)(RSKCDF(I,K,J),K=1,2)
140  FORMAT(1X,1PE8.2,2X,1PE8.2)
```

```

130  CONTINUE
110  CONTINUE
C
  IF (FILENM(1:3) .EQ. 'HWR') THEN
    ICODE2 = 1
  ELSEIF (FILENM(1:3) .EQ. 'LWR') THEN
    ICODE2 = 2
  ELSEIF (FILENM(1:3) .EQ. 'MHT') THEN
    ICODE2 = 3
  ENDIF
C
  IF (FILENM(5:6) .EQ. 'SR') THEN
    ICODE1 = 1
  ELSEIF (FILENM(5:6) .EQ. 'ID') THEN
    ICODE1 = 2
  ELSEIF (FILENM(5:6) .EQ. 'RL') THEN
    IF (FILENM(7:7) .EQ. '1') THEN
      ICODE1 = 3
    ELSEIF (FILENM(7:7) .EQ. '2') THEN
      ICODE1 = 4
    ENDIF
  ENDIF
C
  IF (FILENM(8:9) .EQ. 'ON') THEN
    ICODE3 = 2
  ELSEIF (FILENM(8:9) .EQ. 'OF') THEN
    ICODE3 = 1
  ENDIF
C
  CALL VSTART(0.,0.)
C
  CALL PAGE (11.,8.5)
C
  CALL NOBRDR
C
C SETDEV WRITES ANY MESSAGES TO BE PRINTED ON FILE (FORO99.DAT)
C
  CALL SETDEV(99,99)
C
  CALL DUPLX
C
  CALL BASALF('STANDARD')
C
C
C SET ORIGIN
C
150  DO 160 K = 1,NTOT
      CALL PHYSOR(3.5,2.)
C
      DO 170 J = 1,MAXLEV
        X(J) = RSKCDF(K,1,J)
        Y(J) = RSKCDF(K,2,J)

```

```

170    CONTINUE
C
C FIND MAX LOG CYCLE
C SET PLOT LIMITS AND AXIS LENGTHS
C

```

```

    YAXISL = 5.1
    YORG = 1.E-10
    NOC = 7
    IF (K .EQ. 1) THEN
        XAXISL = 6
        XORG = 1.E+0
        NOCX = 7
    ELSEIF (K .EQ. 2) THEN
        XAXISL = 6.
        XORG = 1.E+0
        NOCX = 7
    ELSEIF (K .EQ. 3) THEN
        XAXISL = 6.
        XORG = 1.E+0
        NOCX = 11
    ELSEIF (K .EQ. 4) THEN
        XAXISL = 6.
        XORG = 1.E+0
        NOCX = 11
    ELSEIF (K .EQ. 5) THEN
        XAXISL = 6.
        XORG = 1.E+0
        NOCX = 7
    ELSEIF (K .EQ. 6) THEN
        XAXISL = 6.
        XORG = 1.
        NOCX = 9
    ELSEIF (K .EQ. 7) THEN
        XAXISL = 6.
        XORG = 1.
        NOCX = 9
    ELSEIF (K .EQ. 8) THEN
        XAXISL = 6.
        XORG = 1.
        NOCX = 9
    ELSEIF (K .EQ. 9) THEN
        XAXISL = 6.
        XORG = 1.
        NOCX = 9
    ELSE
        XAXISL = 6.
        XORG = 1.
        NOCX = 9
    ENDIF

```

```

C
C COMPUTE TABLE OF X'S (XP'S) FOR INTERPOLATION
C

```

```

NPTS = (NOCX - 1) * 5
LB = LOG10(XORG)
JJ = 1
C
DO 180 KK = 1, NPTS + 1
  XP(KK) = XLEV(JJ)*10.**LB
  IF (JJ. LT. 5) THEN
    JJ = JJ + 1
  ELSE
    JJ = 1
    LB = LB + 1
  ENDIF
180 CONTINUE
C
C INTERPOLATE FOR Y'S
C
C ISTOP = END OF NONZERO TABLE VALUES REACHED
C IEND = LAST Y TABLE VALUE ABOVE X-AXIS HAS BEEN REACHED
C
  ISTOP = .FALSE.
  IEND = .FALSE.
  BELOW = .FALSE.
  IX = 1
  IY = 1
C
C SEE IF THE TABLE VALUES ARE ALL BELOW X AXIS OR TO THE LEFT OF
C THE Y AXIS OF THE GRAPH (I.E., BELOW) AND SET ALL Y VALUES ON THE
C X-AXIS IF THEY ARE
C
  IF (Y(1) .LT. YORG) THEN
    BELOW = .TRUE.
    IXCORE = 1
  ENDIF
C
  IF (.NOT. BELOW) THEN
    DO 1 I = 1, MAXLEV
      IF (.NOT. BELOW) THEN
        IF (I .LT. MAXLEV) THEN
          IF (X(I) .NE. 0.0) THEN
            IF ((X(I+1) .EQ. 0.0) .AND.
              (X(I) .LT. XORG)) THEN
              *
              BELOW = .TRUE.
              IXCORE = 2
            ENDIF
          ENDIF
        ELSE
          IF (.NOT. BELOW) THEN
            IF (X(I) .NE. 0.0) THEN
              IF (X(I) .LE. XORG) THEN
                BELOW = .TRUE.
                IXCORE = 3
              ENDIF
            ENDIF
          ENDIF
        ENDIF
      ENDIF
    ENDIF
  ENDIF

```



```

        ENDIF
        ENDIF
        ENDIF
C
        IF ((.NOT. BELOW) .AND. (X(I) .NE. 0.0)) THEN
            IF (X(I) .LT. XORG) IX = IX + 1
            IF (Y(I) .GE. YORG) IY = IY + 1
        ENDIF
1      CONTINUE
        IF (IY .LE. IX) THEN
            BELOW = .TRUE.
            IXCORE = 4
        ENDIF
        ENDIF
C
        IF (BELOW) THEN
            DO 5 I = 1, NPTS+1
                YP(I) = YORG
5          CONTINUE
        ENDIF
C
C SET Y GRAPH VALUES = 1ST Y TABLE VALUE FOR ALL GRAPH X VALUES
C LESS THAT THE LOWEST X TABLE VALUE
C
        IF (.NOT. BELOW) THEN
            IS = 0
            DO 200 I = 1, NPTS+1
                IF (XP(I) .LT. X(1)) THEN
                    YP(I) = Y(1)
                    IS = IS + 1
                ENDIF
200      CONTINUE
C
        IF (IS .EQ. 0) THEN
            IP = 1
        ELSE
            IP = IS + 1
        ENDIF
C
C FOR THE SET OF X GRAPH VALUES ON OR ABOVE TABLE X VALUES
C
        DO 210 IPNT = IP, NPTS+1
C
            IROW = 0
            IF ((.NOT. ISTOP) .AND. (.NOT. IEND)) THEN
220          IROW = IROW + 1
                IF (IROW .LE. MAXLEV) THEN
C
C IF X GRAPH VALUE MATCHES X TABLE VALUE
C
                    IF (XP(IPNT) .EQ. X(IROW)) THEN
C

```

```

C IF ASSOCIATED Y TABLE VALUE ABOVE THE X-AXIS
C
      IF (Y(IROW) .GE. YORG) THEN
        YP(IPNT) = Y(IROW)
C
C IF ASSOCIATED Y TABLE VALUE BELOW THE X-AXIS
C
      ELSE
        XP(IPNT) = XP(IPNT-1)
        DO 2 I = IPNT,NPTS+1
          YP(I) = YORG
2        CONTINUE
        IEND = .TRUE.
      ENDIF
C
C X GRAPH VALUE DOES NOT MATCH X TABLE VALUE
C
      ELSE
        IF (.NOT. IEND) THEN
C
C IF X TABLE VALUE IS THE MAXIMUM PEAK CONSEQUENCE VALUE (LAST ENTRY ON
C TABLE OF X VALUES) AND THE ASSOCIATED Y VALUE LIES ABOVE THE X-AXIS
C
          IF (((IROW .LT. MAXLEV) .AND.
            *      (X(IROW+1) .EQ. 0.0)) .OR.
            *      ((IROW .EQ. MAXLEV) .AND.
            *      (X(IROW) .NE. 0.0))) THEN
C
            IF (Y(IROW) .GE. YORG) THEN
              XP(IPNT+1) = X(IROW)
              XP(IPNT) = X(IROW)
              YP(IPNT) = Y(IROW)
              DO 4 I = IPNT+1,NPTS+1
                YP(I) = YORG
4              CONTINUE
            ELSE
C
C IS THE MAXIMUM PEAK CONSEQUENCE VALUE BUT THE ASSOCIATED Y VALUE LIES
C BELOW THE X-AXIS
C
              XP(IPNT) = XP(IPNT-1)
              DO 6 I = IPNT,NPTS+1
                YP(I) = YORG
6              CONTINUE
            ENDIF
            IEND = .TRUE.
C
            ELSE
              GO TO 220
            ENDIF
          ENDIF
        ENDIF
      ENDIF

```

```

      ENDIF
      ENDIF
C
C
210      CONTINUE
C
      ENDIF
C
      CALL AREA2D(XAXISL,YAXISL)
C
C
      IF (ICODE1 .EQ. 1) THEN
        CALL HEADIN('SAVANNAH RIVER SITE$',100,1.25,3)
      ELSEIF (ICODE1 .EQ. 2) THEN
        CALL HEADIN('IDAHO SITE$',100,1.25,3)
      ELSEIF (ICODE1 .EQ. 3) THEN
        CALL HEADIN('HANFORD SITE 1$',100,1.25,3)
      ELSEIF (ICODE1 .EQ. 4) THEN
        CALL HEADIN('HANFORD SITE 2$',100,1.25,3)
      ENDIF
C
      IF (ICODE2 .EQ. 1) THEN
        CALL HEADIN('HEAVY WATER REACTOR$',100,1.25,3)
      ELSEIF (ICODE2 .EQ. 2) THEN
        CALL HEADIN('LIGHT WATER REACTOR$',100,1.25,3)
      ELSEIF (ICODE2 .EQ. 3) THEN
        CALL HEADIN('HIGH-TEMP GAS REACTOR$',100,1.25,3)
      ENDIF
C
      IF (ICODE3 .EQ. 1) THEN
        CALL HEADIN('OFFSITE CONSEQUENCES$',100,1.1,3)
      ELSEIF (ICODE3 .EQ. 2) THEN
        CALL HEADIN('ONSITE CONSEQUENCES$',100,1.1,3)
      ENDIF
C
      CALL YAXANG(0.)
C
      CALL XREVTK
      CALL YREVTK
C
      CALL YNAME(' ',1)
      CALL XNAME(' ',1)
C
      CALL XNONUM
      CALL YNONUM
C
      CALL FRAME
C
      YCYL = YAXISL/(NOC-1)
      XCYL = XAXISL/(NOCX-1)
C
      CALL LOGLOG(XORG,XCYL,YORG,YCYL)

```

```

C
C DELETE POINTS THAT ARE BELOW THE MINIMUM
C
260 CALL CURVE(XP,YP,NPTS,0)
C
CALL HEIGHT(.12)
C
CALL RESET('HEIGHT')
C
D1 = 5.
IF (((K .EQ. 1) .OR. (K .EQ. 2)) .OR. (K .EQ. 5)) THEN
  D2 = 1
ELSE
  D2 = 1.5
ENDIF
C
IF (K.EQ. 1) THEN
  CALL RLMESS(' TOTAL EARLY FATALITIES 0-805 KM $',100,
* XORG*(10**D2),YORG/D1)
ELSEIF (K .EQ. 2) THEN
  CALL RLMESS(' TOTAL CANCER FATALITIES 0-805 KM $',100,
* XORG*(10**D2),YORG/D1)
ELSEIF (K .EQ. 3) THEN
  CALL RLMESS(' POPULATION DOSE (PERSON-REM) 0-80.5 KM $',100,
* XORG*(10**D2),YORG/D1)
ELSEIF (K .EQ. 4) THEN
  CALL RLMESS(' POPULATION DOSE (PERSON-REM) 0-805 KM $',100,
* XORG*(10**D2),YORG/D1)
ELSEIF (K .EQ. 5) THEN
  CALL SETEND('#',1)
  CALL RLMESS(' TOTAL ECONOMIC COSTS ($ MILLION) 0-805 KM$',100,
* XORG*(10**D2),YORG/D1)
  CALL RESET ('SETEND')
ELSEIF (K .EQ. 6) THEN
  CALL RLMESS(' $',100,XORG*(10**D2),YORG/D1)
ELSEIF (K .EQ. 7) THEN
  CALL RLMESS(' $',100,XORG*(10**D2),YORG/D1)
ELSEIF (K .EQ. 8) THEN
  CALL RLMESS(' $',100,XORG*(10**D2),YORG/D1)
ELSEIF (K .EQ. 9) THEN
  CALL RLMESS(' $',100,XORG*(10**D2),YORG/D1)
ELSEIF (K .EQ. 10) THEN
  CALL RLMESS(' $',100,XORG*(10**D2),YORG/D1)
ENDIF
C
CALL ANGLE(90.)
C
D3 = ((NOC-5)/2) -1
DIV = 10.0
CALL RLMESS(' EXCEEDANCE FREQUENCY (PER REACTOR-YEAR)$',100,
* XORG/10,YORG*(10**D3))
C

```

```

C WRITE THE AXIS NUMBERS
C
    CALL HEIGHT(.12)
C
    CALL RESET('ANGLE')
C
    XPOS = XORG
    LB = LOG10(XORG)
C
    DO 270 INT = 1,NOCX
        CALL RLMESS('1.OE$',100,XPOS-.1*XPOS,YORG/2.)
        CALL RLINT(LB,'ABUT','ABUT')
        LB = LB + 1
        XPOS = 10.** LB
270    CONTINUE
C
    YPOS = YORG
    LB = LOG10(YORG)
C
    DO 280 INT = 1, NOC
        DIV = 7
        CALL RLMESS('1.OE$',100,XORG/DIV,YPOS)
        CALL RLINT(LB,'ABUT','ABUT')
        LB = LB + 1
        YPOS = 10.** LB
280    CONTINUE
C
C RESET FOR NEXT CCDF
C
    CALL RESET('HEIGHT')
    CALL RESET('XREVTK')
    CALL RESET('YREVTK')
C
    CALL XNONUM
    CALL XLGAXS(XORG,XCYL,XAXISL,' ',1,0.,YAXISL)
C
    CALL YNONUM
    CALL YLGAXS(YORG,YCYL,YAXISL,' ',1,XAXISL,0.)
C
    CALL RESET('XNONUM')
    CALL RESET('YNONUM')
C
    CALL ENDPL(0)
C
160 CONTINUE
C
    CALL DONEPL
C
    CLOSE(UNIT=6,STATUS='KEEP')
    CLOSE(UNIT=10,STATUS='KEEP')C
    STOP 'DONE'
    END

```

4.7 Sample of Exceedence Frequency Curves From the Execution of DISSPLA

SAVANNAH RIVER SITE
LIGHT WATER REACTOR
OFFSITE CONSEQUENCES

SAVANNAH RIVER SITE
LIGHT WATER REACTOR
OFFSITE CONSEQUENCES

SAVANNAH RIVER SITE
LIGHT WATER REACTOR
OFFSITE CONSEQUENCES

SAVANNAH RIVER SITE
LIGHT WATER REACTOR
OFFSITE CONSEQUENCES

END

DATE FILMED

02 / 07 / 91