**Modified Hazard Ranking
System/Hazard Ranking
System for Sites with Mixed
Radioactive and Hazardous
Wastes - Software
Documentation**

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November 1986

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PREFACE

The methodology developed by the MITRE Corporation (under contract to the U.S. Environmental Protection Agency) for the ranking of hazardous-substance contaminated facilities was used as the primary basis in developing this computer software package. The MITRE Corporation developed methodology was originally published in the July 16, 1982, Federal Register as "Uncontrolled Hazardous Waste Site Ranking System: A User's Manual (HW-10)." The Pacific Northwest Laboratory (PNL) modified the MITRE Corporation methodology to more accurately score radioactively contaminated facilities. The PNL-developed modified hazard ranking system methodology was also used in the development of the computer software package.

This document is a companion manual to the "Modified Hazard Ranking System for Sites with Mixed Radioactive and Hazardous Wastes - User Manual." Both documents use the terms "code" and "program" synonymously.

The primary purpose of this document is to serve as a basic resource for those individuals who are assigned the responsibility of setting up and maintaining the mHRS/HRS computer program. This document should be used in conjunction with the dBASE III Users Manual (Byers et al. 1984) when performing maintenance activities on the program. Questions or comments regarding the mHRS/HRS computer program should be addressed to the authors:

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EXECUTIVE SUMMARY

The mHRS/HRS software package was developed by the Pacific Northwest Laboratory (PNL) under contract with the Department of Energy (DOE) to provide a uniform method for DOE facilities to use in performing their Conservation Environmental Response Compensation and Liability Act (CERCLA) Phase I Modified Hazard Ranking System or Hazard Ranking System evaluations. The program is designed to remove the tedium and potential for error associated with the performing of hand calculations and the interpreting of information on tables and in reference books when performing an evaluation.

The software package is designed to operate on a microcomputer (IBM^(a) PC, PC/XT, or PC/AT, or a compatible system) using either a dual floppy disk drive or a hard disk storage system. It is written in the dBASE III^(b) language and operates using the dBASE III system.

Although the mHRS/HRS software package was developed for use at DOE facilities, it has direct applicability to the performing of CERCLA Phase I evaluations for any facility contaminated by hazardous waste. The software can perform evaluations using either the modified hazard ranking system methodology developed by DOE/PNL, the hazard ranking system methodology developed by EPA/MITRE Corp., or a combination of the two.

This document is a companion manual to the mHRS/HRS user manual (Hawley et al. 1986). It is intended for the programmer who must maintain the software package and for those interested in the computer implementation. This manual documents the system logic, computer programs, and data files that comprise the package. Hardware and software implementation requirements are discussed. In addition, hand calculations of three sample situations (problems) with associated computer runs used for the verification of program calculations are included.

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This work was performed as part of the Hazardous Waste Risk Assessment project for the Department of Energy, Office of Environmental Guidance, under P. VanHaagen. The authors would like to thank all of those individuals who have helped make the development of this computer program possible. The historical development of the MAXI computer program, which was used as a basis for developing the mHRS methodology, included major contributions from G. R. Hoenes, W. E. Kennedy, Jr., B. A. Napier, J. K. Soldat and E. C. Watson of Pacific Northwest Laboratory. We greatly appreciate the guidance, assistance, and encouragement offered by these individuals in the development of the methods and philosophy applied in the mHRS/HRS program. We would also like to thank N. C. Van Houten and C. A. Davey for their contributions in the development of the information screens and testing of the program. Finally, we would like to recognize L. K. Grove and C. A. Davey for their respective efforts in editing and typing the draft and final manuscripts of this document.

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1.0 INTRODUCTION

The mHRS/HRS computer program was developed by the Pacific Northwest Laboratory (PNL) to provide a uniform method for Department of Energy (DOE) facilities to use in performing their Conservation Environmental Response Compensation and Liability Act (CERCLA) Phase I Modified Hazard Ranking System (mHRS) or Hazard Ranking System (HRS) evaluations. The program is designed to remove the tedium and potential for errors associated with the performing of hand calculations and the interpreting of information on tables and in reference books. It is hoped that this software package will serve to ensure 1) the consistent evaluation of waste constituents across collections of waste sites (i.e., sites located within a specific DOE facility and across the entire DOE system) and 2) the substantiation of score determinations for quality assurance and future reference.

The software package is designed to operate on a microcomputer (IBM^(a) PC, PC/XT, or PC/AT, or a compatible system) using either a dual floppy disk drive or a hard disk storage system. It is written in the dBASE III^(b) language and operates under the dBASE III system. The software requires a minimum of 256K bytes of internal memory and 360K bytes of disk storage capacity.

This mHRS/HRS program documentation manual is a companion to the mHRS/HRS user manual (Hawley et al. 1986). This documentation manual is intended for the programmer who must maintain the software package and for those interested in the computer implementation of the mHRS/HRS program. It documents the system logic, computer programs, and data files that are associated with the program. Hardware and software implementation requirements are also discussed. In addition, hand calculations for three sample situations (problems) with associated mHRS/HRS program runs used for the verification of program calculations are provided and discussed.

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2.0 PROGRAM LOGIC FLOW

The general mHRS/HRS program logic flow is primarily based on the route calculation sequences and the worksheet formats presented in the HRS User's Manual (EPA 1984). The HRS User's Manual was used as the primary basis in designing the program to make the evaluations performed by the mHRS/HRS program as traceable to EPA's HRS methodology as possible.

Figure 2.1 illustrates the general mHRS/HRS program evaluation methodology logic flow, and Figure 2.2 illustrates a simplified mHRS/HRS computer program logic flow. The first logic flow diagram (Figure 2.1) is provided to show how the program was designed to follow the HRS evaluation methodology. This flow diagram was used in the initial design of the mHRS/HRS program. However, when the program was tested, it was discovered that the program did not efficiently utilize the user's time. The interactive inputs were dispersed throughout the program so that the user had to wait for calculations to be performed before providing the next set of input information. To alleviate this problem, the program was reorganized. It was divided into the following four sections: 1) solicitation and filing of information, 2) solicitation of calculation and report choices, 3) calculation and storing of data, and 4) writing of selected reports. This reorganization allows the user to interact with the program on the front end, and then, while the program performs all the calculations, stores information, and writes reports, the user is free to do other things, such as gathering information on the next site. Figure 2.2 contains a simplified flow diagram that shows the general computer program flow through the new format. Figure 2.2 would be difficult to use in answering questions about how the program handles a specific evaluation subject, but it does show how the computer actually moves through the program. To answer questions regarding a specific evaluation subject, Figure 2.1 should be used.

FIGURE 2.1. mHRS/HRS Methodology Logic Flow

FIGURE 2.1. (Contd)

FIGURE 2.1. (Contd)

FIGURE 2.1. (Contd)

FIGURE 2.2. mHRS/HRS Computer Program Logic Flow

3.0 mHRS/HRS PROGRAM

The mHRS/HRS program was developed as a tool for performing the CERCLA Phase I evaluations of abandoned waste sites. The program provides a systematic approach to the evaluation and ranking of the sites that may need to be considered for remedial action. It solicits input information for three major evaluation categories: 1) potential for harm to humans or the environment by migration routes, 2) fire and explosion potential, and 3) direct contact potential. The program ultimately assigns a numerical score for each of the three evaluation categories. These scores can then be compared to an established baseline score when ranking the sites. For example, EPA has established the baseline score of 28.5 for the migration route. That is, if a site has a migration route score greater than 28.5, it must be added to the national priority list for remedial action consideration. Chapter 4.0 of the mHRS/HRS user's manual (Hawley et al. 1986) discusses, in detail, the mHRS/HRS methodology for calculations.

The program was written in the dBASE III language and operates using the dBASE III system. Its use of several program modules provides for considerable flexibility in the program. The modules consist of six types of files:

- Program Command Files (.PRG)
- Format Files (.FMT)
- Database Files (.DBF)
- Database Memo Files (.DBT)
- Index Files (.NDX)
- Report Form Files (.FRM).

Table 3.1 lists these modules and provides a brief description of the purpose of each. The table lists all of the files contained in the software package in order by type. The table displays 1) the name of the file, including the dBASE III suffix that indicates the type of file; 2) the module or file type [program code, data, format, index, report format, or work space used by the code(s) (designated as SCRATC)]; 3) user interaction (if the user interacts with the file during a run it is labeled "T", if not, it is labeled "F"); and 4) module description (a short description of the file's purpose).

TABLE 3.1. mHRS/HRS Program Module Descriptions

<u>File Name</u>	<u>Module Type</u>	<u>User Inter-action</u>	<u>Module Description</u>
MHRS.TXT	ASCII	.T.	Site log file: input report, justifications, worksheets
ACALC.PRG	CODE	.F.	Calculates and controls air route score
AIN.PRG	CODE	.F.	Controls air route input and editing
APOP.PRG	CODE	.F.	Selects air route score from population matrix
APRINT2.PRG	CODE	.F.	Controls printing of the air route worksheet
BOX3.FMT	CODE	.F.	General mHRS/HRS logo screen
BOX4.FMT	CODE	.F.	Route-specific mHRS/HRS logo screen
CHEMIN.FMT	CODE	.F.	Chemical constituent input menu screen with instructions
CHKCHEM.PRG	CODE	.F.	Transfers chemical scores, gets missing persistence/toxicity data
CHKCHEM2.PRG	CODE	.F.	Gets missing reactivity score/control incompatibility check
CHKCHEM3.PRG	CODE	.F.	Gets missing ignitability score
CHKINC.PRG	CODE	.F.	Checks for incompatible chemicals and prints names if found
CREDITS.FMT	CODE	.F.	Introductory screen
DCCALC.PRG	CODE	.F.	Calculates direct contact route score
DCIN.PRG	CODE	.F.	Controls direct contact route input and editing
DCPRINT2.PRG	CODE	.F.	Controls printing of the direct contact route worksheet
DEFS.FMT	CODE	.F.	Introductory screen
DISENV.FMT	CODE	.F.	Distance to sensitive environment information screen
DISENV2.FMT	CODE	.F.	Distance to sensitive environment scoring screen

TABLE 3.1. (Contd)

<u>File Name</u>	<u>Module Type</u>	<u>User Inter-action</u>	<u>Module Description</u>
EDCHEM.PRG	CODE	.F.	Shows menu of options for use of previously entered radionuclides
EDITOPT.PRG	CODE	.F.	Shows user-input edit options
EDRAD.PRG	CODE	.F.	Shows menu of options for use of previously entered chemicals
EDROUTE.PRG	CODE	.F.	Allows option of editing previously entered route
FECALC.PRG	CODE	.F.	Calculates fire and explosion route score
FEIN.PRG	CODE	.F.	Controls fire and explosion route input and editing
FEPRINT2.PRG	CODE	.F.	Controls printing of the fire and explosion route worksheets
FIELDINT.PRG	CODE	.F.	Initializes worksheet parameters to maximum values
GENERAL.PRG	CODE	.F.	Inputs general information for current site
GWCALC.PRG	CODE	.F.	Calculates ground-water route score
GWCONT.PRG	CODE	.F.	Ground-water containment input and scoring
GWIN.PRG	CODE	.F.	Controls ground-water route input and editing
GWPRINT2.PRG	CODE	.F.	Controls printing of the ground-water route worksheets
HRSTP.PRG	CODE	.F.	Calculates toxicity and persistence for HRS scores
HWQUAN.PRG	CODE	.F.	Inputs quantity of hazardous waste for each applicable route
INCHEM.PRG	CODE	.F.	Controls input of chemical hazardous-waste constituents
INCOM.PRG	CODE	.F.	Determines incompatibility scores
INRAD.PRG	CODE	.F.	Controls input of radiological hazardous-waste constituents

TABLE 3.1. (Contd)

File Name	Module Type	User Inter-action	Module Description
INTR01.FMT	CODE	.F.	Introductory screen
INTR02.FMT	CODE	.F.	Introductory screen
INTR03.FMT	CODE	.F.	Introductory screen
INTR04.FMT	CODE	.F.	Introductory screen
INTR05.FMT	CODE	.F.	Introductory screen
JUST.PRG	CODE	.F.	Controls input of score justifications entry to JUST database
LANDUSE.PRG	CODE	.F.	Controls input of land use parameters
LOOP.PRG	CODE	.F.	Controls main process loop of the program
MHRS.PRG	CODE	.F.	Controls main program
NFPATAB.PRG	CODE	.F.	Displays NFPA reactivity ratings tables
OBSIN.PRG	CODE	.F.	Controls radiological observed-release input and calculations
PERSTOX.PRG	CODE	.F.	Selects persistence and toxicity scores for mHRS scores
PHYSTAT.PRG	CODE	.F.	Controls input physical state of each constituent for this route
POPIN.FMT	CODE	.F.	Population scoring input screen
PR2A.PRG	CODE	.F.	Prints report of air route input parameters
PR2DC.PRG	CODE	.F.	Prints report of direct contact route input parameters
PR2FE.PRG	CODE	.F.	Prints report of fire and explosion route input parameters
PR2GW.PRG	CODE	.F.	Prints report of ground-water route input parameters
PR2SW.PRG	CODE	.F.	Prints report of surface-water route input parameters

TABLE 3.1. (Contd)

<u>File Name</u>	<u>Module Type</u>	<u>User Inter-action</u>	<u>Module Description</u>
PRINT1.PRG	CODE	.F.	Controls format of inventory report and site log
PRINT2.PRG	CODE	.F.	Controls format of input/justification report, site log file
PRINT3.PRG	CODE	.F.	Controls format and printing of the cover sheet
PRINTON.PRG	CODE	.F.	Displays "Turn on Printer" message and waits for response
PRINTOPT.PRG	CODE	.F.	Shows user-input print options
PUSCREEN.PRG	CODE	.F.	Displays PU and U information screens
RADCONC.PRG	CODE	.F.	Controls input of parameters for radiological concentrations
RADREL.PRG	CODE	.F.	Calculates radiological concentrations, does table look-up
ROOT.FMT	CODE	.F.	Chemical name input instructions screen
SAXTAB.PRG	CODE	.F.	Sax Toxicity Table lookup code module
SELINCOM.PRG	CODE	.F.	Determines incompatibilities
SETUP.PRG	CODE	.F.	Performs file manipulation procedures to set up for the run
SWCALC.PRG	CODE	.F.	Calculates surface-waste route score
SWCONT.PRG	CODE	.F.	Surface water containment input and scoring
SWIN.PRG	CODE	.F.	Controls surface-water route input and editing
SWPRINT2.PRG	CODE	.F.	Controls printing of the surface-water route worksheets
CHEMICAL.DBF	DATA	.F.	Master chemical mHRS/HRS database
CONC.DBF	DATA	.T.	Constituent database for mHRS/HRS

TABLE 3.1. (Contd)

File Name	Module Type	User Inter-action	Module Description
CONCTEMP.DBF	DATA	.T.	Temporary database corresponding to CONC for current site
COVER.DBF	DATA	.T.	Cover sheet and general site information database
COVERTMP.DBF	DATA	.T.	Temporary database corresponding to COVER for current site
JUST.DBF	DATA	.T.	Justifications database for mHRS/HRS
JUST.DBT	DATA	.T.	Memo fields contained in the JUST database
JUSTMASK.DBF	DATA	.F.	Master justification file records
JUSTMASK.DBT	DATA	.T.	Memo fields contained in the JUSTMASK database
JUSTTEMP.DBF	DATA	.T.	Temporary database corresponding to JUST for current site
JUSTTEMP.DBT	DATA	.T.	Temporary database memo fields of JUSTTEMP for current site
MATRIX.DBF	DATA	.F.	Master radionuclide concentration matrices database for mHRS
MHRS.DBF	DATA	.T.	mHRS/HRS worksheet parameter database
MHRSTEMP.NDX	DATA	.T.	Temporary database corresponding to MHRS for current site
NUCLIDES.DBF	DATA	.F.	Master radionuclide database for mHRS/HRS
SUBPARA.DBF	DATA	.F.	Worksheet headings database for site log file/justification
CONFIG.DB	DBASE	.F.	dBASE configuration file
AWORK2.DBF	FORMAT	.F.	Air route worksheet format database
DCWORK2.DBF	FORMAT	.F.	Direct contact route worksheet format database
FEWORK2.DBF	FORMAT	.F.	Fire and explosion route worksheet format database

TABLE 3.1. (Contd)

<u>File Name</u>	<u>Module Type</u>	<u>User Inter-action</u>	<u>Module Description</u>
GWORK2.DBF	FORMAT	.F.	Ground-water route worksheet format database
JUSTIN.FMT	FORMAT	.F.	JUST input screen for memo data entry
SWWORK2.DBF	FORMAT	.F.	Surface-water route worksheet format database
CALPHA.NDX	INDEX	.F.	Index file for the CHEMICAL database
JUSTINDX.NDX	INDEX	.T.	Program-created index file for organizing JUSTTEMP database
NALPHA.NDX	INDEX	.F.	Index file for the NUCLIDES database
SUB.NDX	INDEX	.F.	Index file for the SUBPARA database
CHEMLIST.FRM	REPORT	.F.	Prints radionuclide database report
SITELIST.FRM	REPORT	.F.	Report format for program-generated list of sites included
WORK.DBF	SCRATC	.F.	Work space database for radiological calculations
WORK2.DBF	SCRATC	.F.	Work space database for chemical incompatibility check

The program command files contain the actual coding necessary for program operation. The mHRS Program Command File is the main program file. It runs all of the other program command files, which are set up to operate as subprograms. The complicated nature of the mHRS/HRS methodology required that several levels of subprograms (modules) be developed for access during various stages of data handling, calculating, and reporting. Therefore, subprograms may call on other subprograms down through a hierarchy of six levels. Table 3.2 shows the program hierarchy, starting from the main mHRS program through all six levels. The table includes all of the modules, not just the program command file modules, to illustrate how the whole mHRS/HRS program package fits together.

TABLE 3.2. mHRS/HRS Program Hierarchy

mHRS Code Level 0	mHRS Code Level 1	mHRS Code Level 2	mHRS Code Level 3	mHRS Code Level 4	mHRS Code Level 5
mHRS	SETUP	SITELIST FIELDINT			
	LOOP GENERAL	EDCHEM	INCHEM	CHEMIN PRINTON BOX3 CHKCHEM CHEMLIST	SAXTAB
		INCHEM	CHEMIN PRINTON BOX3 CHKCHEM CHEMLIST	SAXTAB	
		EDRAD INRAD	INRAD		
	JUST	JUSTIN BOX4			
	PRINTON CONSTIT	CHKCHEM2 CHKCHEM3	NFPATAB		
		INCOM	SELINCOM	CHKINC	
			JUST	JUSTIN BOX4	
		PHYSTAT	JUST	JUSTIN BOX4	
	EDITOPT PRINTON PRINT1				
	GWIN	OBSIN GWCONT HWQUAN POPIN EDROUTE JUST	JUSTIN BOX4		
		BOX4			

TABLE 3.2. (Contd)

<u>mHRS Code Level 0</u>	<u>mHRS Code Level 1</u>	<u>mHRS Code Level 2</u>	<u>mHRS Code Level 3</u>	<u>mHRS Code Level 4</u>	<u>mHRS Code Level 5</u>
	SWIN	OBSIN SWCONT HWQUAN DISENV DISENV2 POPIN EDROUTE JUST	JUSTIN BOX4		
		BOX4			
	AIN	OBSIN HWQUAN APOP DISENV DISENV2 LANDUSE EDROUTE JUST	JUSTIN BOX4		
		BOX4			
	FEIN	HWQUAN RADCONC LANDUSE POPIN EDROUTE JUST	JUSTIN BOX4		
		BOX4			
	DCIN	RADCONC EDROUTE JUST	JUSTIN BOX4		
		BOX4			
	PRINTOPT				

TABLE 3.2. (Contd)

<u>mHRS Code Level 0</u>	<u>mHRS Code Level 1</u>	<u>mHRS Code Level 2</u>	<u>mHRS Code Level 3</u>	<u>mHRS Code Level 4</u>	<u>mHRS Code Level 5</u>
	GWCALC	RAOREL PERSTOX			
	SWCALC	RADREL PERSTOX			
	ACALC	RADREL			
	FECALC	RADREL			
	DCCALC	RADREL			
	PRINT2	PR2GW PR2SW PR2A PR2FE PR2DC			
	GWPRINT2				
	SWPRINT2				
	APRINT2				
	FEPRINT2				
	DCPRINT2				
	PRINT3				

The format files create custom screens that are used during specific queries to inform the user of special considerations necessary regarding the input. Such format screens were created to allow special considerations to be presented on the screen before the information was solicited because the mHRS/HRS methodology requires the use of professional judgment regarding much of the input. Also, since the mHRS/HRS methodology assigns rankings for specific ranges of data, the format files are used to present those ranges of data that apply to each ranking so the user can pick the appropriate ranking value and enter it as it is solicited.

The database files are used to store information as received or as calculated. The database files are indexed on key parameters, using the standard dBASE III routine for indexing. The indexing provides for easier and more rapid data handling. The system uses both temporary and permanent database

files. The temporary files handle data while the program is using it. Such temporary files provide a straightforward means by which to handle data while calculations and other manipulative operations are taking place. They also allow the use of internal editing routines within the program. For example, a permanent file can be accessed and read into the internal temporary file, the temporary file can be edited by selecting the "edit an existing file" option in the program, and then the edited version in the temporary file can be read into a new permanent file, giving two separate complete files, with only minor editing work needed to create the second file.

A special database file (CHEMICAL.DBF) was created to contain the hazard characteristics of 488 specific chemicals that may need to be considered at a site. This file contains the toxicity, persistence, ignitability, reactivity, and compatibility indexes for the 488 chemicals. In addition, a routine is provided to allow the user to add to this list of chemicals. Another special database file (NUCLIDES.DBF) contains the necessary grouping information for 51 radionuclides that may be associated with a site and hazard characteristics for each. The hazard characteristics for both the chemical and radionuclide lists were derived using information from Sax (1984), CRC's chemistry handbook (Weast and Astle 1981), Lange (1967), and Shleien and Terpilak (1984).

The database memo files are auxiliaries to the database files. They are used to store the contents of memo fields (i.e., fields created using the internal word processor of the dBASE III system). All database memo files (memo fields) will have a corresponding database file that stores the identifier that the dBASE III system automatically sets up to locate the corresponding database memo file. The mHRS/HRS program uses the database memo files and corresponding database files primarily to record mHRS/HRS input parameter justifications. Upon entering a solicited parameter during a program run, the user will be asked to supply information justifying the parameter selected. Since this information may be quite lengthy, the program calls in the internal dBASE III word processor to give the user more flexibility in writing the justification. In addition, each justification query has a designated database memo file already set up that indicates the framework of information needed to supply adequate justification for that particular input. The

appropriate database memo file is then called in and displayed using the dBASE III word processor for use in providing the justification information.

The index files provide a means to use a database file in a logical order rather than the order in which the records were entered into the file. Each index file will have a corresponding database file associated with it. The index files translate between a key parameter and the parameter's corresponding database record number. This indexing allows the database files to be accessed more efficiently, and it also allows random access of a particular record within a file.

The report form files are used to set up specialized report formats for the dBASE III system to use when printing out lists of data from a specified database file. The specialized reports are made up from report form files for the chemical database file (CHEMLIST.FRM), the radionuclide database file (NUCLIST.FRM), and the program-generated list of sites that have been evaluated (SITELIST.FRM).

The mHRS/HRS software package involves a long list of variables used in the various program command files and databases. Table 3.3 lists (with descriptions) the program variable names that are common to the various program command files contained in the package. Table 3.4 lists (with descriptions) the database field names (variable names) used in the various database files contained in the package. A complete listing of each of the program command files contained in the mHRS/HRS program package is supplied in Appendix A.

TABLE 3.3. mHRS/HRS Common Program Parameters and Descriptions

<u>Field Name</u>	<u>Field Type</u>	<u>Field Description</u>
ANSWER	Character	General purpose input parameter
A_TOT_TAR	Numeric	Total target score, air route
A_TOX	Numeric	Toxicity score, air route
C	Numeric	Concentration calculated in RADREL
CF	Numeric	Area correction factor, radiological calculations, fire, explosion, and direct contact routes
CHEM	Logical	Flag set if chemicals are considered at this site
CNINDX	Numeric	Index of the current constituent
DONE	Logical	General purpose loop control
DRIVE	Character	Letter designating the default disk drive
EDFLG	Logical	Set if user indicates additional editing is required
EDJ	Logical	Set if justification fields are to be edited
FIRST	Logical	Set if first time through the program
GNAME	Character	String "ABCDEF", used for radiological group determination
HDQ	Numeric	Input hazardous waste quantity
HIPHY	Numeric	Highest physical state score of all constituents at site
HIREACT	Numeric	Highest reactivity score of all constituents at site
HISCORE	Numeric	General purpose highest score of all possibilities
HITP	Numeric	Highest toxicity/persistence score of constituents at site
MHRSINDX	Numeric	Program index of the current site

TABLE 3.3. (Contd)

<u>Field Name</u>	<u>Field Type</u>	<u>Field Description</u>
NCHEM	Numeric	Number of chemicals in CHEMICAL database
NNUC	Numeric	Number of radionuclides in the NUCLIDES database
NOP	Numeric	Number of distance/population groups to be considered
NOTFOUND	Logical	General purpose search/find flag
NOTRIGHT	Logical	General purpose loop control
NUMBER	Numeric	General purpose input parameter
OBSFLG	Character	Y/N indicating whether or not there was a release this route
OLDINDX	Numeric	Saved value of MHRSINDX for file checking/manipulation
PATHSEL	Numeric	mHRS/HRS-assigned index of the current route
PINDX	Numeric	mHRS/HRS-assigned index of current parameter
RAD	Logical	Set if radionuclides considered at this site
RADFLG	Logical	Set if there is evidence of a radiological release at the current site
RCNO	Numeric	General purpose: record number
RDFLG	Logical	Set if user wishes to read introductory screens
READINT	Character	User input for setting the parameter RDFLG
REDOFLG	Logical	Set if editing a previously-entered route
RINDX	Numeric	mHRS/HRS-assigned index of the current route
ROUTE	Character	Label of the current route
ROWN	Numeric	Row index for full-screen functions
SC	Numeric	Unnormalized total chemical score this site
SITE_LOG	Character	File name to store text file associated with this site

TABLE 3.3. (Contd)

<u>Field Name</u>	<u>Field Type</u>	<u>Field Description</u>
SR	Numeric	Unnormalized total radiological score this site
SWFLOW	Numeric	Corresponds to SW_FLOW in the mHRS database
SYM	Character	Used to test for incompatibility classifications
USROPT	Numeric	General purpose value of user input option

TABLE 3.4. mHRS/HRS Database Fields and Descriptions

Field Name	Field Type	Field Length	Field Description
A_CH_WC	Numeric	3	Total waste characteristics score (chemical), air route
A_CONC	Numeric	19	Observed release concentration, air route
A_OATE	Character	8	Date of observed release, air route
A_DIST	Numeric	1	Distance to a sensitive environment score, air route
A_HW_QUAN	Numeric	1	Hazardous waste quantity score, air route
A_INCOMP	Numeric	1	Incompatibility value, air route
AIR_GROUP	Character	1	Radiological group assignment for constituent, air route
A_LAND_ALL	Character	5	Packed string of land use input values, air route
A_LAND_USE	Numeric	1	Land use score, air route
A_LOC	Character	60	Location of observed release, air route
A_OBSERVE	Numeric	3	Observed release score, air route
AP	Logical	1	Flag set if air route selected for any constituent
A_PATH	Logical	1	Flag set if air route to be considered
A_POP	Numeric	3	Population score, air route
A_POP_1	Numeric	8	Population within 1/4 mi, air route
A_POP_2	Numeric	8	Population within 1/2 mi, air route
A_POP_3	Numeric	8	Population within 1 mi, air route
A_POP_4	Numeric	8	Population within 4 mi, air route
A_RAD	Logical	1	Flag set if any radionuclides considered in air route
A_RAD_MO	Numeric	10	Radiological maximum observed score, air route

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
A_REACT	Numeric	1	Reactivity value, air route
A_RE_IN	Numeric	3	Reactivity/incompatibility score, air route
A_SAM_PRO	Character	60	Sampling protocol of observed release, air route
A_SC	Numeric	10	mHRS total chemical score, air route
A_SR	Numeric	10	mHRS total radiological score, air route
ATMINUS1	Numeric	2	mHRS/HRS-assigned score at 1.0E-1 pCi/l concentration
ATMINUS2	Numeric	2	mHRS/HRS-assigned score at 1.0E-2 pCi/l concentration
ATMINUS3	Numeric	2	mHRS/HRS-assigned score at 1.0E-3 pCi/l concentration
A_TONS	Numeric	10	Quantity of waste impacting air route (tons)
A_TOT_TAR	Numeric	3	Total target score, air route
A_TOX	Numeric	3	Toxicity score, air route
ATPLUS1	Numeric	2	mHRS/HRS-assigned score at 1.0E+1 pCi/l concentration
ATPLUS2	Numeric	2	mHRS/HRS-assigned score at 1.0E+2 pCi/l concentration
ATPLUS3	Numeric	2	mHRS/HRS-assigned score at 1.0E+3 pCi/l concentration
ATPLUS4	Numeric	2	mHRS/HRS-assigned score at 1.0E+4 pCi/l concentration
ATPLUS5	Numeric	2	mHRS/HRS-assigned score at 1.0E+5 pCi/l concentration
ATPLUS6	Numeric	2	mHRS/HRS-assigned score at 1.0E+6 pCi/l concentration

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
ATPLUS7	Numeric	2	mHRS/HRS-assigned score at 1.DE+7 pCi/l concentration
ATPLUS8	Numeric	2	mHRS/HRS-assigned score at 1.0E+8 pCi/l concentration
ATPLUS9	Numeric	2	mHRS/HRS-assigned score at 1.0E+9 pCi/l concentration
ATZERO	Numeric	2	mHRS/HRS-assigned score at 1.0E+0 pCi/l concentration
CF	Numeric	3	Area correction factor, radiological calculations, fire, explosion, and direct contact routes
CHEM	Logical	1	Flag set if chemical constituents in the waste
CHEM_NAME	Character	45	Name of chemical in master chemical database
CHEM_NUC	Character	1	'C' or 'N' indicating chemical or radiological constituent
C_INDX	Numeric	3	mHRS-assigned index for this chemical
CN_INDX	Numeric	3	Index of constituent in chemical or radionuclide data base
CONC	Numeric	19	Work field used by mHRS
CONC_UNIT	Character	8	Observed release concentration units
CONTAINER	Logical	1	Flag set if containers used for storage/disposal
CSCORE	Numeric	2	Work field used by mHRS
DC_ACCESS	Numeric	1	Accessibility score, direct contact route
DC_CH_WC	Numeric	3	Waste characteristics score (chemical), direct contact route
DC_CONC	Numeric	19	Observed release concentration, direct contact route

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
DC_CONTAIN	Numeric	2	Containment score, direct contact route
DC_DIS	Numeric	3	Distance to a critical habitat score, direct contact route
DC_GROUP	Character	1	Radiological group assignment, direct contact route
DC_MEAS	Logical	1	Flag set if measured concentration of radionuclides available, direct contact route
DC_OBSERVE	Numeric	3	Observed release score, direct contact route
OCP	Logical	1	Flag set if direct contact route selected
DC_PATH	Logical	1	Flag set if direct contact route to be considered
DC_POP	Numeric	3	Population within 1 mi, direct contact route
DC_RAD_MP	Numeric	10	Radiological maximum potential score, direct contact route
DC_SC	Numeric	10	mHRS total chemical score, direct contact route
DC_SR	Numeric	10	mHRS total radiological score, direct contact route
DC_TOT_TAR	Numeric	3	Total target score, direct contact route
DC_VOL	Numeric	10	Volume of the wastes for radionuclide concentration calculation, direct contact route
DESC	Character	36	Heading describing the current worksheet
DESC_COM1	Character	60	Additional comments to be included on cover sheet
DESC_COM2	Character	60	Additional comments to be included on cover sheet
DESC_COM3	Character	60	Additional comments to be included on cover sheet

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
ELEMENT	Character	2	Atomic symbol of this radionuclide
EPA_REGION	Character	40	EPA Region Office having jurisdiction over this site
FAC_LOCATE	Character	60	Location of this facility/site
FAC_NAME	Character	60	DOE Operations Office and location
FAC_TYPE	Character	60	Description of facility/site use
FE_BLDG	Numeric	3	Buildings within 2 mi, fire and explosion route
FE_CH_WC	Numeric	3	mHRS total waste characteristics score (chemical), fire and explosion route
FE_CONC	Numeric	19	Observed release concentration, fire and explosion route
FE_CONTAIN	Numeric	1	Containment score, fire and explosion route
FE_DIR_EVI	Numeric	1	Direct contact score, fire and explosion route
FE_DIS_BLD	Numeric	3	Distance to nearest building score, fire and explosion route
FE_DIS_ENV	Numeric	3	Distance to a sensitive environment score, fire and explosion route
FE_DIS_POP	Numeric	3	Distance to nearest population score, fire and explosion route
FE_GROUP	Character	1	Radiological group assignment, fire and explosion route
FE_HW_QUAN	Numeric	1	Hazardous waste quantity score, fire and explosion route
FE_IGNITE	Numeric	1	Ignitability score, fire and explosion route
FE_INCOMP	Numeric	1	Incompatibility score, fire and explosion route
FE_LAN_ALL	Character	5	Packed string of land use input values, fire and explosion route

TABLE 3.4. (Contd)

<u>Field Name</u>	<u>Field Type</u>	<u>Field Length</u>	<u>Field Description</u>
FE_MEAS	Logical	1	Flag set if measured releases of radionuclides are available, fire and explosion route
FEP	Logical	1	Flag set if fire and explosion route selected
FE_PATH	Logical	1	Flag set if fire and explosion route to be considered
FE_POP	Numeric	3	Population within 2 mi, fire and explosion route
FE_RAD_MP	Numeric	10	Radiological maximum potential score, fire and explosion route
FE_RD_WC	Numeric	3	Total waste characteristics score (radiological), fire and explosion route
FE_REACT	Numeric	1	Reactivity score, fire and explosion route
FE_SC	Numeric	10	mHRS total chemical score, fire and explosion route
FE_SEN_1	Logical	1	Flag set if distance to wetlands is < 100 feet, fire and explosion route
FE_SEN_2	Numeric	1	mHRS/HRS values for distance to critical habitat, fire and explosion route
FE_SEN_3	Logical	1	Flag set if fire could spread to sensitive environment, fire and explosion route
FE_SR	Numeric	10	mHRS total radiological score, fire and explosion route
FE_TONS	Numeric	10	Quantity of hazardous waste (tons) considered, fire and explosion route
FE_TOT_TAR	Numeric	3	Total targets score, fire and explosion route
FE_USE	Numeric	3	Land use score, fire and explosion route
FE_VOL	Numeric	10	Volume of waste used to estimate maximum radionuclide concentration, fire and explosion route

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
FLUNIT	Character	6	Units of surface-water flow rate
GROUP	Character	1	mHRS/HRS-assigned radiological group for this matrix
GW_CH_WC	Numeric	3	Total waste characteristics score (chemical), ground-water route
GW_CONC	Numeric	19	Observed release concentration, ground-water route
GW_CONTAIN	Numeric	1	Containment score, ground-water route
GW_CON_1	Numeric	1	Containment value - surface impoundment, ground-water route
GW_CON_2	Numeric	1	Containment value - containers, ground-water route
GW_CON_3	Numeric	1	Containment value - piles, ground-water route
GW_CON_4	Numeric	1	Containment value - landfills, ground-water route
GW_DEPTH	Numeric	1	Aquifer depth score, ground-water route
GW_DIS_POP	Numeric	2	Distance to nearest population/population served score, ground-water route
GW_GROUP	Character	1	Radiological group assignment, ground-water route
GW_HW_QUAN	Numeric	1	Hazardous waste quantity score, ground-water route
GW_OBSERVE	Numeric	2	Observed release score, ground-water route
GWP	Logical	1	Flag set if ground-water route selected for any constituent
GW_PATH	Logical	1	Flag set if ground-water route to be considered

TABLE 3.4. (Contd)

<u>Field Name</u>	<u>Field Type</u>	<u>Field Length</u>	<u>Field Description</u>
GW_PERMBIL	Numeric	1	Permeability of unsaturated zone score, ground-water route
GW_PHY	Numeric	1	User-assigned physical state for ground-water route
GW_PHYSTAT	Numeric	1	Score for physical state of the waste, ground-water route
GW_POP_ALL	Character	20	Packed string of population and distant inputs, ground-water route
GW_PRECIP	Numeric	1	Precipitation score, ground-water route
GW_RAD	Logical	1	Flag set if any radionuclides considered for ground-water route
GW_RAD_MO	Numeric	10	Radiological maximum observed score, ground-water route
GW_RAD_MP	Numeric	10	Radiological maximum potential score, ground-water route
GW_RAD_MX	Numeric	10	The greater of observed or potential radiological release, ground-water route
GW_SC	Numeric	10	mHRS total chemical score, ground-water route
GW_SR	Numeric	10	mHRS total radiological score, ground-water route
GW_TONS	Numeric	10	Quantity of hazardous waste impacting ground water (tons)
GW_TOT_ROU	Numeric	3	Total route characteristics score, ground-water route
GW_TOT_TAR	Numeric	3	Total targets score, ground-water route
GW_TOX_PER	Numeric	3	Toxicity/persistence score, ground-water route
GW_USE	Numeric	1	Ground-water use score, ground-water route
HRS_S_A	Numeric	8	HRS air route score

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
HRS_S_DC	Numeric	8	HRS direct contact route score
HRS_S_FE	Numeric	8	HRS fire and explosion route score
HRS_S_GW	Numeric	8	HRS ground-water route score
HRS_S_M	Numeric	8	HRS composite score of the three migration routes
HRS_S_SW	Numeric	8	HRS surface-water route score
HS_TYPE	Character	60	Types of hazardous waste at this facility/site
HW_QUAN	Numeric	12	Quantity of this constituent disposed
ID1			Work field used by mHRS
ID2			Work field used by mHRS
ID3			Work field used by mHRS
IDENT	Character	60	Additional identification code/number/description for this site
IGNIT_INDX	Numeric	1	Assigned ignitability index for this chemical or radionuclide
INCOM_IND2	Character	3	Secondary incompatibility classification for this chemical or radionuclide
INFO_NEEDS	Character	60	Descriptive comments to be included on HRS/mHRS cover sheet
ISOTOPE	Numeric		Atomic mass number plus metastable/daughter designation
LANDFILL	Logical	1	Flag set if landfill is used for storage/disposal
MAJOR_ROUT	Character	60	Contamination route of major concern at this facility/site
MAX	Numeric	24	Maximum score
M_DATE	Date	8	Date of last modification to this record
mHRS_S_A	Numeric	8	mHRS air route score

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
mHRS_S_DC	Numeric	8	mHRS direct contact route score
mHRS_S_FE	Numeric	8	mHRS fire and explosion route score
mHRS_S_GW	Numeric	8	mHRS ground-water route score
mHRS_S_M	Numeric	8	mHRS composite score of the three migration routes
mHRS_S_SW	Numeric	8	mHRS surface-water route score
MULT	Numeric	11	Multiplier
NAME	Character	30	Name of this waste constituent
NEW_FLG	Logical	1	Flag set if chemical added during application
NOTE			Work field used by mHRS
NOTES	Memo	10	Justification text concerning this route/parameter
N_INDX			mHRS-assigned index for this radionuclide
PER_CONTC1	Character	40	Person #1 in charge of this facility/site
PER_CONTC2	Character	40	Person #2 in charge of this facility/site
PER_CONTC3	Character	40	Person #3 in charge of this facility/site
PERS_INDX	Numeric	1	HRS/mHRS persistence index assigned to this chemical or radionuclide
PILES	Logical	1	Flag set if piles are used for storage/disposal
P_INDX	Character	2	mHRS-assigned parameter index
QU_UNITS	Character	8	Units associated with the field HW_QUAN
RAD	Logical	1	Flag set if radiological constituents in the waste
REACT_INDX	Numeric	1	Assigned reactivity index for this chemical or radionuclide
REVIEWER	Character	40	Person scoring this HRS/mHRS worksheet package

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
REV_DATE	Date	8	Date to appear on the HRS/mHRS cover sheet
RTINDX			mHRS-assigned route index for this radiological score matrix
R_INDX	Character	1	mHRS-assigned route index
SCORE	Numeric	6	Weighted parameter score
SITE_INDX	Numeric	4	mHRS-assigned index number for this site
SITE_LOG	Character	8	File name to store the site log file under
SITE_NAME	Character	60	Name of this facility/site
SUR_IMPND	Logical	1	Flag set if surface impound is storage/disposal method
SW_CH_WC	Numeric	3	Total waste characteristics score (chemical), surface-water route
SW_CONC	Numeric	19	Observed release concentration, surface-water route
SW_CON_LOG	Logical	1	Flag set if diversion structure/intervening terrain preclude runoff/spill
SW_CONTAIN	Numeric	1	Containment score, surface-water route
SW_CON_1	Numeric	1	Containment value - surface impoundment, surface-water route
SW_CON_2	Numeric	1	Containment value - containers, surface-water route
SW_CON_3	Numeric	1	Containment value - piles, surface-water route
SW_CON_4	Numeric	1	Containment value - landfills, surface-water route
SW_DIS_ENV	Numeric	3	Distance to a sensitive environment score, surface-water route
SW_DIS_POP	Numeric	3	Distance to water intake/population served score, surface-water route

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
SW_DIS_SUR	Numeric	1	Distance to nearest surface water score, surface-water route
SW_FLOW	Numeric	16	Surface-water flow rate
SW_FSLOPE	Numeric	1	Facility slope value, surface-water route
SW_GROUP	Character	1	Radiological group assignment, surface-water route
SW_HW_QUAN	Numeric	1	Hazardous waste quantity, surface-water route
SW_OBSERVE	Numeric	2	Observed release score, surface-water route
SWP	Logical	1	Flag set if surface-water route selected for any constituent
SW_PATH	Logical	1	Flag set if surface-water route to be considered
SW_PHY	Numeric	1	User-assigned physical state for surface-water route
SW_PHYSTAT	Numeric	1	Score of physical state of waste, surface-water route
SW_POP_ALL	Character	20	Packed string of distance/population input for surface-water route
SW_RAD	Logical	1	Flag set if any radionuclides considered in surface-water route
SW_RAD_MO	Numeric	10	mHRS radiological maximum observed score, surface-water route
SW_RAD_MP	Numeric	10	mHRS radiological maximum potential score, surface-water route
SW_RAD_MX	Numeric	10	The greater of radiological observed/potential score, surface-water route
SW_RAINFAL	Numeric	1	One-year rainfall score, surface water route
SW_SC	Numeric	10	mHRS total chemical score, surface water route
SW_SLOPE	Numeric	1	Facility/terrain slope score, surface water route

TABLE 3.4. (Contd)

Field Name	Field Type	Field Length	Field Description
SW_SR	Numeric	10	mHRS total radiological score, surface water route
SW_TONS	Numeric	10	Quantity of waste impacting surface water (tons)
SW_TOT_ROU	Numeric	3	Total route characteristics score, surface water route
SW_TOT_TAR	Numeric	3	Total targets score, surface water route
SW_TOX_PER	Numeric	3	Toxicity/persistence score, surface water route
SW_TSLOPE	Numeric	1	Intervening terrain slope value, surface water route
SW_USE	Numeric	1	Water use score, surface water route
TOX_INDX	Numeric	1	Toxicity index assigned to this chemical or radionuclide
TP_SCORE	Numeric	2	Toxicity/persistence score of this constituent
TRCO	Numeric	3	HRS/mHRS-assigned transfer coefficient for this radionuclide
USEFLG	Logical	1	Flag set if this classification considered at this site
VALUE	Numeric	3	Assigned parameter score

4.0 mHRS/HRS DATA FILES

The mHRS/HRS program uses two types of data files. User-generated data files are created during a program run to handle the input data necessary for completing a site evaluation. Program-generated data files are created internally to aid in the locating and handling of the input data. These two types of data files are discussed in the next two subsections.

4.1 USER-GENERATED DATA FILES

The user-generated data fields handle the actual data used to perform the mHRS/HRS evaluations. An alphabetized listing of the user-generated data files, with a brief description of each file, is supplied in Table 4.1. The table displays 1) the file name, including the dBASE III suffix that designates the type of file; 2) the module type (i.e., whether it is an ASCII file, a dBASE III database file, or an index file that helps the program locate parameters); and 3) a brief description of the file contents to indicate where it is used in the program.

The dBASE III system breaks the information stored in each data file (database in dBASE III terminology) down into individual records. This breakdown allows the system to locate and handle pieces of information by record number, providing considerable flexibility in how the information is accessed. Each record is further broken down by variables (fields in dBASE III terminology) that contain the specific data elements to be stored and handled. Each record contained within a data file has the following structure:

- Field number
- Field name
- Type of data (whether character, numeric, logical, memo, or date)
- Width of field (number of characters, numbers, etc.)
- Number of decimal places necessary (applicable only to numeric data).

Table 4.2 contains an alphabetized listing of all the variable names used in the various user-created data files. The list is alphabetized first by database name, then by field or variable name. The table displays 1) the name of

TABLE 4.1. mHRS/HRS User-Generated Data File Descriptions

<u>File Name</u>	<u>Module Type</u>	<u>Data File Description</u>
CONC.DBF	DATA	Constituent database for mHRS/HRS
CONCTEMP.DBF	DATA	Current site temporary database corresponding to CONC
COVER.DBF	DATA	Cover sheet and general site information database
COVERTMP.DBF	DATA	Current site temporary database corresponding to COVER
JUST.DBF	DATA	Justifications database for mHRS/HRS
JUST.DBT	DATA	Memo fields contained in the JUST database
JUSTINDX.NDX	INDEX	Program-created index file for organizing JUSTTEMP database
JUSTMASK.DBT	DATA	Memo fields contained in the JUSTMASK database
JUSTTEMP.DBF	DATA	Current site temporary database corresponding to JUST
JUSTTEMP.DBT	DATA	Current site temporary database memo fields of JUSTTEMP
mHRS/DBF	DATA	mHRS/HRS worksheet parameter database
mHRS.TXT	ASCII	Site log file: input report, justifications, worksheets
mHRSTEMP.NDX	DATA	Current site temporary database corresponding to mHRS

TABLE 4.2. mHRS/HRS User-Generated Data Field Descriptions

Database Name	Field Name	Field Type	Field Length	Field Description
CONC	A_CONC	Numeric	19	Observed release concentration, air route
CONC	AIR_GROUP	Character	1	Radiological group assignment for constituent, air route
CONC	A_PATH	Logical	1	Flag set if air route to be considered
CONC	CHEM_NUC	Character	1	'C' or 'N' indicating chemical or radiological constituent
CONC	CN_INOX	Numeric	3	Index of constituent in chemical or radionuclide database
CONC	CONC	Numeric	19	Workspace used by the mHRS program
CONC	CONC_UNIT	Character	8	Observed release concentration units
CONC	DC_CONC	Numeric	19	Observed release concentration, direct contact route
CONC	DC_GROUP	Character	1	Radiological group assignment, direct contact route
CONC	DC_PATH	Logical	1	Flag set if direct contact route to be considered
CONC	FE_CONC	Numeric	19	Observed release concentration, fire and explosion route
CONC	FE_GROUP	Character	1	Radiological group assignment, fire and explosion route
CONC	FE_PATH	Logical	1	Flag set if fire and explosion route to be considered
CONC	GW_CONC	Numeric	19	Observed released concentration, ground-water route
CONC	GW_GROUP	Character	1	Radiological group assignment, ground-water route

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
CONC	GW_PATH	Logical	1	Flag set if ground-water route to be considered
CONC	GW_PHY	Numeric	1	User-assigned physical state for ground-water route
CONC	HW_QUAN	Numeric	12	Quantity of this constituent disposed
CDNC	IGNIT_INDX	Numeric	1	Assigned ignitability index for this constituent
CONC	INCOM_INDX	Character	3	Incompatibility classification for this constituent
CONC	INCDM_IND2	Character	3	Second incompatibility classification for this constituent
CONC	NAME	Character	30	Name of this waste constituent
CONC	PERS_INDX	Numeric	1	Assigned persistence value for this constituent
CONC	QU_UNITS	Character	8	Units associated with the field HW_QUAN
CONC	REACT_INDX	Numeric	1	Assigned reactivity index for this constituent
CONC	SITE_INDX	Numeric	4	mHRS-assigned index for this facility/site
CONC	SW_CONC	Numeric	19	Observed release concentration, surface-water route
CONC	SW_GROUP	Character	1	Radiological group assignment, surface-water route
CONC	SW_PATH	Logical	1	Flag set if surface-water route to be considered
CONC	SW_PHY	Numeric	1	User-assigned physical state for surface-water route
CONC	TOX_INDX	Numeric	1	Assigned toxicity value for this constituent

TABLE 4.2. (Contd)

<u>Database Name</u>	<u>Field Name</u>	<u>Field Type</u>	<u>Field Length</u>	<u>Field Description</u>
CONC	TP_SCORE	Numeric	2	Toxicity/persistence score of this constituent
CONC	TRCO	Numeric	3	Radiological transfer coefficient for this constituent
COVER	AP	Logical	1	Flag set if air route selected for any constituent
COVER	DCP	Logical	1	Flag set if direct contact route selected
COVER	DESC_COM1	Character	60	Additional comments to be included on cover sheet
COVER	DESC_COM2	Character	60	Additional comments to be included on cover sheet
COVER	DESC_COM3	Character	60	Additional comments to be included on cover sheet
COVER	EPA_REGION	Character	40	EPA Region Office having jurisdiction over this site
COVER	FAC_LOCATE	Character	60	Location of this facility/site
COVER	FAC_NAME	Character	60	DOE Operations Office and location
COVER	FAC_TYPE	Character	60	Description of facility/site use
COVER	FEP	Logical	1	Flag set if fire and explosion route selected
COVER	GWP	Logical	1	Flag set if ground-water route selected for any constituent
COVER	HRS_S_A	Numeric	8	HRS air route score
COVER	HRS_S_DC	Numeric	8	HRS direct contact route score
COVER	HRS_S_FE	Numeric	8	HRS fire and explosion route score
COVER	HRS_S_GW	Numeric	8	HRS ground-water route score

TABLE 4.2. (Contd)

<u>Database Name</u>	<u>Field Name</u>	<u>Field Type</u>	<u>Field Length</u>	<u>Field Description</u>
COVER	HRS_S_M	Numeric	8	HRS composite score for the three migration routes
COVER	HRS_S_SW	Numeric	8	HRS surface-water route score
COVER	HS_TYPE	Character	60	Types of hazardous waste at this facility/site
COVER	IDENT	Character	60	Additional identification code/number/description this site
COVER	INFO_NEEDS	Character	60	Descriptive comments to be included on mHRS/HRS cover sheet
COVER	MAJOR_ROUT	Character	60	Contamination route of major concern at this facility/site
COVER	mHRS_S_A	Numeric	8	mHRS air route score
COVER	mHRS_S_DC	Numeric	8	mHRS direct contact route score
COVER	mHRS_S_FE	Numeric	8	mHRS fire and explosion route score
COVER	mHRS_S_GW	Numeric	8	mHRS ground-water route score
COVER	mHRS_S_M	Numeric	8	mHRS composite score for the three migration routes
COVER	mHRS_S_SW	Numeric	8	mHRS surface-water route score
COVER	M_DATE	Date	8	Date of last modification to this record
COVER	PER_CONTC1	Character	40	Person #1 in charge of this facility/site
COVER	PER_CONTC2	Character	40	Person #2 in charge of this facility/site
COVER	PER_CONTC3	Character	40	Person #3 in charge of this facility/site
COVER	REVIEWER	Character	40	Person scoring this mHRS/HRS worksheet package

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
COVER	REV_DATE	Date	8	Date to appear on the mHRS/HRS cover sheet
COVER	SITE_INDX	Numeric	4	mHRS-assigned index number for this site
COVER	SITE_LOG	Character	8	File name to store the site log file under
COVER	SITE_NAME	Character	60	Name of this facility/site
COVER	SWP	Logical	1	Flag set if surface-water route selected for any constituent
JUST	NOTES	Memo	10	Justification text concerning this route/parameter
JUST	P_INDX	Character	2	mHRS-assigned parameter index assigned to this record
JUST	R_INDX	Character	1	mHRS-assigned route index for this record
JUST	SITE_INDX	Numeric	4	mHRS-assigned index number for this site
JUST	USEFLG	Logical	1	Flag set if this classification considered at this site
mHRS	A_CH_WC	Numeric	3	Total waste characteristics score (chemical), air route
mHRS	A_DATE	Character	8	Date of observed release, air route
mHRS	A_DIST	Numeric	1	Distance to a sensitive environment score, air route
mHRS	A_HW_QUAN	Numeric	1	Hazardous waste quantity score, air route
mHRS	A_INCOMP	Numeric	1	Incompatibility value, air route
mHRS	A_LAND_ALL	Character	5	Packed string of land use input values, air route

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
mHRS	A_LAND_USE	Numeric	1	Land use score, air route
mHRS	A_LOC	Character	60	Location of observed release, air route
mHRS	A_OBSERVE	Numeric	3	Observed release score, air route
mHRS	A_POP	Numeric	3	Population score, air route
mHRS	A_POP_1	Numeric	8	Population within 1/4 mi, air route
mHRS	A_POP_2	Numeric	8	Population within 1/2 mi, air route
mHRS	A_POP_3	Numeric	8	Population within 1 mi, air route
mHRS	A_POP_4	Numeric	8	Population within 4 mi, air route
mHRS	A_RAD	Logical	1	Flag set if any radionuclides considered in air route
mHRS	A_RAD_MO	Numeric	10	Radiological maximum observed score, air route
mHRS	A_REACT	Numeric	1	Reactivity value, air route
mHRS	A_RE_IN	Numeric	3	Reactivity/incompatibility score, air route
mHRS	A_SAM_PRO	Character	60	Sampling protocol of observed release, air route
mHRS	A_SC	Numeric	10	mHRS total chemical score, air route
mHRS	A_SR	Numeric	10	mHRS total radiological score, air route
mHRS	A_TONS	Numeric	10	Quantity of waste impacting air route (tons)
mHRS	A_TOT_TAR	Numeric	3	Total target score, air route
mHRS	A_TOX	Numeric	3	Toxicity score, air route

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
mHRS	CF	Numeric	3	Area correction factor, radiological calculations, fire, explosion, and direct contact routes
mHRS	CHEM	Logical	1	Flag set if chemical constituents in the waste
mHRS	CONTAINER	Logical	1	Flag set if containers used for storage/disposal
mHRS	DC_ACCESS	Numeric	1	Accessibility score, direct contact route
mHRS	DC_CH_WC	Numeric	3	Waste characteristics score (chemical), direct contact route
mHRS	DC_CONTAIN	Numeric	2	Containment score, direct contact route
mHRS	DC_DIS	Numeric	3	Distance to a critical habitat score, direct contact route
mHRS	DC_MEAS	Logical	1	Flag set if measured concentration of radionuclides available, direct contact route
mHRS	DC_OBSERVE	Numeric	3	Observed release score, direct contact route
mHRS	DC_POP	Numeric	3	Population within 1 mi, direct contact route
mHRS	DC_RAD_MP	Numeric	10	Radiological maximum potential score, direct contact route
mHRS	DC_SC	Numeric	10	mHRS total chemical score, direct contact route
mHRS	DC_SR	Numeric	10	mHRS total radiological score, direct contact route
mHRS	DC_TOT_TAR	Numeric	3	Total target score, direct contact route

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
mHRS	DC_VOL	Numeric	10	Volume of the wastes for radionuclide concentration calculation, direct contact route
mHRS	FE_BLDG	Numeric	3	Buildings within a 2-mi radius score, fire and explosion route
mHRS	FE_CH_WC	Numeric	3	mHRS total waste characteristics score (chemical), fire and explosion route
mHRS	FE_CONTAIN	Numeric	1	Containment score, fire and explosion route
mHRS	FE_DIR_EVI	Numeric	1	Direct evidence score, fire and explosion route
mHRS	FE_DIS_BLD	Numeric	3	Distance to nearest building score, fire and explosion route
mHRS	FE_DIS_ENV	Numeric	3	Distance to a sensitive environment score, fire and explosion route
mHRS	FE_DIS_POP	Numeric	3	Distance to nearest population score, fire and explosion route
mHRS	FE_HW_QUAN	Numeric	1	Hazardous waste quantity score, fire and explosion route
mHRS	FE_IGNITE	Numeric	1	Ignitability score, fire and explosion route
mHRS	FE_INCOMP	Numeric	1	Incompatibility score, fire and explosion route
mHRS	FE_LAN_ALL	Character	5	Packed string of land use input values for fire and explosion route
mHRS	FE_MEAS	Logical	1	Flag set if measured releases of radionuclides are available
mHRS	FE_POP	Numeric	3	Population within 2 mi, fire and explosion route

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
mHRS	FE_RAD_MP	Numeric	10	Radiological maximum potential score, fire and explosion route
mHRS	FE_RD_WC	Numeric	3	Total waste characteristics score (radiological), fire and explosion route
mHRS	FE_REACT	Numeric	1	Reactivity score, fire and explosion route
mHRS	FE_SC	Numeric	10	mHRS total chemical score, fire and explosion route
mHRS	FE_SEN_1	Logical	1	Flag set if distance to wetlands is < 100 feet, fire and explosion route
mHRS	FE_SEN_2	Numeric	1	HRS/mHRS values for distance to critical habitat
mHRS	FE_SEN_3	Logical	1	Flag set if fire could spread to sensitive environment
mHRS	FE_SR	Numeric	10	mHRS total radiological score, fire and explosion route
mHRS	FE_TONS	Numeric	10	Quantity of hazardous waste (tons) considered for fire and explosion route
mHRS	FE_TOT_TAR	Numeric	3	Total targets score, fire and explosion route
mHRS	FE_USE	Numeric	3	Land use score, fire and explosion route
mHRS	FE_VOL	Numeric	10	Volume of waste used to estimate radionuclide maximum concentration, fire and explosion route
mHRS	FLUNIT	Character	6	Units of surface-water flow rate
mHRS	GW_CH_WC	Numeric	3	mHRS waste characteristics score (chemical), ground-water route

TABLE 4.2. (Contd)

<u>Database Name</u>	<u>Field Name</u>	<u>Field Type</u>	<u>Field Length</u>	<u>Field Description</u>
mHRS	GW_CONTAIN	Numeric	1	Containment score, ground-water route
mHRS	GW_CON_1	Numeric	1	Containment value - surface impoundment, ground-water route
mHRS	GW_CON_2	Numeric	1	Containment value - containers, ground-water route
mHRS	GW_CON_3	Numeric	1	Containment value - piles, ground-water route
mHRS	GW_CON_4	Numeric	1	Containment value - landfills, ground-water route
mHRS	GW_OEPH	Numeric	1	Aquifer depth score, ground-water route
mHRS	GW_DIS_POP	Numeric	2	Distance to nearest population/population served score, ground-water route
mHRS	GW_HW_QUAN	Numeric	1	Hazardous waste quantity score, ground-water route
mHRS	GW_OBSERVE	Numeric	2	Observed release score, ground-water route
mHRS	GW_PERMBIL	Numeric	1	Permeability of unsaturated zone score, ground-water route
mHRS	GW_PHYSTAT	Numeric	1	Score of physical state of the waste, ground-water route
mHRS	GW_POP_ALL	Character	20	Packed string of population and distance inputs for ground-water route
mHRS	GW_PRECIP	Numeric	1	Precipitation score, ground-water route
mHRS	GW_RAD	Logical	1	Flag set if any radionuclides considered for ground-water route
mHRS	GW_RAD_MO	Numeric	10	Radiological maximum observed score, ground-water route

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
mHRS	GW_RAD_MP	Numeric	10	Radiological maximum potential score, ground-water route
mHRS	GW_RAD_MX	Numeric	10	The greater of observed or potential radionuclide release, ground-water route
mHRS	GW_SC	Numeric	10	mHRS total chemical score, ground-water route
mHRS	GW_SR	Numeric	10	mHRS total radiological score, ground-water route
mHRS	GW_TONS	Numeric	10	Quantity of hazardous waste impacting ground water (tons)
mHRS	GW_TOT_ROU	Numeric	3	Total route characteristics score, ground-water route
mHRS	GW_TOT_TAR	Numeric	3	Total targets score, ground-water route
mHRS	GW_TOX_PER	Numeric	3	Toxicity/persistence score, ground-water route
mHRS	GW_USE	Numeric	1	Ground-water use score, ground-water route
mHRS	LANDFILL	Logical	1	Flag set if landfill used for storage/disposal
mHRS	PILES	Logical	1	Flag set if piles used for storage/disposal
mHRS	RAD	Logical	1	Flag set if radiological constituents in the waste
mHRS	SITE_INDX	Numeric	4	mHRS-assigned index for this facility/site
mHRS	SUR_IMPND	Logical	1	Flag set if surface impoundment used for storage/disposal
mHRS	SW_CH_WC	Numeric	3	Total waste characteristics score (chemical), surface-water route

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
mHRS	SW_CON_LOG	Logical	1	Flag set if diversion structure or intervening terrain preclude runoff/spill
mHRS	SW_CONTAIN	Numeric	1	Containment score, surface-water route
mHRS	SW_CON_1	Numeric	1	Containment value - surface impoundment, surface-water route
mHRS	SW_CON_2	Numeric	1	Containment value - containers, surface-water route
mHRS	SW_CON_3	Numeric	1	Containment value - piles, surface-water route
mHRS	SW_CON_4	Numeric	1	Containment value - landfills, surface-water route
mHRS	SW_DIS_ENV	Numeric	3	Distance to a sensitive environment score, surface-water route
mHRS	SW_DIS_POP	Numeric	3	Distance to water intake/population served score, surface-water route
mHRS	SW_DIS_SUR	Numeric	1	Distance to nearest surface water score, surface-water route
mHRS	SW_FLOW	Numeric	16	Surface-water flow rate
mHRS	SW_FSLOPE	Numeric	1	Facility slope value, surface-water route
mHRS	SW_HW_QUAN	Numeric	1	Hazardous waste quantity score, surface-water route
mHRS	SW_OBSERVE	Numeric	2	Observed release score, surface-water route
mHRS	SW_PHYSTAT	Numeric	1	Score for physical state of waste, surface-water route
mHRS	SW_POP_ALL	Character	20	Packed string of distance and population input for surface-water route

TABLE 4.2. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
mHRS	SW_RAD	Logical	1	Flag set if any radionuclides considered for surface-water route
mHRS	SW_RAD_MO	Numeric	10	mHRS radiological maximum observed score, surface-water route
mHRS	SW_RAD_MP	Numeric	10	mHRS radiological maximum potential score, surface-water route
mHRS	SW_RAD_MX	Numeric	10	Greater of radiological observed/potential scores, surface-water route
mHRS	SW_RAINFAL	Numeric	1	One-year rainfall score, surface-water route
mHRS	SW_SC	Numeric	10	mHRS total chemical score, surface-water route
mHRS	SW_SLOPE	Numeric	1	Facility/terrain slope score, surface-water route
mHRS	SW_SR	Numeric	10	mHRS total radiological score, surface-water route
mHRS	SW_TONS	Numeric	10	Quantity of waste impacting surface water (tons)
mHRS	SW_TOT_ROU	Numeric	3	Total route characteristics score, surface-water route
mHRS	SW_TOT_TAR	Numeric	3	Total target score, surface-water route
mHRS	SW_TOX_PER	Numeric	3	Toxicity/persistence score, surface-water route
mHRS	SW_TSLOPE	Numeric	1	Intervening terrain slope value, surface-water route
mHRS	SW_USE	Numeric	1	Water use score, surface-water route

the database containing the field, 2) the name of the field (variable name), 3) the field type (e.g., character, numeric, logical), 4) field width (i.e., the number of characters or numbers contained in the field), and 5) a brief description of the field's purpose.

The complete dBASE III data file structure for each of the mHRS/HRS user-created data files is included in Appendix B. These data file listings show the variables and structures as they are contained within the dBASE III system.

4.2 PROGRAM DATA FILES

As mentioned previously, program data files are the files set up to assist in locating and handling user-supplied data. Because the types of data handled by the mHRS/HRS program vary from large blocks of text, to very small numbers, to indexes, and so on, these files were established to serve as special matrices and locator files. Specific data identifiers are stored in these files, allowing the program to operate more smoothly and efficiently. The information stored in these files is generated automatically by the program as the user progresses through a run. An alphabetized listing of the program-generated data files with brief descriptions of each file, is shown in Table 4.3. The program data files incorporate the same basic internal dBASE III structure as the user-generated data files. The table displays 1) the file name, including the dBASE III suffix that designates the type of file, 2) the module type [i.e., whether it is a code file (dBASE III programming file), a format file used to display information on the screen, a data file (dBASE III database), dBASE system configuration file (an index file that helps the program locate parameters), a report form file (files used by program to structure reports), or a working database file]; and 3) a brief description of the file contents to indicate where it is used in the program. Table 4.4 contains an alphabetized listing of the variable names associated with the program-generated data files. It groups the fields listed by associated database. The table displays 1) the name of the database containing the field (variable name), 2) the name of the field, 3) the field type (e.g., character, numeric, or logical), 4) field width (i.e., the number of characters or numbers contained in the field), and 5) a brief description of the field's purpose.

TABLE 4.3. mHRS/HRS Program Data File Descriptions

<u>File Name</u>	<u>Module</u>	<u>User Inter-</u> <u>Type action</u>	<u>Data File Description</u>
APRINT2.PRG	CODE	.F.	Controls printing of the air route worksheet
AWORK2.DBF	FORMAT	.F.	Air route worksheet format database
BOX3.FMT	CODE	.F.	Draws general mHRS/HRS logo on screen
BOX4.FMT	CODE	.F.	Draws route-specific mHRS/HRS logo on screen
CALPHA.NDX	INDEX	.F.	Index file for the CHEMICAL database
CHEMICAL.DBF	DATA	.F.	Master chemical mHRS/HRS database
CHEMIN.FMT	CODE	.F.	Chemical constituent input menu screen with instructions
CHEMLIST.FRM	REPORT	.F.	Report format for program-generated list of chemicals
CHKCHEM.PRG	CODE	.F.	Transfer chemical scores, gets missing persistence/toxicity
CHKCHEM2.PRG	CODE	.F.	Gets missing reactivity score/controls incompatibility check
CHKCHEM3.PRG	CODE	.F.	Get missing ignitability score
CHKINC.PRG	CODE	.F.	Checks for incompatible chemicals and prints names if found
CONFIG.DB	DBASE	.F.	dBASE configuration file
CREDITS.FMT	CODE	.F.	Introductory screen
DCCALC.PRG	CODE	.F.	Direct contact route calculations
DCIN.PRG	CODE	.F.	Controls direct contact route input and edit
DCPRINT2.PRG	CODE	.F.	Controls printing of the direct contact route worksheet
DCWORK2.DBF	FORMAT	.F.	Direct contact route worksheet format database
DEFS.FMT	CODE	.F.	Introductory screen
DISENV.FMT	CODE	.F.	Distance to sensitive environment information screen

TABLE 4.3. (Contd)

File Name	Module Type	User Inter-action	Data File Description
DISENV2.FMT	CODE	.F.	Distance to sensitive environment scoring screen
EDCHEM.PRG	CODE	.F.	Menu of options for use of previously-entered radionuclides
EDITOPT.PRG	CODE	.F.	Input user edit options
EDRAD.PRG	CODE	.F.	Menu of options for use of previously-entered chemicals
EDROUTE.PRG	CODE	.F.	Allows user option of editing previously-entered route
FECALC.PRG	CODE	.F.	Fire and explosion calculations
FEIN.PRG	CODE	.F.	Controls fire and explosion route input and edit
FEPRINT2.PRG	CODE	.F.	Controls printing of the fire and explosion route worksheets
FEWORK2.DBF	FORMAT	.F.	Fire and explosion route worksheet format database
FIELDINT.PRG	CODE	.F.	Initializes worksheet parameters to maximum values
GENERAL.PRG	CODE	.F.	Inputs general information for current site
GWCALC.PRG	CODE	.F.	Ground-water route calculations
GWIN.PRG	CODE	.F.	Controls ground-water route input and edit
GWCONT.PRG	CODE	.F.	Controls ground-water route containment input and scoring
GWPRINT2.PRG	CODE	.F.	Controls printing of the ground-water route worksheets
GWWORK2.DBF	FORMAT	.F.	Ground-water route worksheet format database
HRSTP.PRG	CODE	.F.	Calculates toxicity and persistence for HRS scores
HWQUAN.PRG	CODE	.F.	Input quantity of hazardous waste for each applicable route
INCHEM.PRG	CODE	.F.	Control input of chemical hazardous waste constituents

TABLE 4.3. (Contd)

File Name	Module Type	User Inter-action	Data File Description
INCOM.PRG	CODE	.F.	Determines incompatibility scores
INRAD.PRG	CODE	.F.	Controls input of radiological hazardous waste constituents
INTRO1.FMT	CODE	.F.	Introductory screen
INTRO2.FMT	CODE	.F.	Introductory screen
INTRO3.FMT	CODE	.F.	Introductory screen
INTRO4.FMT	CODE	.F.	Introductory screen
INTRO5.FMT	CODE	.F.	Introductory screen
JUST.PRG	CODE	.F.	Controls input of score justifications entry to JUST database
JUSTIN.FMT	FORMAT	.F.	Format for memo field input to JUST database
JUSTMASK.DBF	DATA	.F.	Master justification file records
LANOUSE.PRG	CODE	.F.	Controls input of landuse parameters
LOOP.PRG	CODE	.F.	Main process loop of the program
MATRIX.DBF	DATA	.F.	Master radionuclide concentration matrices database for mHRS
MHRS.PRG	CODE	.F.	Main program control
NALPHA.NDX	INDEX	.F.	Index file for the NUCLIDES database
NFPATAB.PRG	CODE	.F.	Displays NFPA Reactivity Ratings Tables
NUCLIDES.DBF	DATA	.F.	Master radionuclide database for mHRS/HRS
NUCLIST.FRM	REPORT	.F.	Prints radionuclide database report
OBSIN.PRG	CODE	.F.	Controls radiological observed release input and calculation
PERSTOX.PRG	CODE	.F.	Select persistence and toxicity scores for mHRS scores

TABLE 4.3. (Contd)

File Name	Module Type	User Inter-action	Data File Description
PHYSTAT.PRG	CODE	.F.	Inputs physical state of each constituent for this route
POPIN.FMT	CODE	.F.	Population scoring input screen
PRINTON.PRG	CODE	.F.	Displays "Turn on Printer" message and waits for response
PRG	CODE	.F.	Selects air route score from population matrix
PRINT1.PRG	CODE	.F.	Controls format of the inventory report, as well as site log
PRINT2.PRG	CODE	.F.	Controls format of input/justification report and site log file
PRINT3.PRG	CODE	.F.	Controls format and printing of the cover sheet
PRINTOPT.PRG	CODE	.F.	Inputs user print options
PR2A.PRG	CODE	.F.	Prints report of air route input parameters
PR2DC.PRG	CODE	.F.	Prints report of direct contact route input parameters
PR2FE.PRG	CODE	.F.	Prints report of fire and explosion route input parameters
PR2GW.PRG	CODE	.F.	Prints report of ground-water route input parameters
PR2SW.PRG	CODE	.F.	Prints report of surface-water route input parameters
PUSCREEN.PRG	CODE	.F.	Displays PU and U information screens
RADCONC.PRG	CODE	.F.	Controls input of parameters for radiological concentrations
RADREL.PRG	CODE	.F.	Calculates radiological concentrations, does table look-up
ROOT.FMT	CODE	.F.	Chemical name input instructions screen
SAXTAB.PRG	CODE	.F.	Sax Toxicity Table lookup code module
SELINCOM.PRG	CODE	.F.	Determines incompatibilities

TABLE 4.3. (Contd)

File Name	Module Type	User Inter-action	Data File Description
SETUP.PRG	CODE	.F.	Performs file manipulation procedures to set up for the run
SITELIST.FRM	REPORT	.F.	Report format for program-generated list of sites included
SUB.NDX	INDEX	.F.	Index file for the SUBPARA database
SUBPARA.DBF	DATA	.F.	Worksheet headings database for site log file/justification
SWCALC.PRG	CODE	.F.	Surface-water route calculations
SWCONT.PRG	CODE	.F.	Controls surface-water route containment input and scoring
SWIN.PRG	CODE	.F.	Controls surface-water route input and edit
SWPRINT2.PRG	CODE	.F.	Controls printing of the surface-water route worksheets
SWWORK2.DBF	FORMAT	.F.	Surface-water route worksheet format database
WORK.DBF	SCRATC	.F.	Work space database for radiological calculations
WORK2.DBF	SCRATC	.F.	Work space database for chemical incompatibility check

TABLE 4.4. mHRS/HRS Program Data Field Descriptions

Database Name	Field Name	Field Type	Field Length	Field Description
AWORK2	DESC	Character	36	Air route worksheet: columns 1-36, description
	MAX	Character	18	Air route worksheet: columns 57-80, maximum score
	MULT	Character	11	Air route worksheet: columns 40-50, multiplier
	SCORE	Character	6	Air route worksheet: column 51-56, weighted parameter score
	VALUE	Character	3	Air route worksheet: columns 37-39, parameter score
CHEMICAL	CHEM_NAME	Character	45	Name of chemical in master chemical database
	C_INDX	Numeric	3	mHRS-assigned index for this chemical
	IGNIT_INDX	Numeric	1	mHRS/HRS ignitability index assigned to this chemical
	INCOM_INDX	Character	3	Primary mHRS/HRS incompatibility index assigned to chemical
	INCOM_IND2	Character	3	Secondary mHRS/HRS incompatibility index assigned to chemical
	NEW_FLG	Logical	1	Flag set if chemical added during application
	PERS_INDX	Numeric	1	mHRS/HRS persistence index assigned to this chemical
	REACT_INDX	Numeric	1	mHRS/HRS reactivity index assigned to this chemical
	TOX_INDX	Numeric	1	mHRS/HRS toxicity index assigned to this chemical
DCWORK2	DESC	Character	36	Direct contact route worksheet: columns 1-36, description

TABLE 4.4. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
DCWORK2	MAX	Character	18	Direct contact route worksheet: columns 57-80, maximum score
	MULT	Character	11	Direct contact route worksheet: columns 40-50, multiplier
	SCORE	Character	6	Direct contact route worksheet: columns 51-56, weighted score
	VALUE	Character	3	Direct contact route worksheet: columns 37-39, parameter score
FEWORK2	DESC	Character	36	Fire and explosion route worksheet: columns 1-36, description
	MAX	Character	18	Fire and explosion route worksheet: columns 57-80, maximum score
	MULT	Character	11	Fire and explosion route worksheet: columns 40-50, multiplier
	SCORE	Character	6	Fire and explosion route worksheet: columns 51-56, weighted score
	VALUE	Character	3	Fire and explosion route worksheet: columns 37-39, parameter score
GWWORK2	DESC	Character	36	Ground-water route worksheet: columns 1-36, description
	MAX	Character	18	Ground-water route worksheet: columns 57-80, maximum score
	MULT	Character	11	Ground-water route worksheet: columns 40-50, multiplier
	SCORE	Character	6	Ground-water route worksheet: columns 51-56, weighted parameter score
	VALUE	Character	3	Ground-water route worksheet: columns 37-39, parameter score
MATRIX	ATMINUS1	Numeric	2	mHRS/HRS-assigned score at 1.0E-1 pCi/l concentration

TABLE 4.4. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
MATRIX	ATMINUS2	Numeric	2	mHRS/HRS-assigned score at 1.0E-2 pCi/l concentration
	ATMINUS3	Numeric	2	mHRS/HRS-assigned score at 1.0E-3 pCi/l concentration
	ATPLUS1	Numeric	2	mHRS/HRS-assigned score at 1.0E+1 pCi/l concentration
	ATPLUS2	Numeric	2	mHRS/HRS-assigned score at 1.0E+2 pCi/l concentration
	ATPLUS3	Numeric	2	mHRS/HRS-assigned score at 1.0E+3 pCi/l concentration
	ATPLUS4	Numeric	2	mHRS/HRS-assigned score at 1.0E+4 pCi/l concentration
	ATPLUS5	Numeric	2	mHRS/HRS-assigned score at 1.0E+5 pCi/l concentration
	ATPLUS6	Numeric	2	mHRS/HRS-assigned score at 1.0E+6 pCi/l concentration
	ATPLUS7	Numeric	2	mHRS/HRS-assigned score at 1.0E+7 pCi/l concentration
	ATPLUS8	Numeric	2	mHRS/HRS-assigned score at 1.0E+8 pCi/l concentration
	ATPLUS9	Numeric	2	mHRS/HRS-assigned score at 1.0E+9 pCi/l concentration
	ATZERO	Numeric	2	mHRS/HRS-assigned score at 1.0E+0 pCi/l concentration
	GROUP	Character	1	mHRS/HRS-assigned radiological group for this matrix
NUCLIDES	RTINDEX	Numeric	1	mHRS-assigned route index for this radiological score matrix
	AIR_GROUP	Character	1	mHRS/HRS-assigned radiological group air route

TABLE 4.4. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
NUCLIDES	DC_GROUP	Character	1	mHRS/HRS-assigned radiological group direct contact route
	ELEMENT	Character	2	Atomic symbol of this radionuclide
	FE_GROUP	Character	1	mHRS/HRS-assigned radiological group, fire and explosion route
	GW_GROUP	Character	1	mHRS/HRS-assigned radiological group, ground-water route
	IGNIT_IND	Numeric	1	mHRS/HRS-assigned ignitability index for this radionuclide
	INCOM_IND2	Character	3	Secondary mHRS/HRS-assigned incompatibility index
	INCOM_IND	Character	3	Primary mHRS/HRS-assigned incompatibility index
	ISOTOPE	Character	8	Atomic mass number plus metastable/daughter designation
	N_IND	Numeric	3	mHRS-assigned index for this radionuclide
	PERS_IND	Numeric	1	mHRS/HRS-assigned persistence index for this radionuclide
	REACT_IND	Numeric	1	mHRS/HRS-assigned reactivity index for this radionuclide
	SW_GROUP	Character	1	mHRS/HRS-assigned radiological group, surface-water route
	TOX_IND	Numeric	1	mHRS/HRS-assigned toxicity index for this radionuclide
	TRCO	Numeric	3	mHRS/HRS-assigned transfer coefficient this radionuclide

TABLE 4.4. (Contd)

Database Name	Field Name	Field Type	Field Length	Field Description
SUBPARA	DESC	Character	35	Heading describing this parameter
	P_IND	Character	2	mHRS-assigned parameter index for this parameter description
	R_IND	Character	1	mHRS-assigned route index for this parameter description
SWWORK2	DESC	Character	36	Surface-water route worksheet: columns 1-36, description
	MAX	Character	18	Surface-water route worksheet: columns 57-80, maximum score
	MULT	Character	11	Surface-water route worksheet: columns 40-50, multiplier
	SCORE	Character	6	Surface-water route worksheet: columns 51-56, weighted parameter score
	VALUE	Character	3	Surface-water route worksheet: columns 37-39, parameter score
WORK	CONC	Numeric	19	Work field used by mHRS
	CSCORE	Numeric	2	Work field used by mHRS
	NOTE	Memo	10	Work field used by mHRS
WORK2	ID1	Numeric	3	Work field used by mHRS
	ID2	Character	3	Work field used by mHRS
	ID3	Character	3	Work field used by mHRS
	NAME	Character	30	Work field used by mHRS

The complete dBASE III database structure for each of the mHRS/HRS program data files is included in Appendix C. A listing of each program data file is supplied in Appendix D. These file listings show the variables and structures as they are contained with the dBASE III system.

4.3 SELECT AREAS

The dBASE III system allows up to 10 data files to be open at the same time. Fields are opened in work areas numbered from 1 to 10 that are accessed by using the SELECT command. As an additional file is opened using the SELECT command, its data become common to each file that is open. To keep work areas straight, the system automatically assigns an ALIAS name to each file. Files can then be accessed across open work areas by referring to the ALIAS name. Table 4.5 lists these work area assignments, that is, the database files assigned to specific SELECT areas.

TABLE 4.5. File Work (Select) Area Assignments

Buffer/ Select Area	Databases Used			
1	MHRS	MHRSTEMP		
2	CONC	CONCTEMP		
3	JUST	JUSTTEMP		
4	SUBPARA			
5	CHEMICAL			
6	NUCLIOES			
7	MATRIX			
8	WORK	WORK2	AWORK2	DCWORK2
	FEWORK2	GWWORK2	SWWORK2	
9	Unassigned			
10	COVER	COVERTMP		

5.0 mHRS/HRS PROGRAM IMPLEMENTATION REQUIREMENTS

The mHRS/HRS program was developed to be operated on an IBM micro-computer. Variations of the program can be set up to operate on different computer system configurations. However, the program does require a minimum system configuration to be able to operate. These requirements are discussed in the following subsections.

5.1 HARDWARE REQUIREMENTS

The program is designed to operate on an IBM PC, PC/XT, or PC/AT micro-computer using either a dual floppy disk drive system or a hard disk storage system. It requires that the microcomputer have a minimum of 256K bytes random access memory (RAM). However, a microcomputer system with 512K bytes or greater RAM and a hard disk storage system can be configured to operate considerably faster than a system having only 256K bytes RAM and either a hard disk or a dual floppy drive storage system.

The most efficient computer hardware set-up would involve the following hardware:

- IBM PC, PC/XT or PC/AT with 512K bytes (or more) RAM
- 20-megabyte (or more) hard disk storage system
- a high-quality printer such as a laser jet printer.

When 512K bytes (or more) of microcomputer RAM (allowing approximately 256K bytes of virtual disk space) are available, some of the larger, more frequently used modules can be transferred into the virtual disk storage space. This configuration allows the system to operate much faster.

The hard disk storage system is almost essential if a large number of sites are going to be evaluated. Because the program is large (it occupies approximately one and a half floppy disks), a computer system using only a dual floppy disk drive storage system will need a separate floppy disk to contain the data for each individual site evaluated. The mHRS/HRS program package does contain, on a separate floppy disk, a routine that can be used to create the individual site storage disks. This separate routine contains

commands that will format a new disk, copy the necessary program operation files on the new disk, and place the user at the beginning of a site evaluation program run.

The program will generate several pages of output information (i.e., cover sheet, applicable score sheets, and lengthy justification files) for each site evaluated. Therefore, a fast high-quality printer will provide for a more efficient operation. This is especially true if a large number of sites are to be evaluated.

5.2 SOFTWARE REQUIREMENTS

The program was written in the dBASE III language and utilizes the storage capabilities of the commercial dBASE III database software. Therefore, the user must have a license agreement to use the commercial dBASE III database software (version 1.1 or higher) to run the mHRS/HRS program. This license agreement is automatically granted when the dBASE III software is purchased. Pacific Northwest Laboratory is currently establishing a compiled version of the mHRS/HRS program that contains the dBASE III software. Once this is established, a procedure will be developed for a user to obtain a license to use the system directly.

The user may wish to use a commercial word processing software package. None is necessary to operate the mHRS/HRS program, but the program does allow the user to place all the output information within a single text (ASCII) file. The text file can then be called up under a word processor equipped to handle text files and used in the development of the CERCLA Phase I document or other reports.

5.3 INSTALLATION INSTRUCTIONS

We suggest the following general subdirectory format for installing the mHRS/HRS program onto a microcomputer having a hard disk storage system:

- dBASE subdirectory (contains the installed dBASE III software)
- MHRSPRG subdirectory (contains the main program modules)
- MHRS subdirectory (contains the database files and remaining modules).

Since microcomputer systems can be configured quite differently, it is difficult to offer a generalized installation procedure that will work on each computer system encountered. To avoid this problem, PNL staff will be available for assistance in installing the program on individual systems or for consultation regarding either installation or operation of the program. To obtain assistance, contact:

R. D. Stenner (509) 375-2916
R. A. Peloquin (509) 375-3916
Pacific Northwest Laboratory
P.O. Box 999
Richland, Washington 99352

Operation of the mHRS/HRS program using a microcomputer with a dual floppy disk storage system does not require special installation; however, you will need to use the mHRS/HRS Boot Disk to create the necessary floppy disks for each site to be evaluated. To use the boot disk, simply place it in drive A and perform a soft-boot of the system by pressing the CTRL, ALT, and DEL keys simultaneously, and follow the directions as they appear on the screen. If you need assistance in the operation of the boot disk or the program, contact one of the PNL staff listed above.

5.4 SPECIAL PROGRAMMING CONSIDERATION

Since the mHRS/HRS program was developed in modules, a considerable amount of flexibility can be built into any special tailoring of the program. For example, a special version of the program was developed to accommodate a facility containing a very large number of sites (with large amounts of data) to evaluate. The program was broken up into an input program, a program to perform calculations on several sites whose inputs were entered previously, and a specially tailored report-generator program. Such tailoring provided for considerably more efficient use of staff assigned to the evaluation task.

If your application for the mHRS/HRS program forces it to consider a very large amount of data or has other unusual requirements that might warrant development of a special version of the program, PNL would gladly discuss such possible new developments or tailoring of the program. If you need assistance in this regard, contact one of the PNL staff listed above.

6.0 mHRS/HRS HAND CALCULATION VERIFICATION OF PROGRAM

An actual CERCLA Phase I application was used to test the mHRS/HRS program for operational adequacy, operational efficiency, and accuracy of calculations. However, before using the program on an actual application, two example scenarios were developed to test the program's accuracy. The first scenario tests the program's calculational accuracy for handling sites with releases to the environment from all pathways. It served as the main example case to check both the mHRS scores (Example Run #1) and the HRS scores (Example Run #3) for a site. The second scenario (Example Run #2) was developed to test the program's calculational accuracy for handling sites without releases to the environment from any of the pathways. Hand calculations for three example runs are provided in Appendix E. Corresponding mHRS/HRS program runs are provided in Appendix F.

7.0 EXAMPLE PROGRAM VERIFICATION RUNS

The mHRS/HRS program is designed to solicit only the data necessary to perform an evaluation of the site, based on the conditions and pathways considered applicable to that site. It is impractical to provide examples of all the different combinations of site evaluation questions and outputs that might be encountered during various runs of the program. However, Example Run #1, discussed under Section 6.0, does cover the types of inputs and outputs common to the program fairly comprehensively. Therefore, for reference purposes, copies of the inventory report, output reports, and justification files for Example Run #1 are provided in Appendix F.

8.0 REFERENCES

- Byers, R., A. Carlile, D. Moody, E. Pader, and T. Rettig. 1984. dBASE III Users Manual. Ashton-Tate, Culver City, California.
- Hawley, K. A., R. A. Peloquin, and R. D. Stenner. 1986. Modified Hazard Ranking System for Sites with Mixed Radioactive and Hazardous Wastes - User Manual. PNL-5841, Pacific Northwest Laboratory. Richland, Washington.
- Lange, N. A. 1967. Handbook of Chemistry. McGraw-Hill Book Company, New York, New York.
- Sax, N. I. 1984. Dangerous Properties of Industrial Materials. 6th edition. VanNostrand Reinhold Company, New York, New York.
- Shleien, B., and M. S. Terpilak. 1984. The Health Physics and Radiological Health Handbook. Nucleon Lectern Associates, Inc., Olney, Maryland.
- U.S. Environmental Protection Agency (EPA). 1984. Uncontrolled Hazardous Waste Site Ranking System - A Users Manual. 1984. HW-10. Federal Register (July 16, 1982).
- Weast, R. C., and M. J. Astle. 1981. CRC Handbook of Chemistry and Physics. CRC Press, Inc., Boca Raton, Florida.

APPENDIX A

mHRS/HRS PROGRAM LISTING

APPENDIX A

mHRS/HRS PROGRAM LISTING

The mHRS/HRS program package contains numerous program-command files. These command files are listed on the following pages. The overall mHRS file is listed first, followed by the code modules in alphabetical order (see Table 3.1 for a summary list).


```

*-----
*
*      MHRS                      2/3/86  RAP
*
*                               Hazardous Ranking System/ Modified
*                               Hazardous Ranking System Software:
*                               Program control module
*-----

```

```

SET BELL OFF
SET TALK OFF
SET ECHO OFF
SET HEADING OFF
SET DELETED ON
SET SAFETY OFF
SET MARGIN TO 5
CLEAR ALL

```

```

PUBLIC cmax, nmax, cnindx, nchem, nnuc, mhrsindx, mult, notfound, route
PUBLIC pathsel, relese, hiphys, hitp, maxc, mdate, hwquan, swflow
PUBLIC ctflag, number, gname, pindx, psindx, rown, sym, hiscore
PUBLIC oldindx, edflg, hireact, site_log, done, answer, number
PUBLIC notright, base, first, old, new, incomp, score1, score2, score3
PUBLIC score4, score5, oldflg, hwq, redoflg, usropt, qopt
PUBLIC ed1,ed2,ed3,ed4,ed5,pm1,pm2,pm3,pm4,pm5,ph1,ph2,ph3,ph4,ph5
PUBLIC pinv, iwf, pslf, firsted, prtrpt, morerout, pcov, edj
PUBLIC gwp, swp, ap, fep, dcp, covflg, drive, site_logp, where, firstq

```

```

STORE .T. TO notfinished
DO WHILE notfinished
    DO setup
    DO loop

```

```

*---- replace records in master data bases -----

```

```

IF usropt = 2

```

```

    SELECT 10
        USE cover
        LOCATE FOR site_indx=oldindx
        DELETE
        PACK

```

```

    SELECT 1
        USE mhrs
        LOCATE FOR site_indx=oldindx
        DELETE
        PACK

```

```

    SELECT 2
        USE conc

```



```

        DELETE ALL FOR site_indx=oldindx
        PACK

        SELECT 3
        USE just
        DELETE ALL FOR site_indx=oldindx
        PACK
    ENDIF
    SELECT 10
    USE cover
    APPEND FROM covertmp

    SELECT 1
    USE mhrs
    APPEND FROM mhrstemp

    SELECT 2
    USE conc
    APPEND FROM conctemp

    SELECT 3
    STORE drive+':\mhrs\' + site_log TO where
    USE justtemp
    COPY TO &where FOR useflg
    ZAP

    STORE drive+':\mhrs\' + site_logp TO where
    COPY FILE &site_logp TO &where
    ERASE &site_logp

    *---- check in user really wants to quit -----

    CLOSE DATABASES

    IF qopt = 2
        @ 6,6 CLEAR
        answer = ' '
        DO WHILE .NOT. (UPPER(answer) $ 'YN')
            @ 20,10 SAY 'Are you sure you want to QUIT (Y or N):'
            @ 20,COL()+1 GET answer PICTURE 'X'
            READ
        ENDDO
        IF UPPER(answer) = 'Y'
            notfinished = .F.
        ENDIF
    ENDIF

    *---- not finished loop end ----
    ENDDO

    @ 6,6 CLEAR
    @ 10,10 SAY "Bye"

```

QUIT

```

*-----
*
*
*   Module:                ACALC            1/19/86 RAP
*
*                           Air Route calculations
*-----

```

```

STORE 0 TO sc, sr
STORE 3 TO pathsel

```

```

IF a->a_observe=45

```

```

    STORE 0 to hireact
    SELECT 2
    GOTO TOP
    DO WHILE .NOT. EOF()
        IF a_path .AND. chem_nuc = 'C'
            IF react_indx > hireact
                hireact = react_indx
            ENDIF
        ENDIF
        SKIP
    ENDDO
    SELECT 1
    REPLACE a_react WITH hireact

    IF a_react > a_incomp
        REPLACE a_re_in WITH a_react
    ELSE
        REPLACE a_re_in WITH a_incomp
    ENDIF

```

```

    hitp = 0
    SELECT 2
    GOTO TOP
    DO WHILE .NOT. EOF()
        IF chem_nuc = 'C' .AND. a_path
            IF tox_indx > hitp
                hitp = tox_indx
            ENDIF
        ENDIF
        SKIP
    ENDDO
    SELECT 1
    REPLACE a_tox WITH hitp

```

```

    SELECT 1
    IF a_rad
        relese = 'Observed'
        DO radrel
    ENDIF

```

```

ELSE
  REPLACE a_rad_mo WITH 0
ENDIF

SELECT 1
STORE 0 TO pop, hiscore

pop = a_pop_1
base = 18
DO apop

pop = a_pop_2
base = 15
DO apop

pop = a_pop_3
base = 12
DO apop

pop = a_pop_4
base = 9
DO apop

REPLACE a_pop WITH hiscore

ELSE

  REPLACE a_react WITH 0
  REPLACE a_tox WITH 0
  REPLACE a_rad_mo WITH 0
  REPLACE a_pop_1 WITH 0
  REPLACE a_pop_2 WITH 0
  REPLACE a_pop_3 WITH 0
  REPLACE a_pop_4 WITH 0
  REPLACE a_pop WITH 0

ENDIF

REPLACE a_ch_wc WITH a_react + a_tox*3 + a_hw_quan
REPLACE a_tot_tar WITH a_pop + 2*a_dist + a_land_use

sc = a_observe*a_ch_wc*a_tot_tar
sr = a_observe*a_rad_mo*a_tot_tar

REPLACE a_sc WITH sc / 351.0
REPLACE a_sr WITH sr / 351.0

SELECT 10
IF a->a_sc > a->a_sr
  REPLACE mhrs_s_a WITH a->a_sc
ELSE
  REPLACE mhrs_s_a WITH a->a_sr

```

ENDIF

IF hrs

```
IF a->a_observe=45
  STORE 0 to hireact
  SELECT 2
  GOTO TOP
  DO WHILE .NOT. EOF()
    IF a_path
      IF react_indx > hireact
        hireact = react_indx
      ENDIF
    ENDIF
    SKIP
  ENDDO
  SELECT 10
  REPLACE a_hrs_re WITH hireact

  IF a_hrs_re > a_hrs_in
    REPLACE a_hrs_ri WITH a_hrs_re
  ELSE
    REPLACE a_hrs_ri WITH a_hrs_in
  ENDIF
```

```
  hitp = 0
  SELECT 2
  GOTO TDP
  DO WHILE .NOT. EOF()
    IF a_path
      IF tox_indx > hitp
        hitp = tox_indx
      ENDIF
    ENDIF
    SKIP
  ENDDO
  SELECT 10
  REPLACE a_hrs_tx WITH hitp
```

ELSE

```
  SELECT 10
  REPLACE a_hrs_re WITH 0
  REPLACE a_hrs_in WITH 0
  REPLACE a_hrs_ri WITH 0
  REPLACE a_hrs_tx WITH 0
  REPLACE hrs_s_a WITH 0
```

ENDIF

```
SELECT 10
REPLACE a_hrs_wc WITH a_hrs_ri + a_hrs_tx*3 + a->a_hw_quan
```

```

sc = a->a_observe * a_hrs_wc * a->a_tot_tar
REPLACE hrs_s_a WITH sc / 351.0

ELSE
  SELECT 10
  REPLACE hrs_s_a WITH 0.0
ENDIF

SELECT 1
RETURN
*-----

```

```

*-----*
*
*   Module:                AIN                1/19/86 RAP
*
*   Air Route input
*
*-----*

```

```

STORE 3 TO pathsel
STORE .T. TO edflg

```

```

done = ' '
CLEAR
DO box4.fmt
@ 12,10 SAY 'The following questions pertain to the AIR route.'
@ 13,10 SAY 'Press any key when you are ready to begin...' GET done PICTURE 'X'
READ

```

```

DO WHILE edflg

```

```

SELECT 1
@ 6,6 CLEAR
@ 7,11 SAY "The only acceptable evidence of release for the air rou"
@ 7,66 SAY "te is data"
@ 8,11 SAY "that show levels of a contaminant at or in the vicinity"
@ 8,67 SAY "of the"
@ 9,11 SAY "facility that significantly exceed background levels, r"
@ 9,66 SAY "egardless"
@ 10,11 SAY "of the frequency of occurrence. Data based on transito"
@ 10,66 SAY "ry conditions"
@ 11,11 SAY "due to facility disturbance by investigative personnel"
@ 11,66 SAY "are not"
@ 12,11 SAY "acceptable."
@ 14,11 SAY "Is there evidence of release for the air route (Y or N)"

```

```

IF redoflg
  IF a_observe = 45
    @ 23,11 SAY 'Previous value: '+'Y'
  ELSE
    @ 23,11 SAY 'Previous value: '+'N'
  ENDIF
ENDIF

```

```

STORE ' ' TO obsflg
DO WHILE .NOT. (UPPER(obsflg) $ 'YN')
  @ 14,66 SAY "? " GET obsflg PICTURE 'X'
  READ
ENDDO

```

```

IF UPPER(obsflg) = 'Y'

```

```

REPLACE a_observe WITH 45
@ 16,11 SAY 'Release date: ' GET a_date
@ 18,11 SAY 'Release location: '
@ 19,15 GET a_loc
@ 20,11 SAY 'Sampling Protocol: '
@ 21,15 GET a_sam_pro
READ

IF edj
    pindx = '10'
    DO just
ENDIF

hwq = a_tons
DO hwquan
IF edj
    pindx='23'
    DO just
ENDIF
REPLACE a_tons WITH hwq
REPLACE a_hw_quan WITH hwquan

SELECT 1
IF rad

    @ 6,6 CLEAR
    IF redoflg
        IF a_rad
            @ 23,11 SAY 'Previous value: '+'Y'
        ELSE
            @ 23,11 SAY 'Previous value: '+'N'
        ENDIF
    ENDIF

    @ 10,10 SAY 'Is there evidence of radiological release?'
    STORE ' ' TO radflg
    DO WHILE .NOT. (UPPER(radflg) $ 'YN')
        @ 11,10 SAY 'Enter Y or N: ' GET radflg PICTURE 'X'
        READ
    ENDDO

    IF UPPER (radflg) = 'Y'
        REPLACE a_rad WITH .T.
        DO obsin
        IF edj
            pindx = '24'
            DO just
        ENDIF
    ELSE
        REPLACE a_rad WITH .F.
    ENDIF
ELSE

```



```

REPLACE a_rad WITH .F.
ENDIF

```

```

SELECT 1
@ 6,6 CLEAR
@ 7,11 SAY "POPULATION WITHIN A FOUR-MILE RADIUS is an indicator of"
@ 7,67 SAY "the popu-"
@ 8,11 SAY "lation which may be harmed should hazardous substances"
@ 8,66 SAY "be released"
@ 9,11 SAY "to the air."
@ 11,11 SAY "The distance is measured from the location of the hazar"
@ 11,66 SAY "dous subs-"
@ 12,11 SAY "tances, not from the facility boundary. The population"
@ 12,67 SAY "to be counted"
@ 13,11 SAY "includes persons residing within the four-mile radius a"
@ 13,66 SAY "s well as"
@ 14,11 SAY "transients such as workers in factories, offices, resta"
@ 14,66 SAY "urants,"
@ 15,11 SAY "motels, or students. It excludes travelers passing thr"
@ 15,66 SAY "ough the"
@ 16,11 SAY "area. If aerial photography is used in making the coun"
@ 16,66 SAY "t, assume"
@ 17,11 SAY "3.8 individuals per dwelling unit. Enter the following"
@ 17,67 SAY "populations:"
rown = ROW()

```

```

@rown+2,15 SAY 'Within 1/4 mi: ' GET a_pop_1 RANGE 0,
@rown+3,15 SAY 'Within 1/2 mi: ' GET a_pop_2 RANGE 0,
@rown+4,15 SAY 'Within 1 mi: ' GET a_pop_3 RANGE 0,
@rown+5,15 SAY 'Within 4 mi: ' GET a_pop_4 RANGE 0,
READ
REPLACE a_pop WITH hiscore
IF edj
    pindx = '31'
    DO just
ENDIF

```

```

done = ' '
@ 6,6 CLEAR
DO disenv.fmt
@ROW(),COL()+1 GET done
READ

```

```

@ 6,6 CLEAR
DO disenv2.fmt
@ROW(),COL()+1 GET a_dist RANGE 0,3
READ
IF edj
    pindx = '32'
    DO just
ENDIF

```

```

STORE VAL(SUBSTR(a_land_all,1,1)) TO score1
STORE VAL(SUBSTR(a_land_all,2,1)) TO score2
STORE VAL(SUBSTR(a_land_all,3,1)) TO score3
IF SUBSTR(a_land_all,4,1) = 'Y'
    STORE .T. TO score4
ELSE
    STORE .F. TO score4
ENDIF
IF SUBSTR(a_land_all,5,1) = 'Y'
    STORE .T. TO score5
ELSE
    STORE .F. TO score5
ENDIF
DO landuse

STORE STR(score1,1)+STR(score2,1)+STR(score3,1) TO temp
IF score4
    temp = temp + 'Y'
ELSE
    temp = temp + 'N'
ENDIF
IF score5
    temp = temp + 'Y'
ELSE
    temp = temp + 'N'
ENDIF
REPLACE a_land_all WITH temp
REPLACE a_land_use WITH hiscore
IF edj
    pindx = '33'
    DO just
ENDIF

ELSE

    REPLACE a_observe WITH 0
    REPLACE a_loc WITH ' '
    REPLACE a_sam_pro WITH ' '
    REPLACE a_tons WITH 0
    REPLACE a_hw_quan WITH 0
    REPLACE a_dist WITH 0
    REPLACE a_land_all WITH '000NN'
    REPLACE a_land_use WITH 0

ENDIF

DO edroute
ENDDO

RETURN
*-----

```

```

*-----
*
*   Module:                APOP                1/8/86  rap
*
*                           Air Route population matrix selection
*
*-----

```

```

IF pop > 10000
  number = base + 12
ELSE
  IF pop > 3000
    number = base + 9
  ELSE
    IF pop > 1000
      number = base + 6
    ELSE
      IF pop > 100
        number = base + 3
      ELSE
        IF pop > 1
          number = base
        ELSE
          number = 0
        ENDIF
      ENDIF
    ENDIF
  ENDIF
ENDIF
ENDIF
ENDIF
ENDIF

IF number > hiscore
  hiscore = number
ENDIF

RETURN

```

```

*-----
*
*
*   Module:                APRINT2                1/21/86 RAP
*
*                           Print mHRS and HRS Air route worksheet
*-----

```

```

STORE ' ' TO x
SELECT 8
USE awork2

```

```

GOTO 4
  REPLACE desc WITH j->fac_name
  REPLACE max WITH SPACE(8)+DTC(mdate)
GOTO 5
  REPLACE desc WITH 'Site: '+j->site_name
  REPLACE max WITH 'Site index: '+STR(mhrsindx,4)

```

```

GOTO 11
x = STR(a->a_observe,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 13
REPLACE max WITH a->a_date
GOTO 14
REPLACE desc WITH ' '+SUBSTR(a->a_loc,1,26)
REPLACE value WITH SUBSTR(a->a_loc,27,3)
REPLACE mult WITH SUBSTR(a->a_loc,29,11)
REPLACE score WITH SUBSTR(a->a_loc,39,6)
REPLACE max WITH SUBSTR(a->a_loc,44)

```

```

GOTO 17
REPLACE desc WITH ' '+SUBSTR(a->a_sam_pro,1,26)
REPLACE value WITH SUBSTR(a->a_sam_pro,27,3)
REPLACE mult WITH SUBSTR(a->a_sam_pro,29,11)
REPLACE score WITH SUBSTR(a->a_sam_pro,39,6)
REPLACE max WITH SUBSTR(a->a_sam_pro,44)

```

```

GOTO 26
x = STR(a->a_react,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 28
REPLACE value WITH STR(a->a_tox,3)
REPLACE score WITH STR(a->a_tox*3,5)

```

```

GOTO 29
x = STR(a->a_hw_quan,3)

```

```

REPLACE value WITH x
REPLACE score WITH ' ' + x

GOTO 31
x = STR(a->a_rad_mo,3)
REPLACE value WITH x
REPLACE score WITH ' ' + x

GOTO 34
REPLACE score WITH STR(a->a_ch_wc,5)
GOTO 35
REPLACE score WITH STR(a->a_rad_mo,5)

GOTO 40
x = STR(a->a_pop,3)
REPLACE value WITH x
REPLACE score WITH ' ' + x

GOTO 42
REPLACE value WITH STR(a->a_dist,3)
REPLACE score WITH STR(a->a_dist*2,5)

GOTO 44
x = STR(a->a_land_use,3)
REPLACE value WITH x
REPLACE score WITH ' ' + x

GOTO 47
REPLACE score WITH STR(a->a_tot_tar,5)

GOTO 50
REPLACE score WITH STR(a->a_sc*351.0,6)

GOTO 51
REPLACE score WITH STR(a->a_sr*351.0,6)
REPLACE mult WITH ' '

GOTO 54
REPLACE mult WITH STR(a->a_sc,6,2)
REPLACE score WITH 'Sr(a)= '
REPLACE max WITH STR(a->a_sr,6,2)

IF pm3 .OR. iwf
  IF pm3
    SET PRINT ON
    ? CHR(12)
  ENDIF
  GOTO TOP
  DO WHILE .NOT. EOF()
    ? desc+value+mult+score+max
    SKIP
  ENDDO

```

```

SET PRINT OFF
ENDIF

IF hrs .AND. (ph3 .OR. iwf)

  IF ph3
    SET PRINT ON
    ? CHR(12)
  ENDIF
  GOTO 26
  x = STR(j->a_hrs_re,3)
  REPLACE value WITH x
  REPLACE score WITH ' ' + x

  GOTO 28
  REPLACE value WITH STR(j->a_hrs_tx,3)
  REPLACE score WITH STR(j->a_hrs_tx*3,5)

  ? CHR(12)
  GOTO TOP
  ? desc+value+mult+score+max
  ? '
  ? '
  ? '
  GOTO 4
  DO WHILE RECNO() < 31
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  ?
  ?
  ?
  GOTO 33
  ? desc+value+mult+score+max
  ? ' Total Waste Characteristics Score ' ,j->a_hrs_wc, ' 20'
  GOTO 36
  DO WHILE RECNO() < 50
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  ?
  ? '4. Multiply 1 x 2 x 3 '
  ?? j->hrs_s_a*351.0, ' 35100'
  ? '-----'
  ? '5. Line 4/35100 S= ' ,STR(j->hrs_s_a,6,2)
  ? '-----'
  SET PRINT OFF
ENDIF

RETURN
*-----

```

```

*-----
*
*   Module:                BOX3.FMT
*
*-----

```

```

@ 1,0 SAY "
@ 1,55 SAY "
@ 2,0 SAY "
@ 2,55 SAY " stem mHRS - Modified Hazardous Ranking Sy
@ 3,0 SAY " Vs 2.0 "
@ 3,55 SAY "
@ 4,0 SAY "
@ 5,0 SAY "
@ 6,0 SAY "
@ 7,0 SAY "
@ 8,0 SAY "
@ 9,0 SAY "
@ 10,0 SAY "
@ 11,0 SAY "
@ 12,0 SAY "
@ 13,0 SAY "
@ 14,0 SAY "
@ 15,0 SAY "
@ 16,0 SAY "
@ 17,0 SAY "
@ 18,0 SAY "
@ 19,0 SAY "
@ 20,0 SAY "
@ 21,0 SAY "
@ 22,0 SAY "
@ 23,0 SAY "
@ 24,0 SAY "

```

```

*-----
*
* Module:                BOX4.FMT
*
*-----

```

```

@ 1,0 SAY "
@ 1,55 SAY "
@ 2,0 SAY "
@ 2,55 SAY "stem"
@ 3,0 SAY "
@ 3,55 SAY "
@ 4,0 SAY "
@ 5,0 SAY "Route:"
@ 5,17 SAY route
@ 5,70 SAY mdate
@ 6,0 SAY "
@ 7,0 SAY "
@ 8,0 SAY "
@ 9,0 SAY "
@ 10,0 SAY "
@ 11,0 SAY "
@ 12,0 SAY "
@ 13,0 SAY "
@ 14,0 SAY "
@ 15,0 SAY "
@ 16,0 SAY "
@ 17,0 SAY "
@ 18,0 SAY "
@ 19,0 SAY "
@ 20,0 SAY "
@ 21,0 SAY "
@ 22,0 SAY "
@ 23,0 SAY "
@ 24,0 SAY "

```


*-----
*
* Module: CHEMIN.FMT
*
*-----

@ 6,10 SAY "Information on the chemical waste substances should now"
@ 6,66 SAY "be entered."
@ 7,10 SAY "This program includes a data base of information on com"
@ 7,65 SAY "mon chemicals"
@ 8,10 SAY "as well as chemicals that may have been added during pr"
@ 8,65 SAY "vious runs."
@ 9,10 SAY "If information is included in the data base, you need o"
@ 9,65 SAY "nly enter"
@ 10,10 SAY "the index associated with that chemical. You will be a"
@ 10,65 SAY "sked to"
@ 11,10 SAY "enter a chemical name or index and then asked to supply"
@ 11,66 SAY "any missing"
@ 12,10 SAY "information for that chemical."
@ 14,10 SAY "The following options are available:"
@ 16,10 SAY "1 View the names of chemicals in the data base"
@ 17,10 SAY "2 Enter the index of a chemical in the data base"
@ 18,10 SAY "3 Enter a chemical name (or add a chemical to the da"
@ 18,65 SAY "ta base)"
@ 19,10 SAY "4 Continue (all chemicals have been identified)"
@ 21,10 SAY "Enter index of selected option:"

```

*-----
*
*   Module:                CHKCHEM                12/31/85   RAP
*
*                           Check if all data fields in CHEMICAL
*                           data base are filled; if not, input
*                           those data
*-----

```

```

SELECT 2
APPEND BLANK
REPLACE site_indx WITH mhrsindx
REPLACE chem_nuc WITH 'C'
REPLACE cn_indx WITH cnindx
REPLACE name WITH e->chem name
REPLACE tox_indx WITH e->tox_indx
REPLACE pers_indx WITH e->pers_indx
REPLACE ignit_indx WITH e->ignit_indx
REPLACE react_indx WITH e->react_indx
REPLACE incom_indx WITH e->incom_indx
REPLACE incom_ind2 WITH e->incom_ind2
nchem = nchem + 1

```

```

SELECT 5

```

```

IF pers_indx = 9
  REPLACE pers_indx WITH 3
  @ 6,6 CLEAR
  @ 8,10 SAY "PERSISTENCE of each hazardous substance is evaluated on"
  @ 8,66 SAY "its bio-"
  @ 9,10 SAY "degradability as follows:"
  @ 11,10 SAY "INDEX      SUBSTANCE"
  @ 13,12 SAY "0          Easily biodegradable compounds"
  @ 14,12 SAY "1          Straight chain hydrocarbons"
  @ 15,12 SAY "2          Substituted and other ring compounds"
  @ 16,12 SAY "3          Metals, polycyclic compounds and halogenated"
  @ 18,10 SAY "Enter index of selected option for "+TRIM(chem_name)+": "
  @ ROW(),COL()+1 GET pers_indx PICTURE '9' RANGE 0,3
  READ
ENDIF

```

```

IF tox_indx = 9

```

```

  STORE .T. TO notdone
  DO WHILE notdone

```

```

    REPLACE tox_indx WITH 4
    @ 6,6 CLEAR
    @ 6,10 SAY "TOXICITY of each hazardous substance being evaluated is"
    @ 6,66 SAY "given a"
  
```

```

@ 7,10 SAY "value using as guidance information provided in [Danger"
@ 7,65 SAY "ous Properties"
@ 8,10 SAY "of Industrial Materials] by Irving Sax and [National Fi"
@ 8,65 SAY "re Codes]"
@ 9,10 SAY "by National Fire Protection Association or other reputa"
@ 9,65 SAY "ble sources,"
@ 10,10 SAY "the rating scheme of Sax (Sax table) or the National Fi"
@ 10,65 SAY "re Protection"
@ 11,10 SAY "Association (NFPA Table) and the following guidance:"
@ 13,10 SAY "INDEX          TOXICITY OR LOOK-UP TABLE"
@ 15,12 SAY "0           Sax Level 0 or NFPA Level 0"
@ 16,12 SAY "1           Sax Level 1 or NFPA Level 1"
@ 17,12 SAY "2           Sax Level 2 or NFPA Level 2"
@ 18,12 SAY "3           Sax Level 3 or NFPA Level 3 or 4"
@ 19,12 SAY "4           Display Sax Table"
@ 20,12 SAY "5           Display NFPA Table"
@ 22,10 SAY "Enter index of selected option for "+TRIM(chem_name)+" : "
@ROW(),COL()+1 GET tox_idx PICTURE '9' RANGE 0,7
READ

```

DO CASE

```

CASE tox_idx < 4
    notdone = .F.

```

```

CASE tox_idx = 4
    DO saxtab

```

```

CASE tox_idx = 5

```

```

@6,6 CLEAR
@ 6,10 SAY "INDEX          NFPA TOXICITY RATINGS(a)"
@ 8,12 SAY "0           Materials which on exposure under fire conditio"
@ 8,67 SAY "ns would"
@ 9,20 SAY "offer no health hazard beyond that of ordinary combusti"
@ 9,75 SAY "ble"
@ 10,20 SAY "material."
@ 12,12 SAY "1           Materials only slightly hazardous to health. 1"
@ 12,67 SAY "t may be"
@ 13,20 SAY "desirable to wear self-contained breathing apparatus."
@ 15,12 SAY "2           Materials hazardous to health, but areas may be"
@ 15,68 SAY "entered"
@ 16,20 SAY "freely with self-contained breathing apparatus."
@ 18,10 SAY "          "
@ 20,10 SAY "{a) National Fire Protection Association. [National Fi"
@ 20,65 SAY "re Codes,]"
@ 21,14 SAY "Vol. 13, No. 49, 1977."
@ 23,10 SAY "Press any key to continue...."
@ROW(),COL()+1 GET done PICTURE 'X'
READ

```

```

@6,6 CLEAR

```

```

@ 7,13 SAY "3      Materials extremely hazardous to health, but ar"
@ 7,68 SAY "eas may be"
@ 8,21 SAY "entered with extreme care. Full protective clothing,"
@ 9,21 SAY "including self-contained breathing apparatus, rubber"
@ 10,21 SAY "gloves, boots and bands around legs, arms and waist sho"
@ 10,76 SAY "uld"
@ 11,21 SAY "be provided. No skin surface should be exposed."
@ 13,13 SAY "4      A few whiffs of the gas or vapor could cause de"
@ 13,68 SAY "ath, or the"
@ 14,21 SAY "gas, vapor, or liquid could be fatal on penetrating the"
@ 15,21 SAY "fire fighters' normal full-protective clothing that is"
@ 16,21 SAY "designed for resistance to heat. For most chemicals"
@ 17,21 SAY "having a Health-4 rating, the normal full protective"
@ 18,21 SAY "clothing available to the average fire department will"
@ 19,21 SAY "not provide adequate protection against skin contact"
@ 20,21 SAY "with these materials. Only special protective clothing"
@ 21,21 SAY "designed to protect against the specific hazard should"
@ 22,21 SAY "be worn."
@ 23,44 SAY "Press any key to continue . . ." GET done PICTURE 'X'
READ

      ENDCASE
    ENDDO
  ENDIF

  SELECT 2
  REPLACE tox_indx WITH e->tox_indx
  REPLACE pers_indx WITH e->pers_indx

  RETURN

```

```

*-----
*
*
*   Module:                CHKCHEM2                1/16/86   RAP
*
*                           Check if all fields for air path in
*                           CHEMICAL data base are filled; if not,
*                           input those data
*
*-----

```

```

SELECT 2
STORE .T. TO notright
DO WHILE notright

  @ 6,6 CLEAR
  SET COLOR TO 0/7, 0/7, 0
  @ 7,11 SAY name
  SET COLOR TO 7/0, 0/7, 0
  @ 9,11 SAY "REACTIVITY provides a measure of the fire/explosion thr"
  @ 9,66 SAY "eat at a"
  @ 10,11 SAY "facility. Assign a value based on the reactivity class"
  @ 10,66 SAY "ification"
  @ 11,11 SAY "used by NFPA."
  @ 13,11 SAY "OPTION      ACTION"
  @ 15,13 SAY "0          Assign NFPA Reactivity Level 0"
  @ 16,13 SAY "1          Assign NFPA Reactivity Level 1"
  @ 17,13 SAY "2          Assign NFPA Reactivity Level 2"
  @ 18,13 SAY "3          Assign NFPA Reactivity Level 3"
  @ 19,13 SAY "4          Assign NFPA Reactivity Level 4"
  @ 20,13 SAY "5          Review NFPA Reactivity Levels"
  @ 22,11 SAY "Enter option of selection action:"

  number = 5
  @ ROW(),COL()+1 GET number PICTURE '9' RANGE 0,5
  READ

  IF number < 5

    notright = .F.
    REPLACE react_indx WITH number
    SELECT 5
      SEEK b->cn_indx
      REPLACE react_indx WITH number
    SELECT 2

  ELSE
    DO nfpatab
  ENDIF

ENDDO

```

RETURN

```
*-----*
*-----*
*
*   Module:                CHKCHEM3                1/16/86  RAP
*
*   Check if ignitability field in CHEMICAL
*   data base are filled; if not, input
*   those data
*-----*
```

SELECT 5
 SEEK b->cn_indx

```
@ 6,6 CLEAR
@ 10,11 SAY "IGNITABILITY is an indicator of the threat of fire at a"
@ 10,67 SAY "facility"
@ 11,11 SAY "and the accompanying potential for release of air conta"
@ 11,66 SAY "minants."
@ 12,11 SAY "Assign this rating factor a value based on the NFPA cla"
@ 12,66 SAY "ssification"
@ 13,11 SAY "scheme. For information, regard specific chemicals con"
@ 13,66 SAY "sult SAX or"
@ 14,11 SAY "another similar Hazardous Chemical Handbook and then us"
@ 14,66 SAY "e NFPA table"
@ 15,11 SAY "to assign it a value."
done = ' '
@ 17,11 SAY "Press any key to continue . . ." GET done PICTURE 'X'
READ
```

STORE .T. TO notright
DO WHILE notright

```
@ 6,6 CLEAR
SET COLOR TO 0/7, 0/7, 0
@ 7,11 SAY chem_name
SET COLOR TO 7/0, 0/7, 0
@ 9,11 SAY "ASSIGNED"
@ 10,12 SAY "VALUE          IGNITABILITY"
@ 12,14 SAY "0              Flashpoint 200 degrees F., or NFPA Level 0"
@ 13,14 SAY "1              Flashpoint 140 degrees F. to 200 degrees F."
@ 13,70 SAY "or NFPA"
@ 14,26 SAY "Level 1"
@ 15,14 SAY "2              Flashpoint 80 degrees F. to 140 degrees F."
@ 15,69 SAY "or NFPA"
@ 16,26 SAY "Level 2"
@ 17,14 SAY "3              Flashpoint 80 degrees F. or NFPA Levels 3 o"
@ 17,69 SAY "r 4"
@ 19,14 SAY "4              View NFPA Ignitability Levels and return to"
@ 19,70 SAY "this"
@ 20,26 SAY "screen"
```

```

@ 22,11 SAY "Enter assigned value or 4 to view levels:"

number = 4
@ 22,COL()+1 GET number PICTURE '9' RANGE 0,4
READ

IF number < 4

    notright = .F.
    REPLACE ignit_indx WITH number
    SELECT 2
        REPLACE ignit_indx WITH number
    SELECT 5

ELSE

    @ 6,6 CLEAR
    @ 7,11 SAY "LEVEL      NFPA IGNITABILITY DESCRIPTION"
    @ 9,13 SAY "4          Very flammable gases, very volatile flammable l"
    @ 9,68 SAY "iquids,"
    @ 10,21 SAY "and materials that in the form of dusts or mists readil"
    @ 10,76 SAY "y"
    @ 11,21 SAY "form explosive mixtures when dispersed in air."
    @ 13,13 SAY "3          Liquids that can be ignited under all normal te"
    @ 13,68 SAY "mperature"
    @ 14,21 SAY "conditions. Any material that ignites spontaneously at"
    @ 15,21 SAY "normal temperatures in air."
    @ 17,13 SAY "2          Liquids that must be moderately heated before i"
    @ 17,68 SAY "gnition"
    @ 18,21 SAY "will occur and solids that readily give off flammable"
    @ 19,21 SAY "vapors."
    @ 21,11 SAY "Press any key to continue . . ." GET done PICTURE 'X'
    READ

    @ 6,6 CLEAR
    @ 8,11 SAY "LEVEL      NFPA IGNITABILITY DESCRIPTION"
    @ 10,13 SAY "1          Materials that must be preheated before ignitio"
    @ 10,68 SAY "n can"
    @ 11,21 SAY "occur. Most combustible solids have a flammability rat"
    @ 11,76 SAY "ing"
    @ 12,21 SAY "of 1."
    @ 14,13 SAY "0          Materials that will not burn."
    @ 16,11 SAY "Press any key to continue" GET done PICTURE 'X'
    READ

ENDIF
ENDDO

SELECT 2
RETURN
*-----

```

```

*-----
*
*   Module:                CHKINC                1/6/86  RAP
*
*                       Check for incompatible chemicals
*                       and print names when found
*-----

```

```

SELECT 9
GOTO TOP
DO WHILE .NOT. EOF()
  IF id2 = sym .OR. id3 = sym
    @ rown,10 SAY name+ ' and '+b->name
    rown = rown + 1
  ENDIF
  SKIP
ENDDO

RETURN
*-----

```



```

*-----
*
*   Module:                      CREDITS.FMT
*
*-----

```

```

@ 5,11 SAY "This software package was prepared by Pacific Northwest"
@ 6,11 SAY "Laboratory, Richland, Washington, as part of the CERCLA"
@ 6,67 SAY "PHASE I"
@ 7,11 SAY "task under the project entitled Hazardous Waste Risk A"
@ 7,66 SAY "ssessment"
@ 8,11 SAY "conducted for the U.S. Department of Energy, Office of"
@ 8,66 SAY "Environ-"
@ 9,11 SAY "mental Audit and Compliance. This is Version 1.2 of th"
@ 9,66 SAY "e software"
@ 10,11 SAY "package, dated November 29, 1985."
@ 12,11 SAY "The software was written by R. A. Peloquin under the di"
@ 12,66 SAY "rection of"
@ 13,11 SAY "R. D. Stenner. The Task Manager is K. A. Hawley, the P"
@ 13,66 SAY "roject"
@ 14,11 SAY "Manager is B. L. Steelman, and the PNL Program Office r"
@ 14,66 SAY "epresent-"
@ 15,11 SAY "ative is W. J. Bair. V. J. DeCarlo is the DOE/OEAC Pro"
@ 15,66 SAY "ject"
@ 16,11 SAY "Manager."
@ 18,11 SAY "For additional information, contact either Vincent DeCa"
@ 18,66 SAY "rlo, FTS"
@ 19,11 SAY "252-8716, Commercial: (301) - , DOE/OEAC or Bob S"
@ 19,66 SAY "tenner,"
@ 20,11 SAY "FTS/Commercial (509) 375-2916, PNL."
@ 22,11 SAY "Press any key to continue. . ."

```

```

*-----
*
*   Module:                      DCCALC                      1/16/86 RAP
*
*                               Direct Contact route calculations
*-----

```

```

STORE 0 TO sc, sr
STORE 5 TO pathsel

```

```

hitp = 0
SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()
  IF chem_nuc = 'C' .AND. dc_path
    IF tox_indx > hitp
      hitp = tox_indx
    ENDIF
  ENDIF
  SKIP
ENDDO
SELECT 1
REPLACE dc_ch_wc WITH hitp

```

```

IF rad
  relese = 'Potential'
  DO radrel
ELSE
  REPLACE dc_rad_mp WITH 0
ENDIF

```

```

SELECT 1
REPLACE dc_tot_tar WITH 4*dc_pop + 4*dc_dis

```

```

IF dc_observe=0
  sc = dc_access * dc_contain * dc_ch_wc*5.0 * dc_tot_tar
  sr = dc_access * dc_contain * dc_rad_mp * dc_tot_tar
ELSE
  sc = dc_observe * dc_ch_wc*5.0 * dc_tot_tar
  sr = dc_observe * dc_rad_mp * dc_tot_tar
ENDIF

```

```

REPLACE dc_sc WITH sc / 216.0
REPLACE dc_sr WITH sr / 216.0

```

```

SELECT 10
IF a->dc_sc > a->dc_sr
  REPLACE mhrs_s_dc WITH a->dc_sc
ELSE
  REPLACE mhrs_s_dc WITH a->dc_sr
ENDIF

```

IF hrs

```
hitp = 0
SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()
  IF dc_path
    IF tox_indx > hitp
      hitp = tox_indx
    ENDIF
  ENDIF
  SKIP
ENDDO
SELECT 10
REPLACE dc_hrs_wc WITH hitp

SELECT 1
IF dc_observe=0
  sc = dc_access * dc_contain * j->dc_hrs_wc*5 * dc_tot_tar
ELSE
  sc = dc_observe * j->dc_hrs_wc*5 * dc_tot_tar
ENDIF
SELECT 10
REPLACE hrs_s_dc WITH sc / 216.0
```

ENDIF

```
SELECT 1
RETURN
```

*-----

```

*-----
*
*   Module:                      DCIN                      1/16/86 RAP
*
*                               Direct Contact route input
*
*-----

```

```

STORE 5 TO pathsel
STORE .T. TO edflg

```

```

done = ' '
CLEAR
DO box4.fmt
@ 12,10 SAY 'The following questions pertain to the DIRECT CONTACT route.'
@ 13,10 SAY 'Press any key when you are ready to begin...' GET done PICTURE 'X'
READ

```

```

*----- edit loop starts here -----
DO WHILE edflg

```

```

SELECT 1
@ 6,6 CLEAR
@ 10,11 SAY "Is there a confirmed instance in which contact with haz"
@ 10,66 SAY "ardous sub-"
@ 11,11 SAY "stances at a facility has caused injury, illness, or de"
@ 11,66 SAY "ath to humans"

```

```

IF redoflg
  IF dc_observe = 45
    @ 23,11 SAY 'Previous value: Y'
  ELSE
    @ 23,11 SAY 'Previous value: N'
  ENDIF
ENDIF

```

```

STORE ' ' TO obsflg
DO WHILE .NOT. (UPPER(obsflg) $ 'YN')
  @ 12,11 SAY "or domestic or wild animals (Y or N)?" GET obsflg PICTURE 'X'
  READ
ENDDO

```

```

IF UPPER(obsflg) = 'Y'
  REPLACE dc_access WITH 0
  REPLACE dc_contain WITH 0
  REPLACE dc_observe WITH 45
  IF edj
    pindx = '10'
    DO just
  ENDIF
ELSE
  REPLACE dc_observe WITH 0

```

ENDIF

IF dc_observe = 0

```
@ 6,6 CLEAR
@ 7,11 SAY "ACCESSIBILITY TO HAZARDOUS SUBSTANCE refers to the meas"
@ 7,66 SAY "ures taken"
@ 8,11 SAY "to limit access by humans or animals to hazardous subst"
@ 8,66 SAY "ances."
@ 10,11 SAY "BARRIER"
@ 12,11 SAY "An adequate surveillance system is a 24-hour surveillan"
@ 12,66 SAY "ce system"
@ 13,11 SAY "(e.g., television monitoring or surveillance by guards"
@ 13,66 SAY "or facility"
@ 14,11 SAY "personnel) that continuously monitors and controls entr"
@ 14,66 SAY "y onto the"
@ 15,11 SAY "facility."
@ 17,11 SAY "An adequate barrier system is an artificial or natural"
@ 17,66 SAY "barrier"
@ 18,11 SAY "(e.g., a fence combined with a cliff), which completely"
@ 18,67 SAY "surrounds"
@ 19,11 SAY "the facility; and a means to control entry, at all time"
@ 19,66 SAY "s, through"
@ 20,11 SAY "the gates or other entrances to the facility (e.g., an"
@ 20,66 SAY "attendant,"
@ 21,11 SAY "television monitors, locked entrances, or controlled ro"
@ 21,66 SAY "adway access"
@ 22,11 SAY "to the facility)."
@ 23,44 SAY "Press any key to continue . . ." GET done PICTURE 'X'
READ
```

```
@ 6,6 CLEAR
@ 8,11 SAY "ASSIGNED"
@ 9,12 SAY "VALUE          BARRIER"
@ 11,14 SAY "0             Adequate surveillance system or barrier sys"
@ 11,69 SAY "tem"
@ 13,14 SAY "1             Security guard, but no barrier"
@ 15,14 SAY "2             A barrier, but no separate means to control"
@ 15,70 SAY "entry"
@ 17,14 SAY "3             Barriers do not completely surround the fac"
@ 17,69 SAY "ility"
@ 19,11 SAY "Enter assigned value of selected barrier:" GET dc_access RANGE
0,3
READ
IF edj
    pindx = '20'
    DO just
ENDIF
```

```
@ 6,6 CLEAR
@ 10,11 SAY "CONTAINMENT indicates whether the hazardous substance i"
@ 10,66 SAY "tself is"
```

```

@ 11,11 SAY "accessible to direct contact. For example, if the haza"
@ 11,66 SAY "rdous sub-"
@ 12,11 SAY "stance at the facility is in surface impoundments, cont"
@ 12,66 SAY "ainers (sealed"
@ 13,11 SAY "or unsealed), piles, tanks, or landfills with a cover d"
@ 13,66 SAY "epth of less"
@ 14,11 SAY "than two feet, or has been spilled on the ground or oth"
@ 14,66 SAY "er surfaces"
@ 15,11 SAY "easily contacted (e.g., the bottom of shallow pond or c"
@ 15,66 SAY "reek), assign"
@ 16,11 SAY "this rating factor a value of 15. Otherwise, assign a"
@ 16,66 SAY "value of 0."
STORE .T. TO notright
DO WHILE notright
  @ 19,11 SAY "Enter assigned value for containment:" GET dc_contain RANGE
0,15
  READ
  DO CASE
    CASE dc_contain=0
      notright=.F.
    CASE dc_contain=15
      notright = .F.
    OTHERWISE
      @ 23,11 SAY 'You must assign a value of either 0 or 15!'
  ENDCASE
ENDDO
IF edj
  pindx = '30'
  DO just
ENOIF

ENDIF

IF rad
  DO radconc

@ 6,6 CLEAR
@ 8,10 SAY 'POPULATION WITHIN A ONE-MILE RADIUS'
DO popin.fmt
@ ROW()+2,11 SAY 'Enter assigned value of selected population:'
@ ROW(),COL()+1 GET dc_pop PICTURE '9' RANGE 0,5
READ
IF edj
  pindx = '51'
  DO just
ENDIF

@ 6,6 CLEAR
@ 8,11 SAY "DISTANCE TO A CRITICAL HABITAT (of an endangered specie"
@ 8,66 SAY "s) is a"
@ 9,11 SAY "rough measure of the probability of harm to members of"
@ 9,66 SAY "an endangered"

```

```

@ 10,11 SAY "species by direct contact with hazardous substance. As"
@ 10,66 SAY "sign a value"
@ 11,11 SAY "as follows:"
@ 13,11 SAY "ASSIGNED"
@ 14,12 SAY "VALUE          DISTANCE"
@ 16,14 SAY "0              >1 mile"
@ 17,14 SAY "1              1/2 to 1 mile"
@ 18,14 SAY "2              1/4 to 1/2 mile"
@ 19,14 SAY "3              <1/4 mile"
@ 21,11 SAY "Enter assigned value of selected distance to a critical"
@ 22,11 SAY "habitat:" GET dc_dis PICTURE '9' RANGE 0,3
READ
IF edj
    pindx = '52'
    DO just
ENDIF

DO edroute
ENDDO

RETURN
*-----

```

```

*-----
*
*   Module:                DCPRINT2                1/21/86   RAP
*
*   Print mHRS and HRS Direct Contact
*   worksheet
*-----

```

```

STORE ' ' TO x
SELECT 8
  USE dcwork2

```

```

GOTO 4
  REPLACE desc WITH j->fac name
  REPLACE max WITH SPACE(8)+DTOC(mdate)
GOTO 5
  REPLACE desc WITH 'Site: '+j->site name
  REPLACE max WITH 'Site index: '+STR(mhrsindx,4)

```

```

GOTO 11
x = STR(a->dc_observe,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 17
x = STR(a->dc_access,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 20
x = STR(a->dc_contain,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 25
REPLACE value WITH STR(a->dc_ch_wc,3)
REPLACE score WITH STR(a->dc_ch_wc*5,5)

```

```

GOTO 26
x = STR(a->dc_rad_mp,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 35
REPLACE value WITH STR(a->dc_pop,3)
REPLACE score WITH STR(a->dc_pop*4,5)

```

```

GOTO 37
REPLACE value WITH STR(a->dc_dis,3)
REPLACE score WITH STR(a->dc_dis*4,5)

```



```

GOTO 47
REPLACE score WITH STR(a->dc_tot_tar,5)

GOTO 49
REPLACE score WITH STR(a->dc_sc*216.0,6)

GOTO 50
REPLACE score WITH STR(a->dc_sr*216.0,6)

GOTO 52
REPLACE mult WITH STR(a->dc_sc,6,2)
REPLACE score WITH 'Sr(dc)'
REPLACE max WITH STR(a->dc_sr,6,2)

IF pm5 .OR. iwf
  IF pm5
    SET PRINT ON
    ? CHR(12)
  ENDIF
  GOTO TOP
  DO WHILE .NOT. EOF()
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  SET PRINT OFF
ENDIF

IF hrs .AND. (ph5 .OR. iwf)

  IF ph5
    SET PRINT ON
    ? CHR(12)
  ENDIF

  GOTO 52
  REPLACE mult WITH STR(j->hrs_s_dc,6,2)
  REPLACE score WITH ' '
  REPLACE max WITH ' '

  GOTO TOP
  ? desc+value+mult+score+max
  ? '          HRS Direct Contact Route Work Sheet'
  ? '          ====='
  GOTO 4
  DO WHILE RECNO() < 24
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  ? '      Chemical Toxicity          ',j->dc_hrs_wc,'      5 '
  ?? j->dc_hrs_wc * 5,'      15'
  ?

```

```

GOTO 27
DO WHILE RECNO() < 49
    ? desc+value+mult+score+max
    SKIP
ENDDO
?'6. If line 1=45 (1x4x5) '
?'   If line 1=0 (2x3x4x5)
??j->hrs_s_dc*216.0,' 21600'
GOTO 51
DO WHILE .NOT. EOF()
    ? desc+value+mult+score+max
    SKIP
ENDDO
SET PRINT OFF
ENDIF

RETURN
*-----

```

```

*-----
*
* Module:                DEFS.FMT
*
*-----

```

```

@ 8,11 SAY "To avoid confusion, we are using the terms FACILITY and"
@ 8,67 SAY "site"
@ 9,11 SAY "interchangeably:"
@ 11,11 SAY "FACILITY, as defined by section 101(9) of CERCLA, means"
@ 11,66 SAY ": a) any"
@ 12,11 SAY "building, structure, installation, equipment, pipe or p"
@ 12,66 SAY "ipeline"
@ 13,11 SAY "(including any pipe into a sewer or publicly owned trea"
@ 13,66 SAY "tment works),"
@ 14,11 SAY "well, pit, pond, lagoon impoundment, ditch, landfill, s"
@ 14,66 SAY "torage con-"
@ 15,11 SAY "tainer, motor vehicle, rolling stock, or aircraft, or b"
@ 15,66 SAY ") any site"
@ 16,11 SAY "or area where a hazardous substance has been deposited,"
@ 16,67 SAY "sorted,"
@ 17,11 SAY "disposed of or deposited, stored, disposed of or placed"
@ 17,66 SAY ", or other-"
@ 18,11 SAY "wise come to be located; but does not include any consu"
@ 18,66 SAY "mer product"
@ 19,11 SAY "in consumer use or any vessel."
@ 22,11 SAY "Press any key to continue . . ."

```

```

*-----
*
*   Module:                      DISENV.FMT
*
*-----

```

```

@ 7,11 SAY "DISTANCE TO A SENSITIVE ENVIRONMENT refers to the dista"
@ 7,66 SAY "nce from"
@ 8,11 SAY "the hazardous substance (not the facility boundary) to"
@ 8,66 SAY "an area"
@ 9,11 SAY "containing an important biological resource or to a fra"
@ 9,66 SAY "gile natural"
@ 10,11 SAY "setting that could suffer an especially severe impact f"
@ 10,66 SAY "rom pollution."
@ 12,11 SAY "In the following table, wetland is defined by EPA in th"
@ 12,66 SAY "e Code of"
@ 13,11 SAY "Federal Regulations 40 CFR Part 230, Appendix A, 1980."
@ 13,67 SAY "Endangered"
@ 14,11 SAY "species are designated by the U.S. Fish and Wildlife Se"
@ 14,66 SAY "rvice."
@ 16,11 SAY "Press any key to continue . . ."

```

```

*-----
*
*   Module:                      DISENV2.FMT
*
*-----

```

```

@ 7,11 SAY "ASSIGNED VALUE"           0      1      2"
@ 7,73 SAY "3"
@ 9,11 SAY "DISTANCE TO WETLANDS"
@ 10,11 SAY "(5-acre minimum):"
@ 12,13 SAY "Coastal"                  >2 mi   1-2 mi   1/2 to"
@ 12,71 SAY "1/2 mi"
@ 13,59 SAY "1 mi"
@ 15,13 SAY "Fresh Water"              >1 mi   1/4 to   100 ft to"
@ 15,71 SAY "<100 ft"
@ 16,50 SAY "1 mi      1/4 mi"
@ 18,11 SAY "DISTANCE TO CRITICAL HABITAT"
@ 19,11 SAY "(of endangered species)"  >1 mi   1/2 to   1/4 to"
@ 19,71 SAY "<1/4 mi"
@ 20,50 SAY "1 mi      1/2 mi"
@ 22,11 SAY "Enter assigned value of selected distance:"

```

```

*-----
*
*   Module:                      EDCHEM                1/16/86  RAP
*
*                               Change chemical selection
*-----

```

```

SELECT 2
GOTO TOP

```

```

notdone = .T.
DO WHILE notdone

```

```

    @ 6,6 CLEAR
    @ 10,11 SAY "Chemical inventory options:"
    @ 12,15 SAY "1 - View selected chemicals"
    @ 13,15 SAY "2 - Delete a chemical from the list"
    @ 14,15 SAY "3 - Add to list of chemicals"
    @ 15,15 SAY "4 - Continue with the program"
    STORE ' ' TO optstr
    DO WHILE .NOT. (optstr $ '1234')
        @ 17,11 SAY "Enter index of selected option: " GET optstr PICTURE 'X'
        READ
    ENDDO
    opt = VAL(optstr)

```

```

IF opt < 3

```

```

    @ 6,6 CLEAR
    @ 7,11 SAY "Index          Chemical Name"
    @ 8,11 SAY "-----"
    rown = 10
    GOTO TOP
    DO WHILE .NOT. EOF()
        IF chem_nuc = 'C'
            @ rown,12 SAY cn_indx
            @ rown,19 SAY name
            rown = rown+1
        ENDIF
        SKIP
    ENDDO

```

```

    rown = rown + 2
ENDIF

```

```

DO CASE
CASE opt = 1
    done = ' '
    @ rown,11 SAY "Press any key to continue..." GET done PICTURE 'X'
    READ

```

```

CASE opt = 2
  STORE 0 TO ndx
  @ rown,11 SAY "Enter index of chemical you wish to delete:"
  @ rown,COL()+1 GET ndx PICTURE '999' RANGE 1,cmax
  READ
  LOCATE FOR cn_indx=ndx
  DELETE
  PACK

CASE opt = 3
  SELECT 5
  USE chemical INDEX calpha
  DO inchem

CASE opt = 4
  notdone = .F.

ENDCASE

ENDDO
RETURN
*-----

```

```

*-----
*
*   Module:                EDITOPT                1/20/86   RAP
*
*                           Input user option for editing of routes
*-----

```

```

STORE .T. TO notsat
STORE .F. TO pinv, ed1, ed2, ed3, ed4, ed5, edj, morerout
IF firsted
  IF gwp
    STORE .T. TO ed1
  ENDIF
  IF swp
    STORE .T. TO ed2
  ENDIF
  IF ap
    STORE .T. TO ed3
  ENDIF
  IF fep
    STORE .T. TO ed4
  ENDIF
  IF dcp
    STORE .T. TO ed5
  ENDIF
  STORE .T. TO edj
ENDIF
DO WHILE notsat
  @ 6,6 CLEAR
  IF firsted
    @ 8,11 SAY 'Do you wish a printed copy of the inventory? ' GET pinv
  ELSE
    @ 7,11 SAY 'YOU NOW HAVE AN OPPORTUNITY TO MAKE CHANGES.'
  ENDIF

  @ 11,11 SAY 'Do you wish to edit justifications?' GET edj

  IF usropt > 0 .OR. (.NOT. firsted)
    @ 13,11 SAY 'Indicate which of the following routes you wish to edit:'

    IF j->gwp
      @ 15,15 SAY 'Ground Water          :' GET ed1
    ELSE
      ed1 = .F.
    ENDIF

    IF j->swp
      @ 16,15 SAY 'Surface Water          :' GET ed2
    ELSE
      ed2 = .F.
    ENDIF
  ENDIF

```



```

ELSE
    ed2 = .F.
ENDIF

IF j->ap
    @ 17,15 SAY 'Air' : GET ed3
ELSE
    ed3 = .F.
ENDIF

IF j->fep
    @ 18,15 SAY 'Fire and Explosion' : GET ed4
ELSE
    ed4 = .F.
ENDIF

IF j->dcp
    @ 19,15 SAY 'Direct Contact' : GET ed5
ELSE
    ed5 = .F.
ENDIF

ENDIF

@21,11 SAY 'You may use arrow keys to move the cursor around the screen.'
@22,11 SAY 'Enter Y or T (for yes or true) or N or F (for no or false).'
READ
@ 21,11 CLEAR

answer = ' '
DO WHILE .NOT. (UPPER(answer) $ 'YN')
    @ 21,11 SAY 'Are all of the above entries correct (Y or N)? ' GET answer
    READ
ENDDO
IF UPPER(answer)='Y'
    notsat = .F.
ENDIF

ENDDO
ENDIF

IF ed1 .OR. ed2 .OR. ed3 .OR. ed4 .OR. ed5
    morerout = .T.
ENDIF
firsted = .F.

RETURN

```

```

*-----*
*
*   Module:                      EDRAD      1/16/86  RAP
*
*                               Change radiological inventory selection
*
*-----*

```

```

STORE .T. TO notdone
DO WHILE notdone

```

```

    SELECT 2
    GOTO TOP

```

```

    @ 6,6 CLEAR
    @ 10,11 SAY "Radiological inventory options:"
    @ 12,15 SAY "1 - View selected radionuclides"
    @ 13,15 SAY "2 - Delete a radionuclide from the list"
    @ 14,15 SAY "3 - Add to list of radionuclides"
    @ 15,15 SAY "4 - Continue with the program"
    STORE ' ' TO optstr
    DO WHILE .NOT. (optstr $ '1234')
        @ 17,11 SAY "Enter index of selected option: " GET optstr PICTURE 'X'
        READ
    ENDDO
    opt = VAL(optstr)

```

```

    IF opt < 3

```

```

        @ 6,6 CLEAR
        @ 7,11 SAY "Index   Radionuclide Name"
        @ 8,11 SAY "-----"
        rown = 10
        GOTO TOP
        DO WHILE .NOT. EOF()
            IF chem_nuc = 'N'
                @ rown,12 SAY cn_indx
                @ rown,19 SAY name
                rown = rown+1
            ENDIF
            SKIP
        ENDDO
    ENOIF

```

```

    rown = rown + 2
    DO CASE

```

```

        CASE opt = 1
            done = ' '
            @ rown,11 SAY "Press any key to continue..." GET done PICTURE 'X'
            READ

```

```

CASE opt = 2
  STORE 0 TO ndx
  @ rown,11 SAY "Enter index of radionuclide you wish to delete:"
  @ rown,COL()+1 GET ndx PICTURE '999' RANGE 1,nmax
  READ
  LOCATE FOR cn_indx=ndx
  DELETE
  PACK

CASE opt=3
  SELECT 6
  USE nuclides INDEX nalpha
  DO inrad

CASE opt=4
  notdone = .F.

ENDCASE

ENDDO
RETURN
*-----

```

```

*-----
*
*   Module:                EDROUTE                1/8/86 RAP
*
*   Control route editing
*
*-----

```

```

@ 6,6 CLEAR
@ 10,10 SAY 'Do you wish to make corrections or changes to the '
@ 11,10 SAY route+' route (Y or N)?'
STORE " " TO edroute
DO WHILE .NOT. (UPPER(edroute) $ 'YN')
    @ 11,40 SAY " " GET edroute PICTURE 'X'
    READ
ENDDO
IF UPPER(edroute)='N'
    edflg = .F.
ELSE
    edflg = .T.
ENDIF
@ 6,6 CLEAR

RETURN
*-----

```

```

*-----
*
*   Module:                FECALC           1/19/86   RAP
*
*                           Fire & Explosion route calculations
*
*-----

```

```

STORE 0 TO sc, sr
STORE 4 TO pathsel

```

```

STORE 0 TO hignit
SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()
    IF chem_nuc = 'C' .AND. fe_path
        IF ignit_indx > hignit
            hignit = ignit_indx
        ENDIF
    ENDIF
    SELECT 2
    SKIP
ENDDO
SELECT 1
REPLACE fe_ignite WITH hignit

```

```

STORE 0 to hireact
SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()
    IF fe_path
        IF react_indx > hireact
            hireact = react_indx
        ENDIF
    ENDIF
    SKIP
ENDDO
SELECT 1
REPLACE fe_react WITH hireact

```

```

IF rad
    relese = 'Potential'
    DO radrel
ELSE
    fe_rad_mp = 0.0
ENDIF

```

```

REPLACE fe_ch_wc WITH fe_dir_evi+ fe_ignite+ fe_react+ fe_incomp+ fe_hw_quan
REPLACE fe_rd_wc WITH fe_dir_evi+ fe_ignite+ fe_react+ fe_incomp+ fe_rad_mp

```

```

REPLACE fe_tot_tar WITH fe_dis_pop+fe_dis_bld+fe_dis_env+fe_use+fe_bldg+fe_pop

```

```

sc = fe_contain * fe_ch_wc * fe_tot_tar
sr = fe_contain * fe_rd_wc * fe_tot_tar

REPLACE fe_sc WITH sc / 14.4
REPLACE fe_sr WITH sr / 14.4

SELECT 10
IF a->fe_sc > a->fe_sr
    REPLACE mhrs_s_fe WITH a->fe_sc
ELSE
    REPLACE mhrs_s_fe WITH a->fe_sr
ENDIF

IF hrs
    sc = a->fe_contain * a->fe_ch_wc * a->fe_tot_tar
    REPLACE hrs_s_fe WITH sc / 14.4
ENDIF

SELECT 1
RETURN

```

```

*-----
*
*   Module:                FEIN      1/16/86  RAP
*
*   Fire & Explosion Route input
*
*-----

STORE 4 TO pathsel
STORE .T. TO edflg

done = ' '
CLEAR
DO box4.fmt
@ 12,10 SAY 'The following questions pertain to the Fire & Explosion route.'
@ 13,10 SAY 'Press any key when you are ready to begin...' GET done
READ

DO WHILE edflg

SELECT 1
@ 6,6 CLEAR
@ 10,11 SAY "CONTAINMENT is an indicator of the measures that have b"
@ 10,66 SAY "een taken"
@ 11,11 SAY "to minimize or prevent hazardous substances at the faci"
@ 11,66 SAY "lity from"
@ 12,11 SAY "catching fire or exploding. Normally it will be assign"
@ 12,66 SAY "ed a value"
@ 13,11 SAY "of 3. If no hazardous substances that are individually"
@ 13,67 SAY "ignitable"
@ 14,11 SAY "or explosive are present and those that may be hazardou"
@ 14,66 SAY "s in com-"
@ 15,11 SAY "bination are segregated and isolated so that they canno"
@ 15,66 SAY "t come"
@ 16,11 SAY "together to form incompatible mixtures, assign this fac"
@ 16,66 SAY "tor a value"
@ 17,11 SAY "of 1."

STORE .T. TO notright
DO WHILE notright
  @19,11 SAY 'Enter assigned value for containment: '
  @19, COL()+1 GET fe_contain PICTURE '9' RANGE 1,3
  READ
  DO CASE
    CASE fe_contain=1
      notright = .F.
    CASE fe_contain=3
      notright = .F.
    OTHERWISE
      @23,11 SAY 'You must assign a value of either 1 or 3!'
  ENDCASE

```

```

ENDDO
IF edj
    pindx = '10'
    DO just
ENDIF

@ 6,6 CLEAR
@ 10,11 SAY "DIRECT EVIDENCE of ignitability or explosion potential"
@ 10,66 SAY "may exist"
@ 11,11 SAY "in the form of measurements with appropriate instrument"
@ 11,66 SAY "s. If so,"
@ 12,11 SAY "assign this factor a value of 3; if not, assign a value"
@ 12,67 SAY "of 0."

STORE .T. TO notright
DO WHILE notright
    @ 14,11 SAY 'Enter assigned value for direct evidence: '
    @ 14,COL()+1 GET fe_dir_evi PICTURE '9' RANGE 0,3
    READ
    DO CASE
        CASE fe_dir_evi=0
            notright = .F.
        CASE fe_dir_evi=3
            notright = .F.
        OTHERWISE
            @23,11 SAY 'You must assign a value of either 0 or 3!'
    ENDCASE
ENDDO
IF edj
    pindx = '21'
    DO just
ENDIF

hwq = fe_tons
DO hwquan
REPLACE fe_tons WITH hwq
REPLACE fe_hw_quan WITH hwquan
IF edj
    pindx = '25'
    DO just
ENDIF

IF rad
    DO radconc
ENDIF

SELECT 1
@ 6,6 CLEAR
@ 7,11 SAY "DISTANCE TO NEAREST POPULATION is the distance from the"
@ 7,67 SAY "hazardous"
@ 8,11 SAY "substance to the nearest building or area in which one"
@ 8,66 SAY "or more"

```



```

@ 9,11 SAY "persons are likely to be located either for residential"
@ 9,66 SAY ", educational,"
@ 10,11 SAY "business, occupational, or recreational purposes. It i"
@ 10,66 SAY "s an indicator"
@ 11,11 SAY "of the potential for harm to humans from fire and explo"
@ 11,66 SAY "sion. The"
@ 12,11 SAY "building or area need not be offsite. Assign values as"
@ 12,67 SAY "follows:"
@ 14,11 SAY "ASSIGNED"
@ 15,12 SAY "VALUE          DISTANCE"
@ 16,14 SAY "0              >2 miles"
@ 17,14 SAY "1              1 mile - 2 miles"
@ 18,14 SAY "2              1/2 mile - 1 mile"
@ 19,14 SAY "3              201 feet - 1/2 mile"
@ 20,14 SAY "4              51 feet - 200 feet"
@ 21,14 SAY "5              0 - 50 feet"
@ 23,11 SAY "Enter assigned value of selected distance to nearest"
@ 24,11 SAY "population:" GET fe_dis_pop PICTURE '9' RANGE 0,5
READ
IF edj
    pindx = '31'
    DO just
ENDIF

@ 6,6 CLEAR
@ 7,11 SAY "DISTANCE TO NEAREST BUILDING is an indicator of the pot"
@ 7,66 SAY "ential for"
@ 8,11 SAY "property damage as a result of fire or explosion. Assi"
@ 8,66 SAY "gn a value"
@ 9,11 SAY "as follows:"
@ 11,11 SAY "ASSIGNED"
@ 12,12 SAY "VALUE          DISTANCE"
@ 14,13 SAY "0              >1/2 mile"
@ 15,13 SAY "1              201 feet - 1/2 mile"
@ 16,13 SAY "2              51 - 200 feet"
@ 17,13 SAY "3              0 - 50 feet"
@ 19,11 SAY "Enter assigned value of selected distance to nearest"
@ 20,11 SAY "building:" GET fe_dis_bld PICTURE '9' RANGE 0,3
READ
IF edj
    pindx = '32'
    DO just
ENDIF

STORE 0 TO score
@ 6,6 CLEAR
@ 10,11 SAY "DISTANCE TO NEAREST SENSITIVE ENVIRONMENT is measured f"
@ 10,66 SAY "rom the"
@ 11,11 SAY "hazardous substances, not from the facility boundary."
@ 11,66 SAY "Is the dis-"
@ 12,11 SAY "tance to Wetlands* less than 100 feet? (Y or N)"
STORE COL() TO coln

```

```

@ 14,11 SAY "
@ 15,11 SAY "*Wetland is defined by EPA in the Code of Federal Regul"
@ 15,66 SAY "ations"
@ 16,12 SAY "40 CFR Part 230, Appendix A, 1980"

IF redoflg
  IF fe_sen_1
    @ 22,11 SAY 'Previous value: Y'
  ELSE
    @ 22,11 SAY 'Previous value: N'
  ENDIF
ENDIF

answer = ' '
rown = ROW()
DO WHILE .NOT. (UPPER(answer) $ 'YN')
  @ 12,coln SAY ' ' GET answer PICTURE 'X'
  READ
ENDDO
IF UPPER(answer) = 'Y'
  REPLACE fe_sen_1 WITH .T.
  score=3
  IF score > hiscore
    hiscore=score
  ENDIF
ELSE
  REPLACE fe_sen_1 WITH .F.
ENDIF

@ 6,6 CLEAR
@ 10,11 SAY "ASSIGNED"
@ 11,12 SAY "VALUE          DISTANCE TO CRITICAL HABITAT*"
@ 13,14 SAY "0              >1/2 mile"
@ 14,14 SAY "1              1000 feet - 1/2 mile"
@ 15,14 SAY "2              100-1000 feet"
@ 16,14 SAY "3              <100 feet"
@ 17,11 SAY "          "
@ 18,11 SAY "*Designated by the U.S. Fish and Wildlife Service"
@ 20,11 SAY "Enter assigned value of selected distance to critical h"
@ 20,66 SAY "abitat:"
@ 20,COL()+1 GET fe_sen_2 PICTURE '9' RANGE 0,3
READ
IF fe_sen_2 > hiscore
  hiscore = fe_sen_2
ENDIF

@ 6,6 CLEAR
@ 10,11 SAY "Could fire be expected to spread to a sensitive environ"
@ 10,66 SAY "ment even"
@ 11,11 SAY "though that environment is more than 100 feet from the"
@ 11,66 SAY "hazardous"

```

```

IF redoflg
  IF fe_sen_3
    @ 22,11 SAY 'Previous value: Y'
  ELSE
    @ 22,11 SAY 'Previous value: N'
  ENDIF
ENDIF

answer = ' '
rown = ROW()
DO WHILE .NOT. (UPPER(answer) $ 'YN')
  @ 12,11 SAY "substance? (Y or N)? " GET answer PICTURE 'X'
  READ
ENDDO
IF UPPER(answer) = 'Y'
  REPLACE fe_sen_3 WITH .T.
  score=3
  IF score > hiscore
    hiscore=score
  ENDIF
ELSE
  REPLACE fe_sen_3 WITH .F.
ENDIF

REPLACE fe_dis_env WITH hiscore
IF edj
  pindx = '33'
  DO just
ENDIF

STORE VAL(SUBSTR(fe_lan_all,1,1)) TO score1
STORE VAL(SUBSTR(fe_lan_all,2,1)) TO score2
STORE VAL(SUBSTR(fe_lan_all,3,1)) TO score3
IF SUBSTR(fe_lan_all,4,1) = 'Y'
  STORE .T. TO score4
ELSE
  STORE .F. TO score4
ENDIF
IF SUBSTR(fe_lan_all,5,1) = 'Y'
  STORE .T. TO score5
ELSE
  STORE .F. TO score5
ENDIF

DO landuse

STORE STR(score1,1)+STR(score2,1)+STR(score3,1) TO temp
IF score4
  temp = temp + 'Y'
ELSE
  temp = temp + 'N'
ENDIF

```

```

IF score5
    temp = temp + 'Y'
ELSE
    temp = temp + 'N'
ENDIF
REPLACE fe_lan_all WITH temp
REPLACE fe_use WITH hiscore
IF edj
    pindx = '34'
    DO just
ENDIF

@ 6,6 CLEAR
@ 10,11 SAY "POPULATION WITHIN TWO-MILE RADIUS (measured from the lo"
@ 10,66 SAY "cation of"
@ 11,11 SAY "the hazardous substance, not from the facility boundary"
@ 11,66 SAY ") is a rough"
@ 12,11 SAY "indicator of the population at risk in the event of fir"
@ 12,66 SAY "e or explosion"
@ 13,11 SAY "at a facility. The population to be counted includes t"
@ 13,66 SAY "hose residing"
@ 14,11 SAY "within the two-mile radius as well as people regularly"
@ 14,66 SAY "in the vicin-"
@ 15,11 SAY "ity such as workers in factories, offices, or students."
@ 15,69 SAY "It does"
@ 16,11 SAY "not include travelers passing through the area. If aer"
@ 16,66 SAY "ial photo-"
@ 17,11 SAY "graphy is used in making the count, assume 3.8 individu"
@ 17,66 SAY "als per"
@ 18,11 SAY "dwelling."
@ 20,11 SAY "Press any key to continue . . ." GET done PICTURE 'X'
READ

@ 6,6 CLEAR
@ 8,11 SAY 'POPULATION WITHIN TWO-MILE RADIUS:'
DO popin.fmt
@ ROW()+2,11 SAY 'Enter assigned value of selected population:'
@ ROW(), COL()+1 GET fe_pop PICTURE '9' RANGE 0,5
READ
IF edj
    pindx = '35'
    DO just
ENDIF

@ 6,6 CLEAR
@ 8,11 SAY "NUMBER OF BUILDINGS WITHIN TWO-MILE RADIUS (measured fr"
@ 8,66 SAY "om the"
@ 9,11 SAY "hazardous substance, not from the facility boundary) is"
@ 9,67 SAY "a rough indi-"
@ 10,11 SAY "cator of the property damage that could result from fir"
@ 10,66 SAY "e and explo-"
@ 11,11 SAY "sion at a facility. Assign values to this factor as fo"

```

```

@ 11,66 SAY "llows:"
@ 13,11 SAY "ASSIGNED"
@ 14,12 SAY "VALUE          NUMBER OF BUILDINGS"
@ 16,14 SAY "0              0"
@ 17,14 SAY "1              1 - 26"
@ 18,14 SAY "2              27 - 260"
@ 19,14 SAY "3              261 - 790"
@ 20,14 SAY "4              791 - 2600"
@ 21,14 SAY "5              >2600"
@ 23,11 SAY "Enter assigned value indicating number of buildings:"
@23,COL()+1 GET fe_bldg PICTURE '9' RANGE 0,5
READ
IF edj
    pindx = '36'
    DO just
ENDIF

DO edroute
ENDDO

RETURN
*-----

```

```

*-----
*
*   Module:                FEPRINT2                1/21/86   RAP
*
*                           Print mHRS and HRS Fire and Explosion
*                           worksheet
*-----

```

```

STORE ' ' TO x
SELECT 8
USE fework2

```

```

GOTO 4
  REPLACE desc WITH j->fac name
  REPLACE max WITH SPACE(8)+DTC(mdate)
GOTO 5
  REPLACE desc WITH 'Site: '+j->site name
  REPLACE max WITH 'Site index: '+STR(mhrsindx,4)

```

```

GOTO 11
x = STR(a->fe_contain,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 16
x = STR(a->fe_dir_evi,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 17
x = STR(a->fe_ignite,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 18
x = STR(a->fe_react,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

GOTO 19
x = str(a->fe_incomp,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

```

```

number = a->fe_dir_evi+a->fe_ignite+a->fe_react+a->fe_incomp
GOTO 21
REPLACE score WITH STR(number,5)

```

```

GOTO 24
x = STR(a->fe_hw_quan,3)

```

```

REPLACE value WITH x
REPLACE score WITH ' ' +x

GOTO 25
x = STR(a->fe_rad_mp,3)
REPLACE value WITH x
REPLACE score WITH ' ' +x

GOTO 28
REPLACE score WITH STR(a->fe_ch_wc,5)

GOTO 29
REPLACE score WITH STR(a->fe_rd_wc,5)

GOTO 35
x = STR(a->fe_dis_pop,3)
REPLACE value WITH x
REPLACE score WITH ' ' +x

GOTO 37
x = STR(a->fe_dis_bld,3)
REPLACE value WITH x
REPLACE score WITH ' ' +x

GOTO 39
x = STR(a->fe_dis_env,3)
REPLACE value WITH x
REPLACE score WITH ' ' +x

GOTO 40
x = STR(a->fe_use,3)
REPLACE value WITH x
REPLACE score WITH ' ' +x

GOTO 42
x = STR(a->fe_pop,3)
REPLACE value WITH x
REPLACE score WITH ' ' +x

GOTO 44
x = STR(a->fe_bldg,3)
REPLACE value WITH x
REPLACE score WITH ' ' +x

GOTO 47
REPLACE score WITH STR(a->fe_tot_tar,5)

GOTO 49
REPLACE score WITH STR(a->fe_sc*14.4,6)

GOTO 50
REPLACE score WITH STR(a->fe_sr*14.4,6)

```

```

GOTO 52
REPLACE mult WITH STR(a->fe_sc,6,2)
REPLACE score WITH 'Sr(fe)'
REPLACE max WITH STR(a->fe_sr,6,2)

IF pm4 .OR. iwf
  IF pm4
    SET PRINT ON
    ? CHR(12)
  ENDIF
  GOTO TOP
  DO WHILE .NOT. EOF()
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  SET PRINT OFF
ENDIF

IF hrs .AND. (ph4 .OR. iwf)

  IF ph4
    SET PRINT ON
    ? CHR(12)
  ENDIF

  GOTO TOP
  ? desc+value+mult+score+max
  ?'          HRS Fire and Explosion Route Work Sheet'
  ?'          ====='
  GOTO 4
  DO WHILE RECNO() < 21
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  GOTO 24
  ? desc+value+mult+score+max
  ?
  ?
  ?
  ?'      Total Waste Characteristics Score          ',a->fe_ch_wc,'      20'
  GOTO 30
  DO WHILE RECNO() < 49
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  ?
  ?'4. Multiply 1 x 2 x 3
  ?? j->hrs_s_fe*14.4,'      1440'
  ?'-----'
  ?'5. Line 4/1440 * 100          S(fe)= ', STR(j->hrs_s_fe,6,2)

```



```

? '-----'
SET PRINT OFF
ENDIF

```

```

RETURN

```

```

*-----
*-----
*
*   Module:                FIELDINT                1/15/86   RAP
*
*               Initialize fields to maximum values
*
*-----

```

```

SELECT 1

```

```

REPLACE gw_observe WITH 45
REPLACE gw_depth WITH 3
REPLACE gw_precip WITH 3
REPLACE gw_permbil WITH 3
REPLACE gw_phystat WITH 3
REPLACE gw_con_1 WITH 3
REPLACE gw_con_2 WITH 3
REPLACE gw_con_3 WITH 3
REPLACE gw_con_4 WITH 3
REPLACE gw_pop_all WITH '135'
REPLACE gw_use WITH 3
REPLACE gw_tons WITH 9999999.99

```

```

REPLACE sw_observe WITH 45
REPLACE sw_fslope WITH 4
REPLACE sw_tslope WITH 4
REPLACE sw_rainfal WITH 3
REPLACE sw_dis_sur WITH 3
REPLACE sw_phystat WITH 3
REPLACE sw_con_1 WITH 3
REPLACE sw_con_2 WITH 3
REPLACE sw_con_3 WITH 3
REPLACE sw_con_4 WITH 3
REPLACE sw_con_log WITH .T.
REPLACE sw_use WITH 3
REPLACE sw_dis_env WITH 3
REPLACE sw_pop_all WITH '135'
REPLACE sw_tons WITH 9999999.99

```

```

REPLACE a_observe WITH 45
REPLACE a_incomp WITH 3
REPLACE a_pop_1 WITH 0
REPLACE a_pop_2 WITH 0
REPLACE a_pop_3 WITH 0
REPLACE a_pop_4 WITH 0
REPLACE a_dist WITH 3

```

REPLACE a_land_all WITH '333YY'
REPLACE a_tons WITH 9999999.99

REPLACE fe_contain WITH 3
REPLACE fe_dir_evi WITH 3
REPLACE fe_incomp WITH 3
REPLACE fe_dis_pop WITH 5
REPLACE fe_dis_bld WITH 3
REPLACE fe_sen_1 WITH .T.
REPLACE fe_sen_2 WITH 3
REPLACE fe_sen_3 WITH .T.
REPLACE fe_lan_all WITH '333YY'
REPLACE fe_pop WITH 5
REPLACE fe_bldg WITH 5
REPLACE fe_tons WITH 9999999.99

REPLACE dc_observe WITH 45
REPLACE dc_access WITH 3
REPLACE dc_contain WITH 15
REPLACE dc_pop WITH 5
REPLACE dc_dis WITH 3

RETURN

*-----

```

*-----
*
*   Module:                GENERAL                2/3/86 RAP
*
*   Get general facility and hazardous waste
*   information from the user
*-----

```

*---- get cover page information ----

SELECT 10

```

@ 6,6 CLEAR
@ 6,11 SAY "ENTER THE FOLLOWING:"
@ 8,11 SAY "DOE Operations Office and location: "
@ 9,15 GET fac_name
@ 10,11 SAY "Site name:"
@ 6,55 SAY "Site index: "+STR(site_indx,4)
@ 11,15 GET site_name
@ 12,11 SAY "Identification number:"
@ 13,15 GET ident
@ 14,11 SAY "Site Location:"
@ 15,15 GET fac_locate
@ 17,11 SAY "Eight-character unique identifier for site log file:"
@ 19,30 SAY "Note: no embedded blanks allowed in file name"
@ 19,15 GET site_log
@ 23,10 SAY 'You may use arrow keys to move cursor around screen'
READ

```

```

STORE AT(' ',site_log) TO sindx
DO CASE
  CASE sindx =1
    REPLACE site_log WITH 'mhrs'
  CASE sindx > 1
    REPLACE site_log WITH SUBSTR(site_log,1,sindx-1)
ENDCASE

```

```

@ 8,6 CLEAR
@ 10,11 SAY "EPA Region: " GET epa_region
@ 12,11 SAY "Person(s) in charge of the facility: "
@ 13,15 GET per_contc1
@ 14,15 GET per_contc2
@ 15,15 GET per_contc3
@ 17,11 SAY "Reviewer: "
@ 18,15 GET reviewer
@ 20,11 SAY "Date: " GET rev_date
@ 23,10 SAY 'You may use arrow keys to move cursor around screen'
READ

```

```

@ 8,6 CLEAR
@ 11,10 SAY "Type of facility/site: "

```

```

@ 12,15 GET fac_type
@ 13,10 SAY "Types of hazardous wastes: "
@ 14,15 GET hs_type
@ 15,10 SAY "Contamination route(s) of major concern:"
@ 16,15 GET major_rout
@ 17,10 SAY "Additional descriptive comments: "
@ 18,15 GET info_needs
@ 19,15 GET desc_com1
@ 20,15 GET desc_com2
@ 21,15 GET desc_com3
@ 23,10 SAY 'You may use arrow keys to move cursor around screen'
READ

SELECT 1

*----- find out if waste is chemical, radiological, or mixed -----

number = 3
IF edflg
  DO CASE
    CASE rad .AND. chem
      number = 3
    CASE rad
      number = 2
    OTHERWISE
      number = 1
  ENDCASE
ENDIF

@ 6,6 CLEAR
@ 10,11 SAY "Select type of wastes associated with the site:"
@ 12,11 SAY "INDEX      WASTE TYPE"
@ 14,13 SAY "1        Chemical only?"
@ 15,13 SAY "2        Radiological only?"
@ 16,13 SAY "3        Mixed chemical and radiological?"
@ 18,11 SAY "Enter index number of selected type (1, 2, or 3):"
@ 18,COL()+1 GET number PICTURE '9' RANGE 1,3
READ

DO CASE
  CASE number = 1
    REPLACE chem WITH .T.
  CASE number = 2
    REPLACE rad WITH .T.
  CASE number = 3
    REPLACE chem WITH .T.
    REPLACE rad WITH .T.
ENDCASE

*----- find out which chemicals -----

IF a->chem

```

```

IF edflg
  DO edchem
ELSE
  DO inchem
ENDIF
ENDIF

*----- find out which radionuclides -----

IF a->rad
  IF edflg
    DO edrad
  ELSE
    DO inrad
  ENDIF
ENDIF

*----- input paths and quantity for each waste substance -----

IF firstq
  STORE .F. TO skpquan
ELSE
  STORE ' ' TO answer
  STORE .F. TO skpquan
  @ 6,6 CLEAR
  DO WHILE .NOT. (UPPER(answer) $ 'YN')
    @ 11,11 SAY 'Do you wish to change routes or quantities?' GET answer
    READ
  ENDDO
  IF UPPER(answer)='N'
    skpquan = .T.
  ENDIF
ENDIF
STORE .F. TO firstq

IF .NOT. skpquan

  STORE .F. TO gwp, swp, ap, fep, dcp
  SELECT 2
  GOTO TOP
  DO WHILE .NOT. EOF()

    @ 6,6 CLEAR
    @ 10,10 SAY "WASTE CONSTITUENT      : "
    SET COLOR TO 0/7, 0/7, 0
    @ 10,37 SAY name
    SET COLOR TO 7/0, 0/7, 0
    @ 12,10 SAY "Based on the processes at this facility, for each waste"
    @ 13,10 SAY "constituent indicate with Y or N which routes apply:"
    @ 15,10 SAY "Ground water      : "
    @ 15,37 GET gw_path
    @ 16,10 SAY "Surface water     : "

```

```

@ 16,37 GET sw_path
@ 17,10 SAY "Air"
@ 17,37 GET a_path
@ 18,10 SAY "Fire and explosion"
@ 18,37 GET fe_path
@ 19,10 SAY "Direct contact"
@ 19,37 GET dc_path
@ 22,10 SAY 'You may use arrow keys to move cursor around screen'
READ

```

```

IF gw_path
    gwp = .T.
ENDIF
IF sw_path
    swp = .T.
ENDIF
IF a_path
    ap = .T.
ENDIF
IF fe_path
    fep = .T.
ENDIF
IF dc_path
    dcp = .T.
ENDIF

```

```

@ 11,6 CLEAR
@ 13,10 SAY "Choose units for inputting the inventory quantity:"
@ 15,15 SAY "INDEX"
IF chem_nuc = 'N'
    @ 16,15 SAY "1"
    @ 17,15 SAY "2"
    pico curie (pCi)"
    curie (Ci)"
ELSE
    @ 16,15 SAY "1"
    @ 17,15 SAY "2"
    gram (g)"
    mega gram (Mg)"
ENDIF
IF qu_units='pCi'.OR. qu_units='g'
    mult = 1
ELSE
    mult = 2
ENDIF
@ 19,10 SAY "Enter index of selection:"
@ ROW(),COL()+1 GET mult PICTURE '9' RANGE 1,2
READ
IF chem_nuc = 'C'
    IF mult = 1
        REPLACE qu_units WITH 'g'
    ELSE
        REPLACE qu_units WITH 'Mg'
    ENDIF
ELSE
    IF mult = 1

```

```

        REPLACE qu_units WITH 'pci'
    ELSE
        REPLACE qu_units WITH 'ci'
    ENDIF
ENDIF

@ 22,10 SAY 'Enter constituent quantity in '+qu_units+': '
@ROW(),COL()+1 GET hw_quan
READ

SKIP
ENDDO

SELECT 10
REPLACE gwp WITH m->gwp
REPLACE swp WITH m->swp
REPLACE ap WITH m->ap
REPLACE fep WITH m->fep
REPLACE dcp WITH m->dcp

ENDIF

*---- input waste storage/disposal methods at this site -----

SELECT 1
STORE .T. TO revum

IF edflg
    @ 6,6 CLEAR
    @ 7,11 SAY "Waste Storage/Disposal Methods at this Facility:"
    @ 8,11 SAY " "
    IF sur_impnd
        @ ROW()+1,15 SAY "Surface Impoundments"
    ENDIF
    IF container
        @ ROW()+1,15 SAY "Containers"
    ENDIF
    IF piles
        @ ROW()+1,15 SAY "Piles"
    ENDIF
    IF landfill
        @ ROW()+1,15 SAY "Landfills"
    ENDIF
    @ 20,11 SAY 'Do you wish to change selection of storage/disposal'
    answer = ' '
    DO WHILE .NOT. (UPPER(answer) $ 'YN')
        @ 21,11 SAY 'methods used at this facility?'GET answer PICTURE 'X'
        READ
    ENDDO
    IF UPPER(answer)='N'
        STORE .F. TO revum
    ENDIF

```

ENDIF

IF revum

REPLACE sur_impnd WITH .F.
REPLACE container WITH .F.
REPLACE piles WITH .F.
REPLACE landfill WITH .F.

@ 6,6 CLEAR

@ 6,10 SAY "Select the method(s) of storage or disposal used at thi"

@ 6,65 SAY "s facility:"

@ 8,10 SAY "INDEX STORAGE/DISPOSAL METHOD"

@ 10,12 SAY "1 Surface Impoundment"

@ 11,12 SAY "2 Containers"

@ 12,12 SAY "3 Piles"

@ 13,12 SAY "4 Landfill"

@ 15,10 SAY "Enter indices of selected methods (or 5 to continue):"

STORE ROW() TO rpos

STORE COL()+1 TO cpos

@ 18,10 SAY 'SELECTED METHODS:'

STORE .T. TO more

DO WHILE more

STORE 0 TO number

@ rpos, cpos GET number PICTURE '9' RANGE 1,5

READ

DO CASE

CASE number = 1

REPLACE sur_impnd WITH .T.

@ 20,15 SAY 'Surface Impoundment'

CASE number = 2

REPLACE container WITH .T.

@ 20,50 SAY 'Containers'

CASE number = 3

REPLACE piles WITH .T.

@ 21,15 SAY 'Piles'

CASE number = 4

REPLACE landfill WITH .T.

@ 21,50 SAY 'Landfill'

CASE number = 5

more = .F.

ENDCASE

ENDDO

ENDIF

RETURN

*-----

```

*-----
*
*   Module:                GWCALC                5/8/86   RAP
*
*   Ground Water calculations
*-----

```

```

STORE 0 TO sc, sr
STORE 1 TO pathsel

```

```

IF chem
  DO perstox
  REPLACE gw_tox_per WITH hitp
ELSE
  REPLACE gw_tox_per WITH 0
ENDIF

```

```

IF gw_observe=0
  STORE 0 to hiphys
  SELECT 2
  GOTO TOP
  DO WHILE .NOT. EOF()
    IF gw_path
      IF gw_phy > hiphys
        hiphys = gw_phy
      ENDIF
    ENDIF
    SKIP
  ENDDO
  SELECT 1
  REPLACE gw_phystat WITH hiphys
ELSE
  REPLACE gw_phystat WITH 0
ENDIF

```

```

IF gw_rad
  release = 'Observed'
  DO radrel
ELSE
  REPLACE gw_rad_mo WITH 0
ENDIF

```

```

IF rad
  release = 'Potential'
  DO radrel
ELSE
  REPLACE gw_rad_mp WITH 0
ENDIF

```

```

IF gw_observe=45

```

```

    REPLACE gw_tot_rou WITH 0
ELSE
    REPLACE gw_tot_rou WITH 2*gw_depth + gw_precip + gw_permbil + gw_phystat
ENDIF

REPLACE gw_ch_wc WITH gw_tox_per + gw_hw_quan
REPLACE gw_rad_mx WITH gw_rad_mo
IF gw_rad_mp > gw_rad_mx
    REPLACE gw_rad_mx WITH gw_rad_mp
ENDIF

REPLACE gw_tot_tar WITH 3*gw_use + gw_dis_pop

IF gw_observe=0
    sc = gw_tot_rou*gw_contain*gw_ch_wc*gw_tot_tar
    sr = gw_tot_rou*gw_contain*gw_rad_mx*gw_tot_tar
ELSE
    sc = gw_observe*gw_ch_wc*gw_tot_tar
    sr = gw_observe*gw_rad_mx*gw_tot_tar
ENDIF

REPLACE gw_sc WITH sc / 573.3
REPLACE gw_sr WITH sr / 573.3

SELECT 10
IF a->gw_sc > a->gw_sr
    REPLACE mhrs_s_gw WITH a->gw_sc
ELSE
    REPLACE mhrs_s_gw WITH a->gw_sr
ENDIF

IF hrs

    STORE 0 TO sc

    DO hrstp
    SELECT 10
    REPLACE gw_hrs_tp WITH hitp
    REPLACE gw_hrs_wc WITH gw_hrs_tp + a->gw_hw_quan

    SELECT 1
    IF gw_observe=0
        sc = gw_tot_rou*gw_contain*j->gw_hrs_wc*gw_tot_tar
    ELSE
        sc = gw_observe*j->gw_hrs_wc*gw_tot_tar
    ENDIF
    SELECT 10
    REPLACE hrs_s_gw WITH sc / 573.3
ELSE
    SELECT 10
    REPLACE hrs_s_gw WITH 0.0
ENDIF

```

SELECT 1
RETURN

```
*-----*  
*-----*  
*  
*   Module:                GWCONT                12/16/85 RAP  
*  
*                           Ground Water Route: Containment input  
*  
*-----*
```

STORE 0 TO hicont

```
@ 6,6 CLEAR  
@ 7,11 SAY "CONTAINMENT is a measure of the natural or artificial m"  
@ 7,66 SAY "eans that"  
@ 8,11 SAY "have been used to minimize or prevent a contaminant fro"  
@ 8,66 SAY "m entering"  
@ 9,11 SAY "ground water. Examples include liners, leachate collec"  
@ 9,66 SAY "tion systems,"  
@ 10,11 SAY "and sealed containers. In assigning a value to this ra"  
@ 10,66 SAY "ting factor,"  
@ 11,11 SAY "consider all ways in which hazardous substances are sto"  
@ 11,66 SAY "red or dis-"  
@ 12,11 SAY "posed at the facility. If the facility involves more t"  
@ 12,66 SAY "han one"  
@ 13,11 SAY "method of storage or disposal, assign the highest from"  
@ 13,66 SAY "among all"  
@ 14,11 SAY "applicable values (e.g., if a landfill has a containmen"  
@ 14,66 SAY "t value of"  
@ 15,11 SAY "1, and, at the same location, a surface impoundment has"  
@ 15,67 SAY "a value of"  
@ 16,11 SAY "2, assign containment a value of 2)."  
@ 18,11 SAY "Press any key to continue . . ."
```

```
done = ' '  
@ ROW(),COL()+1 GET done PICTURE 'X'  
READ
```

```
@ 6,6 CLEAR  
@ 7,11 SAY "Assign containment a value of 0 if: 1) all the hazardo"  
@ 7,66 SAY "us substances"  
@ 8,11 SAY "at the facility are underlain by an essentially nonperm"  
@ 8,66 SAY "eable surface"  
@ 9,11 SAY "(natural or artificial) and adequate leachate collectio"  
@ 9,66 SAY "n systems"  
@ 10,11 SAY "and diversion systems are present; or 2) there is no gr"  
@ 10,66 SAY "ound water"  
@ 11,11 SAY "in the vicinity. The value [0] does not indicate the l"  
@ 11,66 SAY "ack of risk."  
@ 12,11 SAY "Rather, it indicates a significantly lower relative ris"
```

```

@ 12,66 SAY "k when com-"
@ 13,11 SAY "pared with more serious sites on a national level. Oth"
@ 13,66 SAY "erwise,"
@ 14,11 SAY "evaluate the containment for each of the different mean"
@ 14,66 SAY "s of storage"
@ 15,11 SAY "or disposal at the facility using the following guidanc"
@ 15,66 SAY "e."
@ 17,11 SAY "Press any key to continue . . ."

@ ROW(),COL()+1 GET done PICTURE 'X'
READ

IF sur_impnd
  @ 6,6 CLEAR
  @ 7,11 SAY "ASSIGNED"
  @ 8,12 SAY "VALUE      CONTAINMENT OF SURFACE IMPOUNDMENT"
  @ 10,13 SAY "0          Sound run-on diversion structure, essentially"
  @ 10,69 SAY "non-"
  @ 11,23 SAY "permeable liner (natural or artificial) compatible with"
  @ 12,23 SAY "the waste, and adequate leachate collection system."
  @ 14,13 SAY "1          Essentially nonpermeable compatible liner wit"
  @ 14,68 SAY "h no"
  @ 15,23 SAY "leachate collection system; or inadequate freeboard"
  @ 17,13 SAY "2          Potentially unsound run-on diversion structur"
  @ 17,68 SAY "e; or"
  @ 18,23 SAY "moderately permeable compatible liner"
  @ 20,13 SAY "3          Unsound run-on diversion structure; no liner;"
  @ 20,69 SAY "or"
  @ 21,23 SAY "incompatible liner"
  @ 23,11 SAY "Enter appropriate containment assigned value:"

  @ ROW(),COL()+1 GET gw_con_1 PICTURE '9' RANGE 0,3
  READ

  IF gw_con_1 > hicont
    hicont = gw_con_1
  ENDIF
ELSE
  REPLACE gw_con_1 WITH 0
ENDIF

IF container
  @ 6,6 CLEAR
  @ 7,11 SAY "ASSIGNED"
  @ 8,12 SAY "VALUE      CONTAINMENT OF CONTAINERS"
  @ 10,13 SAY "0          Containers sealed and in sound condition, ade"
  @ 10,68 SAY "quate"
  @ 11,23 SAY "liner, and adequate leachate collection system"
  @ 13,13 SAY "1          Containers sealed and in sound condition, no"
  @ 13,68 SAY "liner or"
  @ 14,23 SAY "moderately permeable liner"
  @ 16,13 SAY "2          Containers leaking, moderately permeable line"

```

```

@ 16,68 SAY "r"
@ 18,13 SAY "3 Containers leaking and no liner or incompatib"
@ 18,68 SAY "le liner"
@ 20,11 SAY "Enter appropriate containment assigned value:"

@ ROW(),COL()+1 GET gw_con_2 PICTURE '9' RANGE 0,3
READ
IF gw_con_2 > hicont
    hicont = gw_con_2
ENDIF
ELSE
    REPLACE gw_con_2 WITH 0
ENDIF

IF piles
@ 6,6 CLEAR
@ 7,11 SAY "ASSIGNED"
@ 8,12 SAY "VALUE CONTAINMENT OF PILES"
@ 10,13 SAY "0 Piles uncovered and waste stabilized; or pile"
@ 10,68 SAY "s covered,"
@ 11,23 SAY "waste unstabilized, and essentially nonpermeable liner"
@ 13,13 SAY "1 Piles uncovered, waste unstabilized, moderate"
@ 13,68 SAY "ly permeable"
@ 14,23 SAY "liner, and leachate collection system"
@ 16,13 SAY "2 Piles uncovered, waste unstabilized, moderate"
@ 16,68 SAY "ly permeable"
@ 17,23 SAY "liner, and no leachate collection system"
@ 19,13 SAY "3 Piles uncovered, waste unstabilized, and no l"
@ 19,68 SAY "iner"
@ 21,11 SAY "Enter appropriate containment assigned value:"

@ ROW(),COL()+1 GET gw_con_3 PICTURE '9' RANGE 0,3
READ

IF gw_con_3 > hicont
    hicont = gw_con_3
ENDIF
ELSE
    REPLACE gw_con_3 WITH 0
ENDIF

IF landfill
@ 6,6 CLEAR
@ 7,11 SAY "ASSIGNED"
@ 8,12 SAY "VALUE CONTAINMENT AT LANDFILL"
@ 10,13 SAY "0 Essentially nonpermeable liner, liner compati"
@ 10,68 SAY "ble with"
@ 11,23 SAY "waste and adequate leachate collection system"
@ 13,13 SAY "1 Essentially nonpermeable compatible liner, no"
@ 13,69 SAY "leachate"
@ 14,23 SAY "collection system, and landfill surface precludes pondi"
@ 14,78 SAY "ng"

```

```

@ 16,13 SAY "2           Moderately permeable, compatible liner, and l"
@ 16,68 SAY "andfill"
@ 17,23 SAY "surface precludes ponding"
@ 19,13 SAY "3           No liner or incompatible liner; moderately pe"
@ 19,68 SAY "rmeable"
@ 20,23 SAY "compatible liner; landfill surface encourages ponding;"
@ 21,23 SAY "no run-on control"
@ 23,11 SAY "Enter appropriate containment assigned value:"

@ ROW(),COL()+1 GET gw_con_4 PICTURE '9' RANGE 0,3
READ
IF gw_con_4 > hicont
    hicont = gw_con_4
ENDIF
ELSE
    REPLACE gw_con_4 WITH 0
ENDIF

REPLACE gw_contain WITH hicont

RETURN
*-----

```

```

*-----
*
*   Module:                      GWIN                      1/21/86 RAP
*
*                               Ground Water Route input
*
*-----

```

```

STORE 1 TO pathsel
STORE .T. TO edflg

```

```

done = ' '
CLEAR
DO box4.fmt
@ 12,10 SAY 'The following questions pertain to the GROUND WATER route.'
@ 13,10 SAY 'Press any key when you are ready to begin...' GET done PICTURE 'X'
READ

```

```

*---- edit loop starts here ----
DO WHILE edflg

```

```

SELECT 1
@ 6,6 CLEAR
@ 7,11 SAY "Direct evidence of release must be analytical. If a co"
@ 7,66 SAY "ntaminant"
@ 8,11 SAY "is measured (regardless of frequency) in ground water o"
@ 8,66 SAY "r in a well"
@ 9,11 SAY "in the vicinity of the facility at a significantly (mea"
@ 9,66 SAY "surable)"
@ 10,11 SAY "higher level than the background level, then quantitati"
@ 10,66 SAY "ve evidence"
@ 11,11 SAY "exists, and a release has been observed. Qualitative e"
@ 11,66 SAY "vidence of"
@ 12,11 SAY "release (e.g., an oily or otherwise objectionable taste"
@ 12,67 SAY "or smell"
@ 13,11 SAY "in well water) constitutes direct evidence only if it c"
@ 13,66 SAY "an be con-"
@ 14,11 SAY "firmed that it results from a release at the facility i"
@ 14,66 SAY "n question."
@ 16,11 SAY "Is there direct evidence of a hazardous substance (chem"
@ 16,66 SAY "ical or"
@ 17,11 SAY "radiological) from this facility to ground water"
rown = ROW()+1

```

```

IF redoflg
  IF gw_observe = 45
    @ 23,11 SAY 'Previous value: '+'Y'
  ELSE
    @ 23,11 SAY 'Previous value: '+'N'
  ENDIF
ENDIF
ENDIF

```



```

STORE ' ' TO obsflg
DO WHILE .NOT. (UPPER(obsflg) $ 'YN')
  @ rown,11 SAY "(Y or N)?" GET obsflg PICTURE 'X'
  READ
ENDDO

IF UPPER(obsflg) = 'Y'
  REPLACE gw_observe WITH 45
  IF edj
    pindx = '10'
    DO just
  ENDIF
ELSE
  REPLACE gw_observe WITH 0
ENDIF

IF gw_observe = 0

  @ 6,6 CLEAR
  @ 7,11 SAY "Depth to the aquifer of concern is measured vertically"
  @ 7,66 SAY "from the"
  @ 8,11 SAY "lowest point of the hazardous substances to the highest"
  @ 8,67 SAY "seasonal"
  @ 9,11 SAY "level of the saturated zone of the aquifer of concern."
  @ 9,67 SAY "(Reference"
  @ 10,11 SAY "Figure 3 of the HRS User's Manual for pictorial represe"
  @ 10,66 SAY "ntation.)"
  @ 12,11 SAY "INDEX      DISTANCE TO THE AQUIFER OF CONCERN"
  @ 14,13 SAY "0      Greater than 150 feet"
  @ 15,13 SAY "1      76 to 150 feet"
  @ 16,13 SAY "2      21 to 75 feet"
  @ 17,13 SAY "3      0 to 20 feet"
  @ 19,11 SAY "Enter appropriate index value:"

  @ROW(),COL()+1 GET gw_depth RANGE 0,3
  READ
  IF edj
    pindx = '21'
    DO just
  ENDIF

  @ 6,6 CLEAR
  @ 7,11 SAY "NET PRECIPITATION (precipitation minus evaporation) ind"
  @ 7,66 SAY "icates the"
  @ 8,11 SAY "potential for leachate generation at the facility. Net"
  @ 8,67 SAY "seasonal"
  @ 9,11 SAY "rainfall (seasonal rainfall minus seasonal evaporation)"
  @ 9,67 SAY "data may"
  @ 10,11 SAY "be used if available. If net precipitation is not meas"
  @ 10,66 SAY "ured in the"
  @ 11,11 SAY "region in which the facility is located, calculate it b"
  @ 11,66 SAY "y subtracting"

```

```

@ 12,11 SAY "the mean annual lake evaporation for the region (obtain"
@ 12,66 SAY "ed from"
@ 13,11 SAY "Figure 4) from the normal annual precipitation for the"
@ 13,66 SAY "region"
@ 14,11 SAY "(obtained from Figure 5). EPA Regional Offices will ha"
@ 14,66 SAY "ve maps for"
@ 15,11 SAY "areas outside the continental U.S. Assign a value as f"
@ 15,66 SAY "ollows:"
@ 17,11 SAY "INDEX      NET PRECIPITATION"
@ 19,13 SAY "0      < -10 inches"
@ 20,13 SAY "1      -10 to +5 inches"
@ 21,13 SAY "2      +5 to +15 inches"
@ 22,13 SAY "3      > +15 inches"
@ 24,11 SAY "Enter appropriate index value:"

```

```

@ ROW(),COL()+1 GET gw_precip RANGE 0,3
READ
IF edj
    pindx = '22'
    DO just
ENDIF

```

```

@ 6,6 CLEAR
@ 7,11 SAY "PERMEABILITY OF UNSATURATED ZONE (or intervening geolog"
@ 7,66 SAY "ical forma-"
@ 8,11 SAY "tions) is an indicator of the speed at which a contamin"
@ 8,66 SAY "ant could"
@ 9,11 SAY "migrate from a facility."
@ 11,11 SAY "Press any key to continue . . ."

```

```

done = ' '
@ ROW(),COL()+1 GET done PICTURE 'X'
READ

```

```

@ 6,6 CLEAR
@ 7,6 SAY "ASSIGNED"
@ 7,66 SAY "HYDRAULIC"
@ 8,7 SAY "VALUE      TYPE OF MATERIAL"
@ 8,64 SAY "CONDUCTIVITY"
@ 10,8 SAY "0      Clay, compact till, shale; unfractured      <10E-7"
@ 10,71 SAY "cm/sec"
@ 11,15 SAY "metamorphic & igneous rocks"
@ 12,8 SAY "1      Silt, loess, silty clays, silty & clay loams,"
@ 12,65 SAY "10E-5 to"
@ 13,15 SAY "less permeable limestone, dolomites, & sand-      10E-7"
@ 13,71 SAY "cm/sec"
@ 14,15 SAY "stones; moderately permeable till"
@ 15,8 SAY "2      Fine sand & silty sand; sandy loams; loamy sands;"
@ 15,65 SAY "10E-3 to"
@ 16,15 SAY "mod. permeable lime & sand stone, dolomites (no      10E-5"
@ 16,71 SAY "cm/sec"
@ 17,15 SAY "karat); mod. fractured igneous & metamorphic"

```

```

@ 18,15 SAY "rocks, some coarse till".
@ 19,8 SAY "3    Gravel, sand; highly fractured igneous & meta-"
@ 19,65 SAY ">10-3 cm/sec"
@ 20,15 SAY "morphic rocks; permeable basalt & lavas; karst"
@ 21,15 SAY "limestone & dolomite"
@ 23,6 SAY "Enter assigned value of appropriate permeability:"
@ ROW(),COL()+1 GET gw_permbil RANGE 0,3
READ
IF edj
    pindx = '23'
    DO just
ENDIF

DO gwcont
IF edj
    pindx = '30'
    DO just
ENDIF

ELSE
    REPLACE gw_depth WITH 0
    REPLACE gw_precip WITH 0
    REPLACE gw_permbil WITH 0
    REPLACE gw_contain WITH 0
ENDIF

IF chem
    hwq = gw_tons
    DO hwquan
    IF edj
        pindx='42'
        DO just
    ENDIF
    REPLACE gw_tons WITH hwq
    REPLACE gw_hw_quan WITH hwquan
ELSE
    REPLACE gw_hw_quan WITH 0
    REPLACE gw_tons WITH 0
ENDIF

SELECT 1
IF rad
    @ 6,6 CLEAR
    IF redoflg
        IF gw_rad
            @ 23,11 SAY 'Previous value: '+'Y'
        ELSE
            @ 23,11 SAY 'Previous value: '+'N'
        ENDIF
    ENDIF
    @ 10,10 SAY 'Is there evidence of radiological release?'
    STORE ' ' TO radflg

```

```

rown = ROW()+1
DO WHILE .NOT. (UPPER(radflg) $ 'YN')
  @ rown,10 SAY 'Enter Y or N: ' GET radflg PICTURE 'X'
  READ
ENDDO
IF UPPER (radflg) = 'Y'
  REPLACE gw_rad WITH .T.
  DO obsin
  IF edj
    pindx = '43'
    DO just
  ENDIF
ELSE
  REPLACE gw_rad WITH .F.
ENDIF
ENDIF
ENDIF

SELECT 1
@ 6,6 CLEAR
@ 7,11 SAY "GROUND-WATER USE indicates the nature of the use made o"
@ 7,66 SAY "f ground"
@ 8,11 SAY "water drawn from the aquifer of concern within three mi"
@ 8,66 SAY "les of the"
@ 9,11 SAY "hazardous substance, including the geographical extent"
@ 9,66 SAY "of the mea-"
@ 10,11 SAY "surable concentration in the aquifer."
done = ' '
@ 13,11 SAY "Press any key to continue . . ." GET done PICTURE 'X'
READ

@ 6,6 CLEAR
@ 6,11 SAY "ASSIGNED"
@ 7,12 SAY "VALUE      GROUND-WATER USE"
@ 9,13 SAY "0          Unusable (e.g., extremely saline aquifer, ext"
@ 9,68 SAY "remely"
@ 10,23 SAY "low yield, etc.)"
@ 12,13 SAY "1          Commercial, industrial or irrigation and anot"
@ 12,68 SAY "her water"
@ 13,23 SAY "source presently available; not used, but usable"
@ 15,13 SAY "2          Drinking water with municipal water from alte"
@ 15,68 SAY "rnate"
@ 16,23 SAY "unthreatened sources presently available (i.e., minimal"
@ 17,23 SAY "hookup requirements); or commercial, industrial or"
@ 18,23 SAY "irrigation with no other water source presently availab"
@ 18,78 SAY "le"
@ 20,13 SAY "3          Drinking water; no municipal water from alter"
@ 20,68 SAY "nate"
@ 21,23 SAY "unthreatened sources presently available"
@ 23,11 SAY "Enter appropriate ground-water use value:" GET gw_use RANGE 0,3
READ
IF edj
  pindx = '51'

```

```
DO just
ENDIF
```

```
STORE 0 TO score
STORE 0 TO hiscore
STORE ' 0 0 0 0 0 0 4 6 8 10 0 8 12 16 20' TO mat1
STORE ' 0 12 18 24 30 1 16 24 32 35 0 20 30 35 40' TO mat2
STORE mat1 + mat2 TO mat
```

```
STORE gw_pop_all + SPACE(20) TO old
STORE VAL(SUBSTR(old,1,1)) TO nop
```

```
@ 6,6 CLEAR
@ 7,11 SAY "DISTANCE TO NEAREST WELL is measured from the hazardous"
@ 7,67 SAY "substance"
@ 8,11 SAY "(not the facility boundary) to the nearest well that dr"
@ 8,66 SAY "aws water"
@ 9,11 SAY "from the aquifer of concern. If the actual distance to"
@ 9,67 SAY "the nearest"
@ 10,11 SAY "well is unknown, use the distance between the hazardous"
@ 10,67 SAY "substance"
@ 11,11 SAY "and the nearest occupied building not served by a publi"
@ 11,66 SAY "c water"
@ 12,11 SAY "supply (e.g., a farmhouse). If a discontinuity in the"
@ 12,66 SAY "aquifer"
@ 13,11 SAY "occurs between the hazardous substance and all wells, g"
@ 13,66 SAY "ive this"
@ 14,11 SAY "factor a score of 0, except where it can be shown that"
@ 14,66 SAY "the contami-"
@ 15,11 SAY "nant is likely to migrate beyond the discontinuity. Fi"
@ 15,66 SAY "gure 6 of"
@ 16,11 SAY "the HRS Users Manual illustrates how the distance should"
@ 17,11 SAY "be measured."
@ 20,10 SAY 'Enter number of population groups to consider:'
@ ROW(),COL()+1 GET nop PICTURE '9' RANGE 0,9
READ
```

```
STORE STR(nop,1) TO new
```

```
IF nop = 0
  STORE ' ' TO done
  @ 6,6 CLEAR
  @ 10,10 SAY 'You must include justification of 0 population.'
  @ 12,10 SAY 'Press any key to continue...' GET done PICTURE 'X'
  READ
ENDIF
```

```
n=1
DO WHILE n < nop+1
```

```
  @ 6,6 CLEAR
  @ 7,10 SAY 'Population group: '+STR(n)
```

```

@ 10,11 SAY "ASSIGNED"
@ 11,12 SAY "VALUE      DISTANCE TO NEAREST WELL"
@ 13,13 SAY "0          > 3 miles"
@ 14,13 SAY "1          2 to 3 miles"
@ 15,13 SAY "2          1 to 2 miles"
@ 16,13 SAY "3          2001 feet to 1 mile"
@ 17,13 SAY "4          < 2000 feet"
@ 19,11 SAY "Enter appropriate assigned value for distance to nearest"
@ 19,66 SAY "to well:"

```

```

STORE VAL(SUBSTR(OLD,N*2,1)) TO DINDX
@ ROW(),COL()+1 GET DINDX PICTURE '9' RANGE 0,4
READ
STORE NEW + STR(DINDX,1) TO NEW

```

```

IF EDJ
    PINDX = '52'
    DO JUST
ENDIF

```

```

@ 6,6 CLEAR
IF N=1
    @ 8,11 SAY "POPULATION SERVED BY GROUND WATER is an indicator of the"
    @ 8,66 SAY "population"
    @ 9,11 SAY "at risk, which includes residents as well as others who"
    @ 9,67 SAY "would"
    @ 10,11 SAY "regularly use the water such as workers in factories or"
    @ 10,67 SAY "offices"
    @ 11,11 SAY "and students. Include employees in restaurants, motels"
    @ 11,66 SAY " , or camp-"
    @ 12,11 SAY "grounds, but exclude customers and travelers passing through"
    @ 12,66 SAY "rough the"
    @ 13,11 SAY "area in autos, buses, or trains. If aerial photography"
    @ 13,67 SAY "is used,"
    @ 14,11 SAY "and residents are known to use ground water, assume each"
    @ 14,66 SAY "has dwelling"
    @ 15,11 SAY "unit has 3.8 residents. Where ground water is used for"
    @ 15,67 SAY "irrigation,"
    @ 16,11 SAY "convert to population by assuming 1.5 persons per acre"
    @ 16,66 SAY "of irrigated"
    @ 17,11 SAY "land. The well or wells of concern must be within three"
    @ 17,66 SAY "miles of"
    @ 18,11 SAY "the hazardous substances, including the area of known aquifer"
    @ 18,66 SAY "contamination"
    @ 19,11 SAY "contamination, but the [population served] need not be. List"
    @ 19,66 SAY "the people"
    @ 20,11 SAY "people within three miles who do not use water from the"
    @ 20,67 SAY "aquifer of"
    @ 21,11 SAY "concern are not to be counted."
    @ 22,11 SAY "Press any key to continue . . ."
    done = ' '
    @ ROW(),COL()+1 GET done PICTURE 'X'

```

```

    READ
ENDIF

STORE VAL(SUBSTR(old,n*2+1,1)) TO pndx
@ 6,6 CLEAR
@ 7,10 SAY 'Population group: '+STR(n)
DO popin.fmt
@ ROW()+2,10 SAY 'Population served by ground water:'
@ ROW(),COL()+1 GET pndx PICTURE '9' RANGE 0,5
READ
STORE new + STR(pndx,1) TO new

ndx = pndx*15+dindx*3+1
score = VAL ( SUBSTR (mat, ndx, 3))

IF score > hiscore
    hiscore = score
ENDIF

n = n + 1
ENDDO

REPLACE gw_pop_all WITH new
REPLACE gw_dis_pop WITH hiscore
IF edj
    pindx = '53'
    DO just
ENDIF

DO edroute
ENDDO

RETURN

```

```

*-----
*
*
*   Module:                      GWPRINT2                      1/21/86 RAP
*
*                               Print mHRS and HRS Ground Water worksheet
*
*-----

```

STORE ' ' TO x

SELECT 8

USE gwwork2

GOTO 4

REPLACE desc WITH j->fac_name

REPLACE max WITH SPACE(8)+DTOC(mdate)

GOTO 5

REPLACE desc WITH 'Site: '+j->site_name

REPLACE max WITH 'Site index: '+STR(mhrsindx,4)

GOTO 11

x = STR(a->gw_observe,3)

REPLACE value WITH x

REPLACE score WITH ' '+x

GOTO 18

x = STR(a->gw_depth,3)

REPLACE value WITH x

x = STR(a->gw_depth*2,5)

REPLACE score WITH x

GOTO 19

x = STR(a->gw_precip,3)

REPLACE value WITH x

REPLACE score WITH ' '+x

GOTO 20

x = STR(a->gw_permbil,3)

REPLACE value WITH x

REPLACE score WITH ' '+x

GOTO 22

x = str(a->gw_phystat,3)

REPLACE value WITH x

REPLACE score WITH ' '+x

GOTO 24

x = STR(a->gw_tot_rou,5)

REPLACE score WITH x

GOTO 27

x = STR(a->gw_contain,3)

REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 32
x = STR(a->gw_tox_per,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 33
x = STR(a->gw_hw_quan,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 35
x = STR(a->gw_rad_mo,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 36
x = STR(a->gw_rad_mp,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 38
REPLACE score WITH STR(a->gw_ch_wc,5)

GOTO 39
REPLACE score WITH STR(a->gw_rad_mx,5)

GOTO 43
REPLACE value WITH STR(a->gw_use,3)
REPLACE score WITH STR(a->gw_use*3,5)

GOTO 44
x = STR(a->gw_dis_pop,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 47
REPLACE score WITH STR(a->gw_tot_tar,5)

GOTO 49
REPLACE score WITH STR(a->gw_sc*573.3,6)

GOTO 50
REPLACE score WITH STR(a->gw_sr*573.3,6)

GOTO 52
REPLACE mult WITH STR(a->gw_sc,6,2)
REPLACE score WITH 'Sr(gw)'
REPLACE max WITH STR(a->gw_sr,6,2)

```

IF pm1 .OR. iwf
  IF pm1
    SET PRINT ON
    ? CHR(12)
  ENDIF
  GOTO TOP
  DO WHILE .NOT. EOF()
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  SET PRINT OFF
ENDIF

IF hrs .AND. (ph1 .OR. iwf)

  IF ph1
    SET PRINT ON
    ? CHR(12)
  ENDIF

  GOTO 32
  x = STR(j->gw_hrs_tp,3)
  REPLACE value WITH x
  REPLACE score WITH ' '+x

  GOTO 52
  REPLACE mult WITH STR(j->hrs_s_gw,6,2)
  REPLACE score WITH ' '
  REPLACE max WITH ' '

  GOTO TOP
  ? CHR(12)
  ? desc+value+mult+score+max
  ? '                      HRS Ground Water Route Work Sheet'
  ? '                      ====='
  GOTO 4
  DO WHILE RECNO() < 34
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  ?
  ?
  ?
  ?
  ? '    Total Waste Characteristics Score                      ',j->gw_hrs_wc,'    26'
  GOTO 40
  DO WHILE RECNO() < 49
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  ? '6. If line 1=45 (1x4x5)'
  ? '    If line 1=0 (2x3x4x5)'

```

```
?? j->hrs_s_gw*573.3,' 57330'  
GOTO 51  
DO WHILE .NOT. EOF()  
    ? desc+value+mult+score+max  
    SKIP  
ENDDO  
SET PRINT OFF  
ENDIF  
  
RETURN  
*-----
```

```

*-----
*
*   Module:                HRSTP          1/3/86  RAP
*
*                           Calculate persistence and toxicity scores
*                           for constituents in this route for HRS
*
*-----

```

```

STORE 0 TO score
STORE 0 TO hitp
STORE ' 0 0 0 0 3 6 9 12 6 9 12 15 9 12 15 18' TO mat

```

```

SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()

```

```

    DO CASE
        CASE pathsel=1
            STORE gw_path TO path
        CASE pathsel=2
            STORE sw_path TO path
    ENDCASE

```

```

    IF path
        tndx = tox_indx
        pndx = pers_indx
        ndx = (tndx * 12) + (pndx * 3) + 1
        score = VAL ( SUBSTR (mat, ndx, 3))
        IF score > hitp
            hitp = score
        ENDIF
    ENDIF
    SKIP
ENDDO

```

```

SELECT 1
RETURN
*-----

```

```

*-----
*
*   Module:                HWQUAN        1/13/86   RAP
*
*                           Get hazardous waste quantity from user
*                           and select assigned value
*-----

```

```

@ 6,6 CLEAR
@ 7,11 SAY "HAZARDOUS WASTE QUANTITY includes all hazardous substan"
@ 7,66 SAY "ces at a"
@ 8,11 SAY "facility (as received) except that with a containment v"
@ 8,66 SAY "alue of 0."
@ 9,11 SAY "Do not include amounts of contaminated soil or water; i"
@ 9,66 SAY "n such cases,"
@ 10,11 SAY "the amount of contaminating hazardous substance (chemi"
@ 10,65 SAY "cal) may"
@ 11,11 SAY "be estimated."
@ 13,11 SAY "On occasion, it may be necessary to convert data to a c"
@ 13,66 SAY "ommon unit"
@ 14,11 SAY "to combine them. In such cases, 1 ton = 1 cubic yard ="
@ 14,67 SAY "4 drums"
@ 15,11 SAY "and for the purposes of converting bulk storage, 1 drum"
@ 15,67 SAY "= 50"
@ 16,11 SAY "gallons."
@ 18,11 SAY "Enter (" + route + " impact) chemical waste "
@ 19,11 SAY "quantity in tons:"

```

```

@ ROW(),COL()+1 GET hwq RANGE 0,
READ

```

```

DO CASE
  CASE hwq > 2500
    hwquan = 8
  CASE hwq > 1250
    hwquan = 7
  CASE hwq > 625
    hwquan = 6
  CASE hwq > 250
    hwquan = 5
  CASE hwq > 125
    hwquan = 4
  CASE hwq > 62
    hwquan = 3
  CASE hwq > 10
    hwquan = 2
  CASE hwq > 0
    hwquan = 1
  OTHERWISE
    hwquan = 0
ENDCASE

```

RETURN

```
*-----*
*
*   Module:                INCHEM            1/30/86   RAP
*
*                           Get names of chemicals in inventory
*-----*
```

SELECT 5
GOTO TOP

```
IF .NOT. edflg
  @ 6,6 CLEAR
  @ 10,11 SAY "You will now be asked to enter the chemical"
  @ 11,11 SAY "(nonradiological) hazardous waste constituents"
  @ 12,11 SAY "at this facility."
  @ 15,11 SAY "Press any key to continue ..." GET done PICTURE 'X'
  READ
ENDIF
```

```
@ 6,6 CLEAR
DO chemin.fmt
STORE ROW() TO rpos
STORE COL()+1 TO cpos
STORE .T. TO more
DO WHILE more
```

```
  STORE 0 TO number
  @ rpos, cpos GET number PICTURE '9' RANGE 1,4
  READ
  SELECT 5
```

DO CASE

CASE number = 1

```
  @ 6,6 CLEAR
  STORE 1 TO lisopt
  @ 10,10 SAY 'Do you want:'
  @ 12,15 SAY '1 - A list of all chemicals in database'
  @ 13,15 SAY '2 - A report of chemicals added to database'
  @ 15,10 SAY 'Enter index of selected option: ' GET lisopt
  answer = 'Y'
  @ 20,10 SAY 'Do you wish a printed list (Y or N)?'
  @ ROW(),COL()+1 GET answer
  READ
```

```
  IF UPPER(answer)='Y'
    DO printon
    SET PRINT ON
```

```

ENDIF

CLEAR
IF lisopt=1
  REPORT FORM chemlist
ELSE
  REPORT FORM chemlist FOR new_flg
ENDIF

CLEAR
DO chemin.fmt
DO box3.fmt

CASE number = 2

STORE .T. TO notright
DO WHILE notright
  STORE 0 TO cnindx
  @ 0,1 SAY 'Enter index: ' GET cnindx PICTURE '999' RANGE 1,m->cmax
  READ
  @ 0,1 SAY SPACE(43)
  SEEK cnindx
  SET COLOR TO 0/7, 0/7, 0
  @ 23,10 SAY chem_name+'? (Y or N): ' GET answer PICTURE 'X'
  SET COLOR TO 7/0, 0/7, 0
  READ
  IF UPPER(answer)='Y'
    DO chkchem
    notright = .F.
  ENDIF
  @ 23,10 SAY SPACE(65)
ENDDO

CASE number = 3

@ 6,6 CLEAR
@10,10 SAY "You may enter either a complete chemical name or a"
@11,10 SAY "root name. When you enter the name, the chemical"
@12,10 SAY "data base will be searched for any occurrences of"
@13,10 SAY "that name. When a match is found, the complete name"
@14,10 SAY "will be displayed and you will be asked if this is"
@15,10 SAY "the chemical that you requested. If you answer"
@16,10 SAY "[no], the remainder of the chemical data base will"
@17,10 SAY "be searched."
STORE SPACE(30) TO c_name
@ 0,1 SAY 'Enter name: ' GET c_name
READ
@ 0,1 SAY SPACE(44)
c_name = TRIM(c_name)
c_name = LOWER(c_name)

SET COLOR TO 0/7, 0/7, 0

```

```

@ 21,10 SAY SPACE(58)
SET COLOR TO 7/0, 0/7, 0

STORE .T. TO notfound
LOCATE FOR c_name $ chem_name
DO WHILE .NOT. EOF() .AND. notfound
    SET COLOR TO 0/7, 0/7, 0
    STORE ' ' TO answer
    @ 21,10 SAY chem_name+'? (Y or N): ' GET answer PICTURE 'X'
    SET COLOR TO 7/0, 0/7, 0
    READ
    IF UPPER(answer)='Y'
        STORE .F. TO notfound
        STORE c_indx TO cnindx
        DO chkchem
    ENDIF
    CONTINUE
ENDDO

IF notfound
    @ 21,10 SAY c_name
    STORE ' ' TO addon
    @ 6,10 SAY 'Do you wish to add this chemical to database?'
    @ 7,10 SAY 'Y or N : ' GET addon PICTURE 'X'
    READ

    IF UPPER(addon) = 'Y'
        @ 6,6 CLEAR
        @ 10,11 SAY 'The chemical data base is being reindexed.'
        @ 11,11 SAY 'Please wait. . .'
        APPEND BLANK
        REPLACE chem_name WITH c_name
        REPLACE tox_indx WITH 9
        REPLACE pers_indx WITH 9
        REPLACE ignit_indx WITH 9
        REPLACE react_indx WITH 9
        REPLACE new_ftg WITH .T.
        REPLACE incom_indx WITH 'SAX'
        cmax = cmax + 1
        cnindx = cmax
        REPLACE c_indx WITH cnindx
        INDEX ON c_indx TO calpha
        GOTO cmax
        DO chkchem
    ENDIF
ENDIF
@ 6,6 CLEAR
DO chemin.fmt

CASE number = 4

STORE .F. TO more

```


ENDCASE
ENDDO

SELECT 2
RETURN

*-----

```

*-----
*
*   Module:                INCOM                1/16/86  RAP
*
*                           Establish incompatibilities
*                           for air and F&E paths
*-----

```

```

@ 6,6 CLEAR
@ 9,11 SAY "INCOMPATIBILITY provides a measure of the increased haz"
@ 9,66 SAY "ard when"
@ 10,11 SAY "hazardous substances are mixed under uncontrolled condi"
@ 10,66 SAY "tions, leading"
@ 11,11 SAY "to production of heat, pressure, fire, explosion, viole"
@ 11,66 SAY "nt reaction,"
@ 12,11 SAY "toxic dusts, mists, fumes or gases, or flammable fumes"
@ 12,66 SAY "or gases."
@ 13,11 SAY "This program will flag potential incompatible combinati"
@ 13,66 SAY "ons of"
@ 14,11 SAY "materials contained in the chemical data base. Additio"
@ 14,66 SAY "nal infor-"
@ 15,11 SAY "mation can be obtained from [A Method for Determining the Compati-"
@ 16,11 SAY "bility of Hazardous Wastes,] H. K. Hatayama et al., EPA"
@ 16,66 SAY "-600/2-80-076"
@ 17,11 SAY "(1980)."
```

```

@ 19,11 SAY "Press any key to continue . . ."
@ ROW(),COL()+1 GET done PICTURE 'X'
```

```

SELECT 9
  USE work2
  ZAP
```

```

SELECT 2
  GOTO TOP
```

```

STORE .T. TO notdone
DO WHILE notdone
  IF a_path .OR. fe_path
    SELECT 9
    APPEND BLANK
    REPLACE name WITH b->name
    REPLACE id1 WITH b->cn_indx
    REPLACE id2 WITH b->incom_indx
    REPLACE id3 WITH b->incom_ind2
    SELECT 2
  ENDIF
  IF .NOT. EOF()
    SKIP
  ELSE
    notdone = .F.
  ENDIF
```

ENDDO

READ

@ 6,6 CLEAR

@ 7,10 SAY 'The following materials may be incompatible:'

STORE 9 TO rown

SELECT 2

GOTO TOP

DO WHILE .NOT. EOF()

IF a_path .OR. fe_path

DO selincom

ENDIF

SELECT 2

SKIP

ENDDO

done = ' '

@ 21,10 SAY 'If you wish to print this screen, hold down the key'

@ 22,10 SAY 'marked Ctrl and press the key marked PrtSc.'

@ rown+2,10 SAY 'Press any key to continue..' GET done PICTURE 'X'

READ

@ 6,6 CLEAR

@ 7,11 SAY "Assign a value using the following guidance:"

@ 9,11 SAY "ASSIGNED"

@ 10,12 SAY "VALUE INCOMPATIBILITY"

@ 12,14 SAY "0 No incompatible substances are present"

@ 13,14 SAY "1 Present, but do not pose a hazard"

@ 14,14 SAY "2 Present and may pose a future hazard"

@ 15,14 SAY "3 Present and posing an immediate hazard"

SELECT 9

USE

STORE j->a_hrs_in TO ahrs

SELECT 1

IF ap

@ 17,11 SAY "Enter assigned value for air route (chemicals only):"

@ 17,COL()+1 GET a_incomp RANGE 0,3

IF hrs

@ 18,11 SAY "Enter air route value for HRS (chemicals & radionuclides):"

@ 18,COL()+1 GET ahrs PICTURE '9' RANGE 0,3

ENDIF

ENDIF

IF fep

@ 20,11 SAY "Enter assigned value for fire and explosion route,"

@ 21,15 SAY "(chemicals and radionuclides):" GET fe_incomp RANGE 0,3

ENDIF

READ

```
SELECT 10  
  REPLACE a_hrs_in WITH ahrs
```

```
IF ap .AND. edj  
  pathsel = 3  
  pindx = '21'  
  DO just  
ENDIF
```

```
IF fep .AND. edj  
  pathsel = 4  
  pindx = '21'  
  DO just  
ENDIF
```

```
pathsel = 0  
RETURN
```

```
*-----
```

```

*-----
*
*   Module:                INRAD                1/27/86 RAP
*
*   Input and check radionuclide names
*
*-----

```

```

@ 6,6 CLEAR
@ 10,11 SAY "You will now be asked to enter the radiological"
@ 11,11 SAY "hazardous waste constituents at this facility."
@ 13,11 SAY "Be sure to include significant decay products of"
@ 14,11 SAY "radionuclides."
@ 17,11 SAY "Press any key to continue ..." GET done PICTURE 'X'
READ

```

```

pu = ' '
DO WHILE .NOT. (UPPER(pu) $ 'YN')
  @20,11 SAY "Will you be including plutonium or uranium?" GET pu PICTURE 'X'
  READ
ENDDO
IF UPPER(pu) = 'Y'
  DO puscreen
ENDIF

```

```

SELECT 8
  USE work
  ZAP

```

```

@ 6,6 CLEAR
@ 11,10 SAY "1  Ac 225      14  Fe 55      27  Pu 240      40  Th"
@ 11,66 SAY "232+D"
@ 12,10 SAY "2  Am 241      15  H   3      28  Pu 241+D     41  U"
@ 12,66 SAY "233+D"
@ 13,10 SAY "3  Am 243      16  I  129     29  Pu 242      42  U"
@ 13,66 SAY "234"
@ 14,10 SAY "4  C   14      17  Mo 93      30  Pu 244      43  U"
@ 14,66 SAY "235+D"
@ 15,10 SAY "5  Cd 109      18  Na 22      31  Ra 225      44  U"
@ 15,66 SAY "238+D"
@ 16,10 SAY "6  Cm 243      19  Nb 94      32  Ra 226+D     45  U"
@ 16,66 SAY "240"
@ 17,10 SAY "7  Cm 244      20  Ni 59      33  Sb 125+D     46  U"
@ 17,66 SAY "depleted"
@ 18,10 SAY "8  Co 60      21  Ni 63      34  Sm 151      47  U"
@ 18,66 SAY "enriched"
@ 19,10 SAY "9  Cs 134      22  Np 237+D    35  Sr 90+D      48  U"
@ 19,66 SAY "natural"
@ 20,9 SAY "10 Cs 135      23  Np 239      36  Tc 99       49  u"
@ 20,64 SAY "n id alpha"
@ 21,9 SAY "11 Cs 137+D    24  Pb 210+D    37  Th 228+D     50  u"
@ 21,64 SAY "n id beta"

```

```

@ 22,9 SAY "12 Eu 152      25 Pu 238      38 Th 229+D      51 u"
@ 22,64 SAY "n id gamma"
@ 23,9 SAY "13 Eu 154      26 Pu 239      39 Th 230+D"
SET COLOR TO 0/7, 0/7, 0
@ 23,59 SAY "52 Continue"
SET COLOR TO 7/0, 0/7, 0

@ 10,8 SAY 'Select from the following:'
@ 5,8 SAY 'Selected:'
STORE 6 TO rown
STORE 12 TO coln

IF nnuc < 20
  prtrad = .T.
ENDIF

SELECT 2
STORE .T. TO more
DO WHILE more

  STORE .F. TO good
  DO WHILE .NOT. good
    STORE 0 TO cnindx
    @ 0,1 SAY 'Enter index: ' GET cnindx PICTURE '999' RANGE 1,52
    READ
    @ 5,35 SAY SPACE(42)
    IF cnindx > 0 .AND. cnindx < 52
      SELECT 8
      LOCATE FOR cscore=cnindx
      IF .NOT. EOF()
        @ 5,35 SAY 'Index already entered, not accepted'
      ELSE
        STORE .T. TO good
        IF prtrad
          SELECT 6
          GOTO cnindx
          @ rown,coln SAY element+isotope
          rown = rown + 1
        ENDIF
      ENDIF
    ELSE
      IF cnindx=52
        good = .T.
      ENDIF
    ENDIF
  ENDDO

  IF cnindx < 52

    IF rown > 9
      rown = 6
      coln = coln + 12
    
```

```

IF coln > 60
  STORE .F. TO prtrad
ENDIF
ENDIF

SELECT 2
  APPEND BLANK
  REPLACE site_indx WITH mhrsindx
  REPLACE chem_nuc WITH 'N'
  REPLACE cn_indx WITH cnindx
  REPLACE name WITH f->element+f->isotope
  REPLACE air_group WITH f->air_group
  REPLACE sw_group WITH f->sw_group
  REPLACE gw_group WITH f->gw_group
  REPLACE fe_group WITH f->fe_group
  REPLACE dc_group WITH f->dc_group
  REPLACE trco WITH f->trco
  REPLACE tox_indx WITH f->tox_indx
  REPLACE pers_indx WITH f->pers_indx
  REPLACE ignit_indx WITH f->ignit_indx
  REPLACE react_indx WITH f->react_indx
  REPLACE incom_indx WITH f->incom_indx
  REPLACE incom_ind2 WITH f->incom_ind2
  nnuc = nnuc + 1
SELECT 8
  APPEND BLANK
  REPLACE cscore WITH cnindx
ELSE
  @ 0,1 SAY SPACE(79)
  STORE .F. TO more
ENDIF
ENDDO

@ 5,5 CLEAR
SELECT 8
  USE

RETURN
*-----

```

*-----
*
* Module: INTRO1.FMT
*
*-----

@ 8,11 SAY "The Hazard Ranking System (HRS) and modified Hazard"
@ 9,11 SAY "Ranking System (mHRS) are to be used in evaluating"
@ 10,11 SAY "the relative potential human health/safety problems"
@ 11,11 SAY "or ecological/environmental damage at uncontrolled/"
@ 12,11 SAY "unpermitted hazardous substance (radiological or"
@ 13,11 SAY "nonradiological) sites within a facility."
@ 15,11 SAY "Do you wish to read introductory material (Y or N)?"


```

*-----
*
*   Module:                INTRO2.FMT
*
*-----

```

```

@ 6,10 SAY "The mHRS/HRS ultimately assigns three scores to a hazard"
@ 6,65 SAY "dous facility-"
@ 7,10 SAY "ity:"
@ 9,10 SAY "SM = A composite of the scores for the three possible"
@ 9,65 SAY "migration"
@ 10,18 SAY "routes [i.e., Sgw (ground-water route), Ssw "
@ 10,63 SAY "(surface-water"
@ 11,18 SAY "route) and Sa (air route)]. It reflects the potential"
@ 11,73 SAY "for"
@ 12,18 SAY "harm to humans or the environment from migration of a hazardous"
@ 12,73 SAY "substance-"
@ 13,18 SAY "away from the facility."
@ 15,10 SAY "Sfe = A score that reflects the potential for harm from"
@ 15,65 SAY "flammable or explosive substances"
@ 16,18 SAY "that can explode or cause fires."
@ 18,10 SAY "Sdc = A score that reflects the potential for harm from"
@ 18,65 SAY "direct contact"
@ 19,18 SAY "with hazardous substances at the facility (i.e."
@ 19,73 SAY "if there is"
@ 20,18 SAY "migration need be involved)."
@ 22,10 SAY "Press any key to continue . . ."

```

*-----
*
* Module: INTRO3.FMT
*
*-----

@ 8,11 SAY "REFERENCES:"
@ 10,11 SAY "Hawley, K. A., B. A. Napier, A RANKING SYSTEM FOR SITES"
@ 10,67 SAY "WITH"
@ 11,11 SAY "MIXED RADIOACTIVE AND HAZARDOUS WASTES, June 1985. Paci"
@ 11,66 SAY "fic"
@ 12,11 SAY "Northwest Laboratory, Richland, Washington. In press."
@ 14,11 SAY "United States Environmental Protection Agency, UNCONTRO"
@ 14,66 SAY "LLED"
@ 15,11 SAY "HAZARDOUS WASTE SITE RANKING SYSTEM A USERS MANUAL, 19"
@ 15,66 SAY "84."
@ 16,11 SAY "HW-10. U.S.E.P.A., Washington, D.C. Originally publis"
@ 16,66 SAY "hed in"
@ 17,11 SAY "the July 16, 1982 FEDERAL REGISTER."
@ 21,11 SAY "Press any key to continue . . ."

```

*-----
*
*   Module:                INTRO4.FMT
*
*-----

```

```

@ 5,11 SAY "This software will assist you in preparing the mHRS Wor"
@ 5,66 SAY "ksheets."
@ 6,11 SAY "The software will first ask for general information and"
@ 6,67 SAY "then for"
@ 7,11 SAY "details about the hazardous chemicals at this facility."
@ 7,68 SAY "Ques-"
@ 8,11 SAY "tions are then asked for each route in sequence beginni"
@ 8,66 SAY "ng with"
@ 9,11 SAY "the Ground Water Route."
@ 11,11 SAY "You will be asked to provide justification for the assi"
@ 11,66 SAY "gned"
@ 12,11 SAY "values that you selected. The software will place you i"
@ 12,66 SAY "n the"
@ 13,11 SAY "dBase III wordprocessor that functions much like Wordst"
@ 13,66 SAY "ar*."
@ 14,11 SAY "Enter as much text as necessary to justify your selecti"
@ 14,66 SAY "on, then"
@ 15,11 SAY "hold down the Ctrl key and press the End key to continu"
@ 15,66 SAY "e with the"
@ 16,11 SAY "program. Your justifications will be accumulated in a"
@ 16,66 SAY "file that"
@ 17,11 SAY "may optionally be printed or later modified. A set of"
@ 17,66 SAY "printed"
@ 18,11 SAY "worksheets will be generated for each facility."
@ 19,11 SAY "
@ 20,11 SAY "* Wordstar is a trademark of MicroPro International Cor"
@ 20,66 SAY "poration,"
@ 21,11 SAY "San Rafael, CA."
@ 23,11 SAY "Press any key to continue. . ."

```

```
*-----  
*  
*   Module:                INTRO5.FMT  
*  
*-----
```

```
* B:INTRO5.PRG  
@ 8,11 SAY "Selected information for each facility will be"  
@ 9,11 SAY "accumulated in the mHRS database. This information"  
@ 10,11 SAY "will then be available to you through the dBase III"  
@ 11,11 SAY "software for other applications. Included with this"  
@ 12,11 SAY "software package is a chemical data base containing"  
@ 13,11 SAY "pertinent information for selected chemicals. The"  
@ 14,11 SAY "software will assist you in expanding this data base"  
@ 15,11 SAY "as you enter additional chemical data."  
@ 17,11 SAY "Press any key to continue . . ."
```

```

*-----
*
*   Module:                JUST                2/4/86 RAP
*
*                           Input user justification
*-----

STORE ' ' TO tind

IF first
  answer = ' '
  @ 6,6 CLEAR
  @ 10,10 SAY 'You will use a screen editor to enter text information.'
  @ 11,10 SAY 'See your dBaseIII manual for instructions. A brief'
  @ 12,10 SAY 'summary of commands follows:'
  @ 14,15 SAY '---KEY-- ----- TO DO THIS -----'
  @ 16,15 SAY ' Ins   INSERT mode (You only need to press once)'
  @ 17,15 SAY ' Arrows Move cursor around the screen'
  @ 18,15 SAY ' Del   To delete character at the cursor'
  @ 20,10 SAY 'Press any key to continue. . .' GET answer PICTURE 'X'
  READ
  first = .F.
ENDIF

tind = STR(pathsel,1)+pindx

SELECT 3
SET FORMAT TO

LOCATE FOR r_indx+p_indx = tind
IF EOF()
  APPEND BLANK
ENDIF

REPLACE site_indx WITH mhrsindx
REPLACE r_indx WITH STR(pathsel,1)
REPLACE p_indx WITH pindx
REPLACE useflg WITH .T.

SELECT 3
SET FORMAT TO justin
CHANGE NEXT 1 FIELDS notes

@0,0 CLEAR
DO box4.fmt
SELECT 1

RETURN
*-----

```

```
*-----  
*  
*   Module:                JUSTIN.FMT  
*  
*-----
```

```
@ 9,10 SAY 'Route: '+route  
@ 10,10 SAY 'Justify: '+d->desc  
@ 12,10 SAY 'Do the Following:'  
@ 14,20 SAY 'Press Cntl-PgDn to begin justification'  
@ 15,20 SAY 'Press Cntl-End when finished with justification'  
@ 17,10 SAY 'If you have completed the above two steps, press [return]'
```

```

*-----
*
*      Module:                      LANDUSE      1/19/86  RAP
*
*      Input land use assigned values
*      & determine highest score
*-----

```

STORE 0 TO hiscore

```

@ 6,6 CLEAR
@ 8,11 SAY "Land use indicates the nature and level of human activi"
@ 8,66 SAY "ty in the"
@ 9,11 SAY "vicinity of a facility. What is the distance to the ne"
@ 9,66 SAY "arest"
@ 10,11 SAY "commercial/industrial complex?"
@ 12,11 SAY "ASSIGNED"
@ 13,12 SAY "VALUE          DISTANCE"
@ 15,14 SAY "0              >1 mi"
@ 16,14 SAY "1              1/2 to 1 mi"
@ 17,14 SAY "2              1/4 to 1/2 mi"
@ 18,14 SAY "3              <1/4 mi"
@ 20,11 SAY "Enter assigned value of selected distance:"

```

```

@ ROW(),COL()+1 GET score1 PICTURE '9' RANGE 0,3
READ
IF score1 > hiscore
    hiscore = score1
ENDIF

```

```

@ 6,6 CLEAR
@ 7,11 SAY "What is the distance to the nearest national/state park"
@ 7,66 SAY ", forest,"
@ 8,11 SAY "wildlife reserve or residential areas?"
@ 9,11 SAY "ASSIGNED"
@ 10,12 SAY "VALUE          DISTANCE"
@ 13,14 SAY "0              >2 mi"
@ 14,14 SAY "1              1 to 2 mi"
@ 15,14 SAY "2              1/4 to 1 mi"
@ 16,14 SAY "3              <1/4 mi"
@ 18,11 SAY "Enter assigned value of selected distance:"

```

```

@ ROW(),CDL()+1 GET score2 PICTURE '9' RANGE 0,3
READ
IF score2 > hiscore
    hiscore = score2
ENDIF

```

```

@ 6,6 CLEAR
@ 7,11 SAY "What is the distance to the nearest agricultural lands"
@ 7,66 SAY "(in production"
@ 8,11 SAY "within five years)?"
@ 10,11 SAY "ASSIGNED          DISTANCE TO          DISTANCE TO"

```

@ 11,12 SAY "VALUE	AG LAND	PRIME AG LAND(a)"
@ 13,14 SAY "0	>1 mi	>2 mi"
@ 14,14 SAY "1	1/2 to 1 mi	1 to 2 mi"
@ 15,14 SAY "2	1/4 to 1/2 mi	1/2 to 1 mi"
@ 16,14 SAY "3	<1/4 mi	<1/2 mi"
@ 18,11 SAY "	"	

@ 19,11 SAY "(a) Defined in the Code of Federal Regulations, 7CFR 65"
 @ 19,66 SAY "7.5, 1981."
 @ 22,11 SAY "Enter greatest assigned value that applies:"

```
@ ROW(),COL()+1 GET score3 PICTURE '9' RANGE 0,3
READ
IF score3 > hiscore
  hiscore = score3
ENDIF
```

```
@ 6,6 CLEAR
@ 10,11 SAY "Is this facility within view of historic/landmark sites"
@ 10,67 SAY "(National"
@ 11,11 SAY "Register of Historic Places and National Natural Landma"
@ 11,66 SAY "rks)"
```

```
STORE 0 TO score
IF redoflg
  IF score4
    @ 22,11 SAY 'Previous value: Y'
  ELSE
    @ 22,11 SAY 'Previous value: N'
  ENDIF
ENDIF
```

```
answer = ' '
DO WHILE .NOT. (UPPER(answer) $ 'YN')
  @ 12,11 SAY "Y or N?" GET answer PICTURE 'X'
  READ
ENDDO
IF UPPER(answer) = 'Y'
  score4 = .T.
  score=3
  IF score > hiscore
    hiscore=score
  ENDIF
ELSE
  score4 = .F.
ENDIF
```

```
@ 6,6 CLEAR
@ 10,11 SAY "Are any historic/landmark sites (National Register of H"
@ 10,66 SAY "istoric"
@ 11,11 SAY "Places and National Natural Landmarks) subject to signi"
@ 11,66 SAY "ficant"
STORE 0 TO score
IF redoflg
  IF score5
```



```

        @ 20,11 SAY 'Previous value: Y'
ELSE
        @ 20,11 SAY 'Previous value: N'
ENDIF
ENDIF

answer = ' '
DO WHILE .NOT. (UPPER(answer) $ 'YN')
    @ 12,11 SAY "impacts from this facility (Y or N)?" GET answer PICTURE 'X'
    READ
ENDDO
IF UPPER(answer) = 'Y'
    score5 = .T.
    score=3
    IF score > hiscore
        hiscore=score
    ENDIF
ELSE
    score5 = .F.
ENDIF

RETURN
*-----

```

```

*-----
*
*      Module:                      LOOP   2/4/86   RAP
*
*                               Main execution loop for the MHRS code
*-----
*----- loop until general information and inventory satisfactory -----
STORE .T. TO invcon
STORE 0 TO pathsel

IF ctflag
  @ 6,6 CLEAR
  @ 10,11 SAY 'If you intend to consider additional routes for this site,'
  @ 11,11 SAY 'be sure to set those routes for each applicable waste '
  @ 12,11 SAY 'constituent.'
  @ 15,11 SAY 'Do you wish to make any changes to general information,'
  @ 16,11 SAY 'the previously-entered inventory, or route selection'
  answer = ' '
  DO WHILE .NOT. (UPPER(answer) $ 'YN')
    @ 17,11 SAY '(Y or N)? ' GET answer PICTURE 'X'
    READ
  ENDDO
  IF UPPER(answer)='N'
    invcon = .F.
  ELSE
    ctflag = .F.
  ENDIF
ENDIF

DO WHILE invcon

  DO general

    @ 6,6 CLEAR
    @ 10,11 SAY 'Do you wish to print the Inventory Report?'
    answer = ' '
    DO WHILE .NOT. (UPPER(answer) $ 'YN')
      @ 11,11 SAY '(Y or N)? ' GET answer PICTURE 'X'
      READ
    ENDDO
    IF UPPER(answer) = 'Y'
      SET PRINT ON
      ? CHR(12)
      DO print1
      SET PRINT OFF
    ENDIF

    @ 6,6 CLEAR
    @ 10,11 SAY 'Do you wish to make any changes to the previous entries?'
    answer = ' '
    DO WHILE .NOT. (UPPER(answer) $ 'YN')

```

```

        @ 11,11 SAY '(Y or N)' GET answer PICTURE 'X'
        READ
    ENDDO
    IF UPPER(answer)='N'
        invcon = .F.
    ENDIF
ENDDO

STORE j->gwp TO gwp
STORE j->swp TO swp
STORE j->ap TO ap
STORE j->fep TO fep
STORE j->dcp TO dcp

answer = 'N'
@ 6,6 CLEAR
@ 10,11 SAY 'Do you wish to calculate the HRS as well as the mHRS'
@ 11,11 SAY 'scores (Y or N)' GET answer PICTURE 'X'
READ
IF UPPER(answer) = 'Y'
    hrs = .T.
ELSE
    hrs = .F.
ENDIF

IF .NOT. ctflag
    SELECT 2
    GOTO TOP
    DO WHILE .NOT. EOF()
        IF react_indx=9
            IF a_path .OR. fe_path
                DO chkchem2
            ENDIF
        ENDIF
        IF ignit_indx=9 .AND. fe_path
            DO chkchem3
        ENDIF
    SKIP
    ENDDO
ENDIF

SELECT 5
USE
SELECT 6
USE

STORE j->site_log TO site_log

*---- set up justification file -----

SELECT 4
USE subpara INDEX sub

SELECT 3

```

SET PRINT OFF

*----- edit routes until satisfied then get print and quit options -----

DO WHILE morerout

```
IF ed1
  route = 'Ground Water'
  DO gwin
ENDIF
```

```
IF ed2
  route = 'Surface Water'
  DO swin
ENDIF
```

```
IF ed3
  route = 'Air'
  DO ain
ENDIF
```

```
IF ed4
  route = 'Fire & Explosion'
  DO fein
ENDIF
```

```
IF ed5
  route = 'Direct Contact'
  DO dcin
ENDIF
```

DO editopt

ENDDO

CLEAR

DO box3.fmt

DO printopt

@ 6,6 CLEAR

@ 10,10 SAY 'The site log file is named '+TRIM(site_log)+' .TXT'

@ 11,10 SAY 'It is a standard ASCII file that can be edited'

@ 12,10 SAY 'with any word processing program prior to'

@ 13,10 SAY 'printing.'

@ 16,10 SAY 'Press any key to continue...' GET done PICTURE 'X'

READ

IF prtrpt

DO printon

ENDIF

@ 6,6 CLEAR

@ 10,11 SAY 'When the worksheets for '+TRIM(j->site_name)

@ 11,11 SAY 'are complete, do you wish to:'

```

@ 13,16 SAY '1      Prepare worksheets for another site'
@ 14,16 SAY '2      Quit'
qopt=0
DO WHILE qopt=0
    @16,11 SAY 'Enter index of selected option:' GET qopt PICTURE '9' RANGE 1,2

    READ
ENDDO

@ 6,6 CLEAR
@ 10,11 SAY 'Scores are now being computed. You may wish to use'
@ 11,11 SAY 'this opportunity to get a cup of coffee.'
@ 20,11 SAY 'However, this program is not endorsing coffee. If you'
@ 21,11 SAY 'prefer, a glass of water.'

*----- always recalculate all scores -----

SELECT 3
    USE
SELECT 4
    USE

SELECT 1
IF gwp
    DO gwcalc
ELSE
    SELECT 10
        REPLACE mhrs_s_gw WITH 0.0
        REPLACE hrs_s_gw WITH 0.0
    SELECT 1
        REPLACE gw_sr WITH 0.0
        REPLACE gw_sc WITH 0.0
ENDIF

IF swp
    DO swcalc
ELSE
    SELECT 10
        REPLACE mhrs_s_sw WITH 0.0
        REPLACE hrs_s_sw WITH 0.0
    SELECT 1
        REPLACE sw_sr WITH 0.0
        REPLACE sw_sc WITH 0.0
ENDIF

IF ap
    DO acalc
ELSE
    SELECT 10
        REPLACE mhrs_s_a WITH 0.0
        REPLACE hrs_s_a WITH 0.0
    SELECT 1
        REPLACE a_sr WITH 0.0
        REPLACE a_sc WITH 0.0

```

```

DO CASE
  CASE usropt = 0
    USE justmask
    COPY TO justtemp
    USE justtemp
    REPLACE ALL site_indx WITH mhrsindx

  CASE usropt = 1
    USE &where
    COPY TO justtemp
    USE justtemp
    REPLACE ALL site_indx WITH mhrsindx

  CASE usropt = 2
    USE &site_log
    COPY TO justtemp
    USE justtemp
ENDCASE
SET RELATION TO r_indx+p_indx INTO subpara

*---- allow user edit options -----

DO editopt

IF .NOT. ctflag
  IF edj
    pathsel=0
    pindx = '00'
    DO just
  ENDIF
  IF gwp .OR. swp
    DO phystat
  ENDIF
  IF ap .OR. fep
    DO incom
  ENDIF
ENDIF

*---- send introductory and inventory info to site log file -----

SET ALTERNATE TO &site_log
SET ALTERNATE ON
SET CONSOLE OFF

IF pinv
  DO printon
  SET PRINT ON
  ? CHR(12)
ENDIF

DO print1

SET ALTERNATE OFF
SET CONSOLE ON

```

ENDIF

IF fep

DO fecalc

ELSE

SELECT 10

REPLACE mhrs_s_fe WITH 0.0

REPLACE hrs_s_fe WITH 0.0

SELECT 1

REPLACE fe_sr WITH 0.0

REPLACE fe_sc WITH 0.0

ENDIF

IF dcp

DO dccalc

ELSE

SELECT 10

REPLACE mhrs_s_dc WITH 0.0

REPLACE hrs_s_dc WITH 0.0

SELECT 1

REPLACE dc_sr WITH 0.0

REPLACE dc_sc WITH 0.0

ENDIF

*---- calculate Sm score -----

SELECT 10

STORE mhrs_s_gw TO sgw

STORE mhrs_s_sw TO ssw

STORE mhrs_s_a TO sa

sgw = sgw*sgw

ssw = ssw*ssw

sa = sa*sa

sm = SQRT(sgw+ssw+sa)

sm = sm / 1.73

REPLACE mhrs_s_m WITH sm

IF hrs

STORE hrs_s_gw TO sgw

STORE hrs_s_sw TO ssw

STORE hrs_s_a TO sa

sgw = sgw*sgw

ssw = ssw*ssw

sa = sa*sa

sm = SQRT(sgw+ssw+sa)

sm = sm / 1.73

REPLACE hrs_s_m WITH sm

ENDIF

*---- print worksheets and reports -----

SELECT 4

USE subpara INDEX sub

SELECT 3

```

USE justtemp
SET RELATION TO r_indx+p_indx INTO subpara

DO print2

SELECT 3
USE
SELECT 4
USE

IF iwf
  SET ALTERNATE ON
ENDIF
SET DECIMAL TO 2

IF pcov .OR. iwf
  STORE 1 TO covflg
  DO print3
  IF hrs
    STORE 2 TO covflg
    DO print3
  ENDIF
ENDIF

IF gwp
  IF pm1 .OR. ph1 .OR. iwf
    DO gwprint2
  ENDIF
ENDIF

IF swp
  IF pm2 .OR. ph2 .OR. iwf
    DO swprint2
  ENDIF
ENDIF

IF ap
  IF pm3 .OR. ph3 .OR. iwf
    DO aprint2
  ENDIF
ENDIF

IF fep
  IF pm4 .OR. ph4 .OR. iwf
    DO feprint2
  ENDIF
ENDIF

IF dcp
  IF pm5 .OR. ph5 .OR. iwf
    DO dcprint2
  ENDIF
ENDIF

```



```
SET ALTERNATE OFF
CLOSE ALTERNATE
STORE TRIM(site_log)+'.TXT' TO site_logp
```

```
IF pslf
  SET PRINT ON
  ? CHR(12)
  TYPE &site_logp
  SET PRINT OFF
ENDIF
```

```
RETURN
```

```
*-----
```

```

*-----
*
*   Module:                      NFPATAB                      1/6/86  RAP
*
*   Display NFPA Reactivity table
*
*-----

```

```

@ 6,6 CLEAR
@ 8,11 SAY "INDEX          NFPA REACTIVITY LEVEL"
@ 10,13 SAY "0            Materials which are normally stable even unde"
@ 10,68 SAY "r fire-"
@ 11,23 SAY "exposure conditions and which are not reactive with"
@ 12,23 SAY "water."
@ 14,13 SAY "1            Materials which in themselves are normally st"
@ 14,68 SAY "able, but"
@ 15,23 SAY "which may become unstable at elevated temperatures and"
@ 16,23 SAY "pressures or which may react with water with some relea"
@ 16,78 SAY "se"
@ 17,23 SAY "of energy, but not violently."
@ 20,11 SAY "Press any key to continue . . ."
done = ' '
@ ROW(),COL()+1 GET done PICTURE 'X'
READ

```

```

@ 6,6 CLEAR
@ 8,11 SAY "INDEX          NFPA REACTIVITY LEVEL"
@ 10,13 SAY "2            Materials which in themselves are normally un"
@ 10,68 SAY "stable"
@ 11,23 SAY "and readily undergo violent chemical change, but do"
@ 12,23 SAY "not detonate. Includes materials which can undergo"
@ 13,23 SAY "chemical change with rapid release of energy at normal"
@ 14,23 SAY "temperatures and pressures or which can undergo violent"
@ 15,23 SAY "chemical change at elevated temperatures and pressures."
@ 16,23 SAY "Also includes those materials which may react violently"
@ 17,23 SAY "with water or which may form potentially explosive"
@ 18,23 SAY "mixtures with water."
@ 23,11 SAY "Press any key to continue . . ."
@ ROW(),COL()+1 GET done PICTURE 'X'
READ

```

```

@ 6,6 CLEAR
@ 6,11 SAY "INDEX          NFPA REACTIVITY LEVEL"
@ 8,13 SAY "3            Materials which in themselves are capable of"
@ 8,68 SAY "detonation"
@ 9,23 SAY "or of explosive decomposition or of explosive reaction,"
@ 10,23 SAY "but which requires a strong initiating source or which"
@ 11,23 SAY "must be heated under confinement before initiation."
@ 12,23 SAY "Includes materials which are sensitive to thermal or"
@ 13,23 SAY "mechanical shock at elevated temperatures and pressures"
@ 14,23 SAY "or which react explosively with water without requiring"
@ 15,23 SAY "heat or confinement."
@ 17,13 SAY "4            Materials which in themselves are readily cap"
@ 17,68 SAY "able of"

```

```
@ 18,23 SAY "detonation or of explosive decomposition or explosive"
@ 19,23 SAY "reaction at normal temperatures and pressures. Include"
@ 19,78 SAY "s"
@ 20,23 SAY "materials which are sensitive to mechanical or localize"
@ 20,78 SAY "d"
@ 21,23 SAY "thermal shock."
@ 23,11 SAY "Press any key to continue . . ."
@ ROW(),COL()+1 GET done PICTURE 'X'
READ
```

```
RETURN
```

```
*-----
```

```

*-----
*
*   Module:                OBSIN                1/15/86 RAP
*
*                           Input concentration of observed release
*                           by radionuclide for each route as needed
*-----

```

```
STORE 000000000000000.0000 TO quan
```

```
STORE 'pCi/L' TO unit
IF pathsel=3
    unit = 'pCi/cu m'
ENDIF
```

```
@ 6,6 CLEAR
```

```
SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()
```

```
    IF chem_nuc = 'N'
```

```
        DO CASE
            CASE pathsel=1 .AND. gw_path
                path = .T.
                quan = gw_conc
            CASE pathsel=2 .AND. sw_path
                path = .T.
                quan = sw_conc
            CASE pathsel=3 .AND. a_path
                path = .T.
                quan = a_conc
            OTHERWISE
                path=.F.
        ENDCASE
```

```
    IF path
        SET COLOR TO 0/7,0/7,0
        @ 12,10 SAY 'Radionuclide:  '+name
        SET COLOR TO 7/0, 0/7, 0
        @ 18,10 SAY 'Note:  1.0E9 pCi/cubic m or l is the maximum impact con-'
        @ 19,10 SAY '        sidered.  If concentration is greater than 1.0E9'
        @ 20,10 SAY '        pCi/cubic m or l, you may indicate that this'
        @ 21,10 SAY '        value was exceeded by entering 111111111.1111'

        @ 14,10 SAY 'Enter observed concentration in '+ unit + ': '
        @ ROW(),COL()+1 GET quan RANGE 0,
        READ
```

```
    DO CASE
        CASE pathsel=1
            REPLACE gw_conc WITH quan
```

```
        CASE pathsel=2
          REPLACE sw_conc WITH quan
        CASE pathsel=3
          REPLACE a_conc WITH quan
      ENDCASE
    ENDIF
  ENDIF

  SKIP

ENDDO

SELECT 1
RETURN
*-----
```

```

*-----
*
*   Module:                PERSTOX        1/8/86 rap
*
*                           Select persistence and toxicity scores
*                           for constituents in this route
*-----

```

```

STORE 0 TO score
STORE 0 TO hitp
STORE ' 0 0 0 0 3 6 9 12 6 9 12 15 9 12 15 18' TO mat

```

```

SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()

```

```

    DO CASE
        CASE pathsel=1
            STORE gw_path TO path
        CASE pathsel=2
            STORE sw_path TO path
    ENDCASE

```

```

    IF path .AND. chem_nuc = 'C'
        tndx = tox_indx
        pndx = pers_indx
        ndx = (tndx * 12) + (pndx * 3) + 1
        score = VAL ( SUBSTR (mat, ndx, 3))
        IF score > hitp
            hitp = score
        ENDIF
    ENDIF
    SKIP
ENDDO

```

```

SELECT 1
RETURN
*-----

```

```

*-----
*
*   Module:                PHYSTAT        1/16/86 RAP
*
*                           Input physical state of each pathway
*                           for current constituent
*
*-----

```

```

@ 6,6 CLEAR
@ 9,11 SAY "PHYSICAL STATE refers to the state of the hazardous sub"
@ 9,66 SAY "stances at"
@ 10,11 SAY "the time of disposal, except that gases generated by th"
@ 10,66 SAY "e hazardous"
@ 11,11 SAY "substances in disposal areas should be considered in ra"
@ 11,66 SAY "ting this"
@ 12,11 SAY "factor."
@ 14,11 SAY "INDEX      PHYSICAL STATE"
@ 16,13 SAY "0          Solid, consolidated or stabilized"
@ 17,13 SAY "1          Solid, unconsolidated or unstabilized"
@ 18,13 SAY "2          Powder or fine material"
@ 19,13 SAY "3          Liquid, sludge or gas"

```

```

SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()

```

```

    SET COLOR TO 0/7, 0/7, 0
    @ 7,11 SAY 'Constituent: '+ name
    SET COLOR TO 7/0, 0/7, 0
    IF gw_path
        @ 21,11 SAY "Enter index for ground water route: " GET gw_phy RANGE 0,3
    ENDIF
    IF sw_path
        @ 22,11 SAY "Enter index for surface water route:" GET sw_phy RANGE 0,3
    ENDIF
    READ

```

```

    SKIP

```

```

ENDDO
SELECT 1

```

```

IF edj
    pindx = '01'
    DO just
ENDIF

```

```

RETURN

```

```

*-----

```

```

*-----
*
*   Module:                POPIN.FMT        1/8/86 RAP
*
*   Display population menu
*
*-----

```

```

@ 10,11 SAY "ASSIGNED"
@ 11,12 SAY "VALUE      POPULATION"
@ 13,13 SAY "0          0"
@ 14,13 SAY "1          1-100"
@ 15,13 SAY "2          101-1,000"
@ 16,13 SAY "3          1,001-3,000"
@ 17,13 SAY "4          3,001-10,000"
@ 18,13 SAY "5          >10,000"

```



```

*-----
*
*   Module:                PRINTON
*
*                           Display printer message
*-----

@ 6,6 CLEAR
@ 7,11 SAY "Do the following:"
@ 10,16 SAY "i - ensure that printer has power,"
@ 12,15 SAY "ii - ensure that printer is connected to the computer,"
@ 14,14 SAY "iii - ensure that printer [on-line] light is on."
@ 16,15 SAY "iv - press any key to continue..."
@ 20,12 SAY "If you need to interrupt this program during printing"
@ 21,12 SAY "(e.g., printer jams), press the Esc key!!!"
STORE " " TO done
@ 16,50 SAY " " GET done PICTURE 'X'
READ

RETURN
*-----

```

```

*-----
*
*   Module:                PR2A                2/3/86 RAP
*
*                           Print Air Route Justification Report
*-----

SELECT 1
?
?
?'-----

?' Route: Air'
?'-----

?

IF a_observe=45
  STORE 'Yes' TO obs
ELSE
  STORE 'No' TO obs
ENDIF
?' Was there an observed release to air? ',obs
IF a_observe> 0
?' Reactivity assigned value:                ',a_react
?' Incompatibility assigned value:            ',a_incomp
?' Quantity of chemical waste considered this route: ',a_tons,' tons'
ENDIF

IF a_rad
SELECT 2
GOTO TOP
?
?' Radionuclide Name                Observed Release (pCi/L)'
?'-----
DO WHILE .NOT. EOF()
  IF a_path .AND. chem_nuc='N'
    ?' ',name, a_conc
  ENDIF
  SKIP
ENDDO
?
ELSE
?' No observed radionuclide release.'
ENDIF

SELECT 1
?' Population within 1/4 mi radius:                ',a_pop_1
?' Population within 1/2 mi radius:                ',a_pop_2
?' Population within 1 mi radius:                  ',a_pop_3
?' Population within 4 mi radius:                  ',a_pop_4
?
STORE a_land_all TO m

```

```

?'    Assigned values for land use:'
?'    Distance to commercial/industrial complex: ',SUBSTR(m,1,1)
?'    Distance to park, forest, residential areas: ',SUBSTR(m,2,1)
?'    Distance to agricultural lands: ',SUBSTR(m,3,1)
?'    Historic/landmark sites within view? ',SUBSTR(m,4,1)
?'    Historic/landmark sites subject to impacts? ',SUBSTR(m,5,1)
?
SELECT 3
REPORT FORM justlog PLAIN NOEJECT FOR r_indx='3'

RETURN
*-----

```

```

*-----
*
*   Module:                PR2DC                2/3/86 RAP
*
*                           Print Direct Contact Justification Report
*
*-----
?
?
?'-----'

?' Route: Direct Contact'
?'-----'

?
IF a->dc_observe=45
  STORE 'Yes' TO obs
ELSE
  STORE 'No' TO obs
ENDIF
?' Was there an observed incident of direct contact? ',obs

IF a->rad
  IF a->dc_meas
    SELECT 2
    GOTO TOP
    ?' Radionuclide Name Measured Release pCi/cubic m'
    ?' -----'
    DO WHILE .NOT. EOF()
      IF dc_path .AND. chem_nuc='N'
        ?' ',name, dc_conc
      ENDIF
      SKIP
    ENDDO
  ELSE
    ?' Volume of the waste site (cubic meters): ',a->dc_vol
  ENDIF
ENDIF

IF a->site_area > 1000
  ?' Area of the waste site is greater than 1000 square meters.'
ELSE
  ?' Area of the waste site: ',a->site_area, ' square meters'
ENDIF
?' Waste site area correction factor for radiological calc.: ',a->cf

SELECT 3
REPORT FORM justlog PLAIN NOEJECT FOR r_idx='5'

RETURN
*-----

```

```

*-----
*
*   Module:                PR2FE                2/3/86 RAP
*
*                           Print Fire & Explosion Justification Report
*
*-----
?
?
?'-----
?' Route: Fire & Explosion'
?'-----
?
IF a->rad
  IF a->fe_meas
    SELECT 2
    GOTO TOP
    ?'      Radionuclide Name                Measured Release  pCi/cubic m'
    ?'-----
    DO WHILE .NOT. EOF()
      IF fe_path .AND. chem_nuc='N'
        ?'      ',name, fe_conc
      ENDIF
      SKIP
    ENDDO
    ?
  ELSE
    ?'      Volume of the waste site (cubic meters):                ',a->fe_vol
  ENDIF
ENDIF

IF a->site_area > 1000
  ?'      Area of the waste site is greater than 1000 square meters.'
ELSE
  ?'      Area of the waste site: ',a->site_area, ' square meters'
ENDIF
?'      Waste site area correction factor for radiological calc.: ',a->cf
?'      Quantity of chemical waste considered this route: ',a->fe_tons,' tons'

STORE a->fe_lan_all TO m
?
?'      Assigned values for land use:'
?'      Distance to commercial/industrial complex:                ',SUBSTR(m,1,1)
?'      Distance to park, forest, residential areas:              ',SUBSTR(m,2,1)
?'      Distance to agricultural lands:                             ',SUBSTR(m,3,1)
?'      Historic/landmark sites within view?                       ',SUBSTR(m,4,1)
?'      Historic/landmark sites subject to impacts?                ',SUBSTR(m,5,1)
?
SELECT 3
REPORT FORM justlog PLAIN NOEJECT FOR r_indx='4'
RETURN
*-----

```

```

*-----
*
*   Module:                PR2GW                2/3/86 RAP
*
*                           Print Ground Water Justification Report
*
*-----

```

```

SELECT 1
?
?
?'-----'
?' Route: Ground Water'
?'-----'
?

```

```

IF gw_observe=45
  STORE 'Yes' TO obs
ELSE
  STORE 'No' TO obs
ENDIF
?' Was there an observed release to ground water? ',obs

```

```

IF gw_observe=0
  SELECT 1
  IF sur_impnd
    ?' Surface impoundment containment assigned value: ',gw_con_1
  ENDIF
  IF container
    ?' Container containment assigned value: ',gw_con_2
  ENDIF
  IF piles
    ?' Piles containment assigned value: ',gw_con_3
  ENDIF
  IF landfill
    ?' Landfill containment assigned value: ',gw_con_4
  ENDIF
  ?' Quantity of chemical waste considered this route: ',gw_tons,'
  tons'
ENDIF

```

```

IF gw_rad
  SELECT 2
  GOTO TOP
  ?
  ?' Radionuclide Name Observed Release (pCi/L)'
  ?'-----'
DO WHILE .NOT. EOF()
  IF gw_path .AND. chem_nuc='N'
    ?' ',name, gw_conc
  ENDIF
  SKIP
ENDDO
ELSE

```

```

?'      No observed radionuclide release.'
ENDIF
SELECT 1
STORE gw_pop_all TO m
STORE VAL(SUBSTR(m,1,1)) TO np
?
?'      Number of population groups considered:      ',np
STORE 1 TO n
DO WHILE n < np+1
?'      Population group number:      ',n
?'      Distance to nearest well assigned value:      ',SUBSTR(m,2*n,1)
?'      Population served assigned value:      ',SUBSTR(m,2*n+1,1)
n = n+1
ENDDO

SELECT 3
REPORT FORM justlog PLAIN NOEJECT FOR r_indx='1'
1
RETURN
*-----

```

```

*-----
*
*   Module:                PR2SW                2/3/86 RAP
*
*                           Print Surface Water Justification Report
*
*-----

```

```

SELECT 1
?
?
?'-----'

?' Route: Surface Water'
?'-----'

?

IF sw_observe=45
  STORE 'Yes' TO obs
ELSE
  STORE 'No' TO obs
ENDIF
?' Was there an observed release to surface water? ',obs
IF sw_observe=0
  SELECT 1
  IF sur_impnd
    ?' Surface impoundment containment assigned value: ',sw_con_1
  ENDIF
  IF container
    ?' Container containment assigned value: ',sw_con_2
  ENDIF
  IF piles
    ?' Piles containment assigned value: ',sw_con_3
  ENDIF
  IF landfill
    ?' Landfill containment assigned value: ',sw_con_4
  ENDIF
  ?' Facility slope: ',sw_fslope
  ?' Intervening terrain slope: ',sw_tslope
  ?' Quantity of chemical waste considered this route: ',sw_tons,' tons'
ENDIF

IF sw_rad
  SELECT 2
  GOTO TOP
  ?
  ?' Radionuclide Name Observed Release (pCi/L)'
  ?'-----'
  DO WHILE .NOT. EOF()
    IF sw_path .AND. chem_nuc='N'
      ?' ',name, sw_conc
    ENDIF
  SKIP

```



```

        ENDDO
        ?
    ELSE
        ?'      No observed radionuclide release.'
    ENDIF

    SELECT 1
    IF rad
        ?'      Average annual flow of nearest surface water:  ',sw_flow,' ',flunit

    ENDIF
    ?
    STORE sw_pop_all TO m
    STORE VAL(SUBSTR(m,1,1)) TO np
    ?'      Number of population groups considered:                ',np
    STORE 1 TO n
    DO WHILE n < np+1
        ?'      Population group number:                            ',n
        ?'      Distance to nearest well assigned value:           ',SUBSTR(m,2*n,1)
        ?'      Population served assigned value:                 ',SUBSTR(m,2*n+1,1)
        n = n+1
    ENDDO

    SELECT 3
    REPORT FORM justlog PLAIN NOEJECT FOR r_indx='2'

    RETURN
    *-----

```

```

*-----
*
*   Module:                PR2SW                2/3/86 RAP
*
*                           Print Surface Water Justification Report
*
*-----

```

```

SELECT 1
?
?
?'-----'

?' Route: Surface Water'
?'-----'

?

IF sw observe=45
  STORE 'Yes' TO obs
ELSE
  STORE 'No' TO obs
ENDIF
?' Was there an observed release to surface water? ',obs
IF sw observe=0
  SELECT 1
  IF sur_impnd
    ?' Surface impoundment containment assigned value: ',sw_con_1
  ENDIF
  IF container
    ?' Container containment assigned value: ',sw_con_2
  ENDIF
  IF piles
    ?' Piles containment assigned value: ',sw_con_3
  ENDIF
  IF landfill
    ?' Landfill containment assigned value: ',sw_con_4
  ENDIF
  ?' Facility slope: ',sw_fslope
  ?' Intervening terrain slope: ',sw_tslope
  ?' Quantity of chemical waste considered this route: ',sw_tons,' tons'
ENDIF

IF sw rad
  SELECT 2
  GOTO TOP
  ?
  ?' Radionuclide Name Observed Release (pCi/L)'
  ?'-----'
  DO WHILE .NOT. EOF()
    IF sw_path .AND. chem_nuc='N'
      ?' ',name, sw_conc
    ENDIF
  SKIP

```

```

        ENDDO
        ?
    ELSE
        ?'      No observed radionuclide release.'
    ENDIF

    SELECT 1
    IF rad
        ?'      Average annual flow of nearest surface water:  ',sw_flow,' ',flunit

    ENDIF
    ?
    STORE sw_pop_all TO m
    STORE VAL(SUBSTR(m,1,1)) TO np
    ?'      Number of population groups considered:          ',np
    STORE 1 TO n
    DO WHILE n < np+1
        ?'      Population group number:                    ',n
        ?'      Distance to nearest well assigned value:    ',SUBSTR(m,2*n,1)
        ?'      Population served assigned value:          ',SUBSTR(m,2*n+1,1)
        n = n+1
    ENDDO

    SELECT 3
    REPORT FORM justlog PLAIN NOEJECT FOR r_indx='2'

    RETURN
    *-----

```

```

*-----
*
*   Module:                PRINT1          2/4/86   RAP
*
*   Print summary of general information,
*   storing to log file as well
*
*-----

```

```

SELECT 10
TEXT

```

```

-----
mHRS Hazardous Ranking System Facility Report
-----

```

```

ENDTEXT
? ' Date: ',mdate
? ' Site name: ',site_name
? ' Identification number: ',ident
? ' Site index in mHRS dBaseIII file: ',mhrsindx
? ' Site log file name: ',TRIM(site_log),'.TXT'
?
TEXT

```

```

-----
ENDTEXT
?
? ' DOE Operations Office and location: '
? ' ',fac_name
? ' Location: ',fac_locate
? ' EPA Region: ',epa_region
? ' Person(s) in charge of facility: ',per_contc1
? ' ',per_contc2
? ' ',per_contc3
? ' Reviewer: ',reviewer
?
? ' Type of facility: ',fac_type
? ' Types of hazardous wastes: '
? ' ',hs_type
? ' Contamination route of concern: '
? ' ',major_rout
? ' Additional descriptive comments: '
? ' ',info_needs
? ' ',desc_com1
? ' ',desc_com2
? ' ',desc_com3
?
SELECT 1
? ' Waste storage types: '
IF sur_impnd
? ' Surface Impoundments'
ENDIF
IF container
? ' Containers'
ENDIF

```

```

IF piles
? '      Piles'
ENDIF
IF landfill
? '      Landfills'
ENDIF

```

TEXT

Constituent Name	-----Routes-----					Constituent Quantity
	GW	SW	A	FE	DC	

ENDTEXT

```

SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()

? ' ',name
??gw_path,sw_path,a_path,fe_path,dc_path
?? ' ',hw_quan,' ',TRIM(qu_units)

```

SKIP
ENDDO

TEXT

Constituent Data Base Values

```

ENDTEXT
GOTO TOP
DO WHILE .NOT. EOF()
?
?' Name: ',name
?' Assigned toxicity value:      ',tox_indx
?' Assigned persistence value:   ',pers_indx
?' Assigned ignitability value:  ',ignit_indx
?' Assigned reactivity value:    ',react_indx
?' Assigned incompatibility value(s): ',incom_indx,' ',incom_ind2
IF chem_nuc = 'N'
?' Ground water group:          ',gw_group
?' Ground water transfer coefficient: ',trco
?' Surface water group:        ',sw_group
?' Air group:                   ',air_group
?' Fire and explosion group:    ',fe_group
?' Direct contact group:       ',dc_group
ENDIF
IF j->gwp
?' Physical state ground water route: ',gw_phy
ENDIF

```

```
IF j->swp
  ?' Physical state surface water route: ',sw_phy
ENDIF
SKIP
ENDDO
```

```
TEXT
```

```
-----
ENDTEXT
RETURN
```

```
*-----
```

```

*-----
*
*   Module:                PRINT2                1/19/86  RAP
*
*   Print justification file
*
*-----

```

```

SELECT 3
  INDEX ON r_indx+p_indx TO justindx

```

```

SET ALTERNATE ON
SET CONSOLE OFF

```

```

?'-----'

```

```

?' Inventory'

```

```

?'-----'

```

```

?
GOTO TOP
DO WHILE r_indx='0'
  IF useflg
    ? notes
  ENDIF
  SKIP
ENDDO

```

```

IF gwp
  DO pr2gw
ENDIF
IF swp
  DO pr2sw
ENDIF
IF ap
  DO pr2a
ENDIF
IF fep
  DO pr2fe
ENDIF
IF dcp
  DO pr2dc
ENDIF

```

```

SET ALTERNATE OFF
SET CONSOLE ON
RETURN

```

```

*-----

```

```

*-----
*
*   Module:                PRINT3                1/21/86   RAP
*
*                           Print cover sheet for worksheet packet
*
*-----

```

```

IF pcov
  SET PRINT ON
  ? CHR(12)
ENDIF

```

```

IF covflg=1
  TEXT

```

```

-----
                                mHRS Hazardous Ranking System Facility Report
-----

```

```

  ENDTEXT
ELSE
  TEXT

```

```

-----
                                HRS Hazardous Ranking System Facility Report
-----

```

```

  ENDTEXT
ENDIF

```

```

SELECT 10
?
? ' Facility name: '+site_name
? '                   '+fac_name
?
? ' Location: ',fac_locate
?
? ' EPA Region: ',epa_region
?
? ' Person(s) in charge of facility: ',per_contc1
? '                                     ',per_contc2
? '                                     ',per_contc3
?
? ' Reviewer: ',reviewer
?
? ' Date: ', mdate
?
?
? ' Facility Description:'
?
? ' Type of facility: ',fac_type
? ' Types of hazardous wastes:'
? '                   ',hs_type

```



```

? ' Contamination route of concern:'
? '         ',major_rout
? ' Additional descriptive comments:'
? '         ',info_needs
? '         ',desc_com1
? '         ',desc_com2
? '         ',desc_com3
?
SELECT 1
? ' Waste storage types:'
IF sur_impnd
? '         Surface Impoundments'
ENDIF
IF container
? '         Containers'
ENDIF
IF piles
? '         Piles'
ENDIF
IF landfill
? '         Landfills'
ENDIF
?
? ' The following worksheets are included for this facility:'
IF gwp
? '         Ground Water'
ENDIF
IF swp
? '         Surface Water'
ENDIF
IF ap
? '         Air'
ENDIF
IF fep
? '         Fire and Explosion'
ENDIF
IF dcp
? '         Direct Contact'
ENDIF
SELECT 10
?
IF covflg=1
? ' Scores: Sm = ',STR(mhrs_s_m,7,2)
??' (Sgw=',STR(mhrs_s_gw,7,2)
??' Ssw=',STR(mhrs_s_sw,7,2)
??' Sa=',STR(mhrs_s_a,7,2), ' )'
?
? '         Sfe = ',STR(mhrs_s_fe,7,2)
? '         Sdc = ',STR(mhrs_s_dc,7,2)
ELSE
? ' Scores: Sm = ',STR(hrs_s_m,7,2)
??' (Sgw=',STR(hrs_s_gw,7,2)
??' Ssw=',STR(hrs_s_sw,7,2)

```

```
??' Sa=',STR(hrs_s_a,7,2), ' )'  
?  
?'      Sfe = ',STR(hrs_s_fe,7,2)  
?'      Sdc = ',STR(hrs_s_dc,7,2)  
ENDIF
```

```
SET PRINT OFF  
RETURN
```

```

*-----
*
*
*   Module:                PRINTOPT                1/19/86  RAP
*
*   Input user option for printing of
*   mHRS and HRS worksheets
*-----

```

```

STORE .F. TO pm1, pm2, pm3, pm4, pm5, ph1, ph2, ph3, ph4, ph5
STORE .F. TO iwff, pslf, prtrpt, pcov
STORE .T. TO notsat

```

```

DO WHILE notsat

```

```

    @ 6,6 CLEAR
    @ 7,11 SAY 'Do you wish to: '
    @ 8,15 SAY 'Include worksheets in the site log file?' GET iwff
    @ 9,15 SAY 'Print the site log file? 'GET pslf
    @ 10,15 SAY 'Print the mHRS (and HRS if selected) cover sheet? ' GET pcov

    @ 13,11 SAY 'Indicate which of the following worksheets you wish to print:'

    @ 15,11 SAY '                                MHRs'
    IF hrs
        @ 15,50 SAY 'HRS'
    ENDIF

    IF gwp
        @ 16,15 SAY 'Ground Water                : ' GET pm1
        IF hrs
            @ 16,50 GET ph1
        ENDIF
    ENDIF

    IF swp
        @ 17,15 SAY 'Surface Water                : ' GET pm2
        IF hrs
            @ 17,50 GET ph2
        ENDIF
    ENDIF

    IF ap
        @ 18,15 SAY 'Air                          : ' GET pm3
        IF hrs
            @ 18,50 GET ph3
        ENDIF
    ENDIF

    IF fep
        @ 19,15 SAY 'Fire and Explosion          : ' GET pm4
        IF hrs
            @ 19,50 GET ph4

```

```

ENDIF
ENDIF

IF dcp
  @ 20,15 SAY 'Direct Contact      : ' GET pm5
  IF hrs
    @ 20,50 GET ph5
  ENDIF
ENDIF
ENDIF

@22,11 SAY 'You may use the arrow keys to move the cursor around the screen.'

@23,11 SAY 'Enter Y or T (for yes or true) or N or F (for no or false).'
READ
@ 22,11 CLEAR

answer = ' '
DO WHILE .NOT. (UPPER(answer) $ 'YN')
  @ 22,11 SAY 'Are all of the above entries correct (Y or N)? ' GET answer
  READ
ENDDO
IF UPPER(answer)='Y'
  notsat = .F.
ENDIF

ENDDO

IF pm1 .OR. pm2 .OR. pm3 .OR. pm4 .OR. pm5 .OR. pcov .OR. pslf
  prtrpt = .T.
ELSE
  IF ph1 .OR. ph2 .OR. ph3 .OR. ph4 .OR. ph5
    prtrpt = .T.
  ENDIF
ENDIF
ENDIF

RETURN
*-----

```

```

*-----
*
*   Module:                      PUSCREEN                      1/27/86 RAP
*
*                               Pu and U input information screens
*-----

```

```

@ 6,6 CLEAR
@ 10,11 SAY "THE FOLLOWING SCREEN NEEDS TO BE READ ONLY IF YOUR SOUR"
@ 10,66 SAY "CE TERM"
@ 11,11 SAY "INCLUDES:"
@ 13,36 SAY "Total Plutonium"
@ 15,11 SAY "If available, use the plutonium isotope distribution kn"
@ 15,66 SAY "own for"
@ 16,11 SAY "your facility."
@ 18,11 SAY "If the specific isotopic distribution is not known for"
@ 18,66 SAY "your facility,"
@ 19,11 SAY "the following distribution can be used:"
@ 22,11 SAY "Press any key to continue . . ." GET done PICTURE 'X'
READ

```

```

@ 6,6 CLEAR
@ 6,52 SAY "SPECIFIC ACTIVITY"
@ 7,24 SAY "ISOTOPE" (WT%) (Ci/g)
@ 9,24 SAY "Pu-238" 0.016 17"
@ 10,24 SAY "Pu-239" 92.6 6.14E-2"
@ 11,24 SAY "Pu-240" 6.398 0.22"
@ 12,24 SAY "Pu-241" 0.039 1.01E-2"
@ 13,24 SAY "Pu-242" 0.021 3.92E-3"
@ 14,24 SAY "Am-241" 0.647 3.2"
@ 16,11 SAY "To use the above table, multiply your grams of total pl"
@ 16,66 SAY "utonium by"
@ 17,11 SAY "the WT% (converted to decimal) and the specific activit"
@ 17,66 SAY "y (Ci/g)."

```

```

@ 6,6 CLEAR
@ 6,11 SAY "THIS SCREEN NEEDS TO BE READ ONLY IF YOUR SOURCE TERM I"
@ 6,66 SAY "NCLUDES:"
@ 8,33 SAY "Depleted Uranium, or"
@ 9,33 SAY "Natural Uranium, or"
@ 10,33 SAY "Enriched Uranium"

```

```

@ 12,11 SAY "If your source term list DEPLETED URANIUM in grams, use"
@ 12,67 SAY "the following"
@ 13,11 SAY "conversion factor to convert to curies:"
@ 15,38 SAY "5.2E-7 Ci/g"
@ 17,11 SAY "If your source term lists NATURAL URANIUM in grams, use"
@ 17,67 SAY "the following"
@ 18,11 SAY "conversion factor to convert to curies:"
@ 20,38 SAY "7.0E-7 Ci/g"
@ 23,11 SAY "Press any key to continue . . ." GET done PICTURE 'X'
READ

```

```

@ 6,6 CLEAR
@ 10,11 SAY "If your source term lists ENRICHED URANIUM in grams, us"
@ 10,66 SAY "e the follow-"
@ 11,11 SAY "ing conversion factor to convert to curies:"
@ 13,38 SAY "2.2E-6 Ci/g"
@ 15,11 SAY "NOTE: The assumed weight percent distribution of U-234"
@ 15,66 SAY ", U-235 and"
@ 16,18 SAY "U-238 used to derive these conversion factors is presen"
@ 16,73 SAY "ted"
@ 17,18 SAY "in Table 3.5 of the User's Manual."
@ 21,11 SAY "Press any key to continue . . ." GET done PICTURE 'X'
READ

```

RETURN

*-----

```

*-----
*
*      Module:                      RADCONC                      1/21/86 RAP
*
*                               Input measured concentration if known,
*                               site area if zero and determine
*                               area correction factor
*-----

```

```
STORE 00000000000000.0000 TO con
```

```

SELECT 1
IF pathsel=4
  STORE fe_meas TO meas
  STORE fe_vol TO vol
ELSE
  STORE dc_meas TO meas
  STORE dc_vol TO vol
ENDIF

```

```

@ 6,6 CLEAR
@ 10,10 SAY 'Are measured concentrations of the radionuclides at the'
STORE ' ' TO radflg
IF redoflg
  IF meas
    @ 20,10 SAY 'Previous value: Y'
  ELSE
    @ 20,10 SAY 'Previous value: N'
  ENDIF
ENDIF

```

```

DO WHILE .NOT. (UPPER(radflg) $ 'YN')
  @ 11,10 SAY 'waste site known (Y or N)?' GET radflg PICTURE 'X'
  READ
ENDDO

```

```

IF UPPER (radflg) = 'Y'

  IF pathsel=4
    REPLACE fe_meas WITH .T.
  ELSE
    REPLACE dc_meas WITH .T.
  ENDIF

```

```

SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()

```

```

  IF pathsel=4
    STORE fe_path TO path
    STORE fe_conc TO con
  ELSE

```

```

        STORE dc_path TO path
        STORE dc_conc TO con
    ENDIF

    IF chem_nuc = 'N' .AND. path
        @ 6,6 CLEAR
        SET COLOR TO 0/7, 0/7, 0
        @ 8,10 SAY 'WASTE CONSTITUENT: '+name
        SET COLOR TO 7/0, 0/7, 0
        @ 18,10 SAY 'Note: 1.0E9 pCi/cubic m is the maximum impact'
        @ 19,10 SAY '      considered. If concentration is greater'
        @ 20,10 SAY '      than 1.0E9 pCi/cubic m, you may indicate'
        @ 21,10 SAY '      that this value was exceeded by entering'
        @ 22,10 SAY '      111111111.1111'
        @ 10,10 SAY 'Enter concentration in pCi/cubic m: ' GET con RANGE 0,
        READ

        IF pathsel=4
            REPLACE fe_path WITH path
            REPLACE fe_conc WITH con
        ELSE
            REPLACE dc_path WITH path
            REPLACE dc_conc WITH con
        ENDIF

    ENDIF

    SKIP
    ENDDO

ELSE

    @ 6,6 CLEAR
    STORE .T. TO notright
    DO WHILE notright
        @ 10,10 SAY 'Enter volume of the waste site in cubic m:' GET vol
        READ
        IF vol > 0
            notright = .F.
        ENDIF
    ENDDO

    SELECT 1
    IF pathsel=4
        REPLACE fe_meas WITH .F.
        REPLACE fe_vol WITH vol
    ELSE
        REPLACE dc_meas WITH .F.
        REPLACE dc_vol WITH vol
    ENDIF

ENDIF

```



```

SELECT 1
@ 6,6 CLEAR
IF redoflg
  IF site_area > 1000
    @ 20,10 SAY 'Previous value: Y'
  ELSE
    @ 20,10 SAY 'Previous value: N'
  ENDIF
ENDIF

STORE ' ' TO sitflg
DO WHILE .NOT. (UPPER(sitflg) $ 'YN')
  @ 11,10 SAY 'Is site area greater than 1000 square meters (Y or N)?'
  @ 11,COL()+1 GET sitflg PICTURE 'X'
  READ
ENDDO

IF UPPER(sitflg) = 'Y'
  REPLACE site_area WITH 1111.
ELSE
  @ 13,10 SAY "Enter site area in square meters: " GET site_area
  READ
ENDIF

DO CASE
  CASE site_area < 100
    REPLACE cf WITH 0.2
  CASE site_area < 300
    REPLACE cf WITH 0.4
  CASE site_area < 500
    REPLACE cf WITH 0.6
  CASE site_area < 1000
    REPLACE cf WITH 0.8
  OTHERWISE
    REPLACE cf WITH 1.0
ENDCASE

IF edj
  pindx = '28'
  DO just
ENDIF

RETURN
*-----

```

```

*-----
*
*   Module:                RADREL                1/16/86   RAP
*
*                           Setup for rad release calculations
*                           and store score for all media routes
*
*-----

```

```

STORE 0 to c, n, quan, gindx
STORE .F. TO path

```

```

*----- clean out work db -----
SELECT 8
  USE work
  ZAP
  DO WHILE n < 7
    APPEND BLANK
    n = n + 1
  ENDDO

```

```

*----- for each radionuclide-----
SELECT 2
GOTO TOP
DO WHILE .NOT. EOF()

```

```

  IF chem_nuc = 'N'

```

```

*   ----- transfer to common parameters

```

```

  DO CASE

```

```

    CASE pathsel=1
      path = gw_path
      c = gw_conc
      g = gw_group

```

```

    CASE pathsel=2
      path = sw_path
      c = sw_conc
      g = sw_group

```

```

    CASE pathsel = 3
      path = a_path
      c = a_conc
      g = air_group

```

```

    CASE pathsel = 4
      note: matrix adjusted by 100.
      path = fe_path
      IF a->fe_meas
        c = fe_conc * 100. * a->cf
      ENDIF

```

```

    g = fe_group
CASE pathsel = 5
    path = dc_path
    IF a->dc_meas
        c = dc_conc * a->cf
    ENDIF
    g = dc_group
ENDCASE

* ----- overwrite c if potential -----

IF relese = 'Potential'

    DO CASE

        CASE pathsel=1
            IF qu_units = 'pCi'
                c = hw_quan * trco / 10000000000000.
            ELSE
                c = hw_quan*trco
            ENDIF

        CASE pathsel=2

            STORE a->sw_flow TO swflow
            IF swflow = 0.0
                swflow = 1.0
            ENDIF

            IF qu_units = 'pCi'
                IF a->flunit = 'L/yr'
                    c = hw_quan * 0.0001 / swflow
                ELSE
                    c = hw_quan / swflow / 10000000000000000.
                ENDIF
            ELSE
                IF a->flunit = 'L/yr'
                    c = hw_quan * 100000000. / swflow
                ELSE
                    c = hw_quan / swflow / 10000.
                ENDIF
            ENDIF

        CASE pathsel = 4
            note: matrix adjusted by 100 and 1000.
            IF .NOT. a->fe_meas
                IF qu_units = 'pCi'
                    c = hw_quan / a->fe_vol * a->cf * 100000.
                ELSE
                    c = hw_quan / a->fe_vol * a->cf
                    c = c * 100000000.
                    IF c < 1.0
                        c = c * 1000000000.
                    ENDIF
                ENDIF
            ENDIF
        END CASE
    END IF

```

```

        ELSE
            c = 1000000001.
        ENDIF
*       '?'Concentration in RADREL: ',c
*       WAIT
    ENDIF
ENDIF

CASE pathsel = 5
    IF .NOT. a->dc_meas
        IF qu_units = 'pCi'
            c = hw_quan * 1000. / a->dc_vol * a->cf
        ELSE
            c = hw_quan / a->dc_vol * a->cf
            c = c * 1000000000.
            IF c < 1.0
                c = c * 100000000.
            ELSE
                c = 1000000001.
            ENDIF
*       '?'Concentration in RADREL: ',c
*       WAIT
        ENDIF
    ENDIF

ENDCASE
ENDIF
* ----calculate total conc. each group ----
IF path

    SELECT 8
    gindx = AT(g,gname)
    IF gindx > 0
        GOTO gindx
        REPLACE conc WITH conc + c
    ENDIF
ENDIF

SELECT 2
ENDIF
SKIP
ENDDO

STORE 0 to maxc
STORE 0 TO n
STORE .F. TO path

SELECT 7
USE matrix

SELECT 8
GOTO TOP
n=1
DO WHILE n < 7

```

```

STORE SUBSTR (gname,n,1) TO gm
SELECT 7
LOCATE FOR rtindx = pathsel .AND. group = gm

SELECT 8
DO CASE
  CASE conc > 100000000.
    REPLACE cscore WITH g->atplus9
  CASE conc > 10000000.
    REPLACE cscore WITH g->atplus8
  CASE conc > 1000000.
    REPLACE cscore WITH g->atplus7
  CASE conc > 100000.
    REPLACE cscore WITH g->atplus6
  CASE conc > 10000.
    REPLACE cscore WITH g->atplus5
  CASE conc > 1000.
    REPLACE cscore WITH g->atplus4
  CASE conc > 100.
    REPLACE cscore WITH g->atplus3
  CASE conc > 10.
    REPLACE cscore WITH g->atplus2
  CASE conc > 1.
    REPLACE cscore WITH g->atplus1
  CASE conc > 0.1
    REPLACE cscore WITH g->atzero
  CASE conc > 0.01
    REPLACE cscore WITH g->atminus1
  CASE conc > 0.001
    REPLACE cscore WITH g->atminus2
  OTHERWISE
    REPLACE cscore WITH g->atminus3
ENDCASE
n = n+1
SKIP
ENDDO

SELECT 8
GOTO TOP

DO WHILE .NOT. EOF()
  IF cscore > maxc
    maxc = cscore
  ENDIF
  SKIP
ENDDO

SELECT 7
USE
SELECT 8
USE
SELECT 1

IF relese = 'Observed'

```

```

DO CASE
  CASE pathsel = 1
    REPLACE gw_rad_mo WITH maxc
  CASE pathsel = 2
    REPLACE sw_rad_mo WITH maxc
  CASE pathsel = 3
    REPLACE a_rad_mo WITH maxc
ENDCASE
ELSE
  DO CASE
    CASE pathsel = 1
      REPLACE gw_rad_mp WITH maxc
    CASE pathsel = 2
      REPLACE sw_rad_mp WITH maxc
    CASE pathsel = 3
      REPLACE a_rad_mp WITH maxc
    CASE pathsel = 4
      REPLACE fe_rad_mp WITH maxc
    CASE pathsel = 5
      REPLACE dc_rad_mp WITH maxc
  ENDCASE
ENDIF

RETURN
*-----
*-----
*
*   Module:                ROOT.FMT
*
*-----

```

```

@10,10 SAY "You may enter either a complete chemical name or a root name."
@11,10 SAY "When you enter the name, the chemical data base will be searched"

@12,10 SAY "for any occurrences of that name. When a match is found, the "
@13,10 SAY "complete name will be displayed and you will be asked if this is"

@14,10 SAY "the chemical that you requested. If you answer [no], the"
@15,10 SAY "remainder of the chemical data base will be searched."

```

```

*-----
*
*   Module:                SXTAB
*
*                           Display Sax toxicity tables
*
*-----

```

```

@ 6,6 CLEAR
@ 6,10 SAY "0 - NO TOXICITY(a) (NONE)(b)"
@ 8,10 SAY "This designation is given to materials that fall into o"
@ 8,65 SAY "ne of the"
@ 9,10 SAY "following categories:"
@ 11,11 SAY "1) Materials that cause no harm under any conditions o"
@ 11,66 SAY "f normal use."
@ 13,11 SAY "2) Materials that produce toxic affects on humans only"
@ 13,67 SAY "under the"
@ 14,15 SAY "most unusual conditions or by overwhelming dosage."
@ 16,10 SAY " "
@ 17,10 SAY "(a) Sax, N.I., [Dangerous Properties of Industrial Mate"
@ 17,65 SAY "rials],"
@ 18,14 SAY "Van Nostrand Rheinhold Company, New York, 4th Edition,"
@ 18,69 SAY "1975."
@ 19,10 SAY "(b) Sax, N.I., [Dangerous Properties of Industrial Mate"
@ 19,65 SAY "rials],"
@ 20,14 SAY "Van Nostrand Rheinhold"
@ 22,10 SAY "Press any key to continue . . ."
@ROW(),COL()+1 GET done PICTURE 'X'
READ

```

```

@ 6,6 CLEAR
@ 6,11 SAY "1 - SLIGHT TOXICITY(a) (LOW)(b)"
@ 9,12 SAY "1) ACUTE LOCAL. Materials which on single exposures l"
@ 9,67 SAY "asting"
@ 10,16 SAY "seconds, minutes, or hours cause only slight effects on"
@ 10,72 SAY "the skin"
@ 11,16 SAY "or mucous membranes regardless of the extent of the exp"
@ 11,71 SAY "osure."
@ 12,12 SAY "2) ACUTE SYSTEMIC. Materials that can be absorbed int"
@ 12,67 SAY "o the body"
@ 13,16 SAY "by inhalation, ingestion, or through the skin and that"
@ 13,71 SAY "produce"
@ 14,16 SAY "only slight effects following single exposures lasting"
@ 14,71 SAY "seconds,"
@ 15,16 SAY "minutes, or hours, or following ingestion of a single d"
@ 15,71 SAY "ose,"
@ 16,16 SAY "regardless of the quantity absorbed or the extent of ex"
@ 16,71 SAY "posure."
@ 18,11 SAY " "
@ 19,11 SAY "(a) Sax, N.I., [Dangerous Properties of Industrial Mate"
@ 19,66 SAY "rials],"
@ 20,15 SAY "Van Nostrand Rheinhold Company, New York, 4th Edition,"
@ 20,70 SAY "1975."
@ 21,11 SAY "(b) Sax, N.I., [Dangerous Properties of Industrial Mate"

```

```

@ 21,66 SAY "rials],"
```

@ 22,15 SAY "Van Nostrand Rheinhold Company, New York, 5th Edition,"

@ 22,70 SAY "1979."

@ROW(),COL()+1 GET done PICTURE 'X'

READ

@ 6,6 CLEAR

@ 6,11 SAY "3) CHRONIC LOCAL. Materials which on continuous or re"

@ 6,66 SAY "peated"

@ 7,15 SAY "exposures extending over periods of days, months, or ye"

@ 7,70 SAY "ars"

@ 8,15 SAY "cause only slight and usually reversible harm to the sk"

@ 8,70 SAY "in or"

@ 9,15 SAY "mucous membranes. The extent of exposure may be great"

@ 9,70 SAY "or small."

@ 11,11 SAY "4) CHRONIC SYSTEMIC. Materials which can be absorbed"

@ 11,66 SAY "into the"

@ 12,15 SAY "body by inhalation, ingestion, or through the skin and"

@ 12,70 SAY "that"

@ 13,15 SAY "produce only slightly usually reversible effects extend"

@ 13,70 SAY "ing"

@ 14,15 SAY "over days, months, or years. The extent of the exposur"

@ 14,70 SAY "e may"

@ 15,15 SAY "be great or small."

@ 17,10 SAY "In general, those substances classified as having [slig"

@ 17,65 SAY "ht toxicity]"

@ 18,10 SAY "produce changes in the human body that are readily reve"

@ 18,65 SAY "rsible and"

@ 19,10 SAY "that will disappear following termination of exposure,"

@ 19,65 SAY "either with"

@ 20,10 SAY "or without medical treatment."

@ 22,10 SAY "Press any key to continue . . ."

@ROW(),COL()+1 GET done PICTURE 'X'

READ

@ 6,6 CLEAR

@ 6,11 SAY "2 - MODERATE TDXICITY(a) (MOD)(b)"

@ 8,12 SAY "1) ACUTE LOCAL. Materials which on single exposure la"

@ 8,67 SAY "sting sec-"

@ 9,16 SAY "onds, minutes, or hours cause moderate effects on the s"

@ 9,71 SAY "kin or"

@ 10,16 SAY "mucous membranes. These effects may be the result of i"

@ 10,71 SAY "ntense"

@ 11,16 SAY "exposure for a matter or seconds or moderate exposure f"

@ 11,71 SAY "or a"

@ 12,16 SAY "matter of hours."

@ 14,12 SAY "2) ACUTE SYSTEMIC. Materials that can be absorbed int"

@ 14,67 SAY "o the body"

@ 15,16 SAY "by inhalation, ingestion, or through the skin and produ"

@ 15,71 SAY "ce"

@ 16,16 SAY "moderate effects following single exposures lasting sec"

@ 16,71 SAY "onds,"

@ 17,16 SAY "minutes, or hours, or following ingestion of a single d"

@ 17,71 SAY "ose."


```

@ 19,11 SAY "
@ 20,11 SAY "(a) Sax, N.I., [Dangerous Properties of Industrial Mate"
@ 20,66 SAY "rials],"
@ 21,15 SAY "Van Nostrand Rheinhold Company, New York, 4th Edition,"
@ 21,70 SAY "1975."
@ 22,11 SAY "(b) Sax, N.I., [Dangerous Properties of Industrial Mate"
@ 22,66 SAY "rials],"
@ 23,15 SAY "Van Nostrand Rheinhold Company, New York, 5th Edition,"
@ 23,70 SAY "1979."
@ROW(),COL()+1 GET done PICTURE 'X'
READ

```

```

@ 6,6 CLEAR
@ 6,11 SAY "3) CHRONIC LOCAL. Materials which on continuous or re"
@ 6,66 SAY "peated"
@ 7,15 SAY "exposures extending over periods of days, months, or ye"
@ 7,70 SAY "ars"
@ 8,15 SAY "cause moderate harm to the skin or mucous membranes."
@ 10,11 SAY "4) CHRONIC SYSTEMIC. Materials that can be absorbed i"
@ 10,66 SAY "nto the"
@ 11,15 SAY "body by inhalation, ingestion, or through the skin and"
@ 11,70 SAY "that"
@ 12,15 SAY "produce moderate effects following continuous or repeat"
@ 12,70 SAY "ed"
@ 13,15 SAY "exposures extending over periods of days, months, or ye"
@ 13,70 SAY "ars."
@ 15,10 SAY "Those substances classified as having [moderate toxicit"
@ 15,65 SAY "y] may produce"
@ 16,10 SAY "irreversible, as well as reversible changes, in the hum"
@ 16,65 SAY "an body."
@ 17,10 SAY "These changes are not of such severity as to threaten l"
@ 17,65 SAY "ife or to"
@ 18,10 SAY "produce serious physical impairment."
@ 20,10 SAY "Press any key to continue . . ."
@ROW(),COL()+1 GET done PICTURE 'X'
READ

```

```

@ 6,11 SAY "3 - SEVERE TOXICITY(a) (HIGH)(b)"
@ 8,12 SAY "1) ACUTE LOCAL. Materials which on single exposure 1a"
@ 8,67 SAY "sting seconds"
@ 9,16 SAY "or minutes cause injury to skin or mucous membranes or"
@ 9,71 SAY "suffi-"
@ 10,16 SAY "cient severity to threaten life or to cause permanent p"
@ 10,71 SAY "hysical"
@ 11,16 SAY "impairment or disfigurement."
@ 13,12 SAY "2) ACUTE SYSTEMIC. Materials that can be absorbed int"
@ 13,67 SAY "o the body"
@ 14,16 SAY "by inhalation, ingestion, or through the skin and that"
@ 14,71 SAY "can"
@ 15,16 SAY "cause injury of sufficient severity to threaten life fo"
@ 15,71 SAY "llowing"
@ 16,16 SAY "a single exposure lasting seconds, minutes, or hours, o"
@ 16,71 SAY "r"
@ 17,16 SAY "following ingestion of a single dose."

```

```

@ 18,11 SAY "
@ 19,11 SAY "(a) Sax, N.I., "Dangerous Properties of Industrial Mate"
@ 19,66 SAY "rials,"
@ 20,15 SAY "Van Nostrand Rheinhold Company, New York, 4th Edition,"
@ 20,70 SAY "1975."
@ 21,11 SAY "(b) Sax, N.I., "Dangerous Properties of Industrial Mate"
@ 21,66 SAY "rials,"
@ 22,15 SAY "Van Nostrand Rheinhold Company, New York, 5th Edition,"
@ 22,70 SAY "1979." GET done PICTURE 'X'
READ

```

```

@ 6,6 CLEAR
@ 6,12 SAY "3) CHRONIC LOCAL. Materials which on continuous or re"
@ 6,67 SAY "peated"
@ 7,16 SAY "exposures extending over periods of days, months, or ye"
@ 7,71 SAY "ars"
@ 8,16 SAY "can cause injury to skin or mucous membranes of suffici"
@ 8,71 SAY "ent"
@ 9,16 SAY "severity to threaten life or cause permanent impairment"
@ 9,71 SAY ","
@ 10,16 SAY "disfigurement, or irreversible change."
@ 12,12 SAY "4) CHRONIC SYSTEMIC. Materials that can be absorbed i"
@ 12,67 SAY "nto the"
@ 13,16 SAY "body by inhalation, ingestion or through the skin and c"
@ 13,71 SAY "an"
@ 14,16 SAY "cause death or serious physical impairment following co"
@ 14,71 SAY "ntinuous"
@ 15,16 SAY "or repeated exposures to small amounts extending over p"
@ 15,71 SAY "eriods"
@ 16,16 SAY "of days, months, or years."
@ 18,11 SAY "Press any key to continue . . ."
@ROW(),COL()+1 GET done PICTURE 'X'
READ

```

```

RETURN

```

```

*-----

```

```

*-----
*
*   Module:                SELINCOM          1/16/86   RAP
*
*               Determine incompatibilities
*
*-----

```

```

DO CASE
CASE incom_indx='1-A' .OR. incom_ind2='1-A'
  sym = '1-B'
  DO chkinc

CASE incom_indx='2-A' .OR. incom_ind2='2-A'
  sym = '2-B'
  DO chkinc
  sym = '1-A'
  DO chkinc
  sym = '1-B'

CASE incom_indx='2-B' .OR. incom_ind2='2-B'
  sym = '2-A'
  DO chkinc

CASE incom_indx='3-A' .OR. incom_ind2='3-A'
  sym = '3-B'
  DO chkinc
  sym = '1-A'
  DO chkinc
  sym = '1-B'
  DO chkinc

CASE incom_indx='3-B' .OR. incom_ind2='3-B'
  sym = '3-A'
  DO chkinc

CASE incom_indx='4-A' .OR. incom_ind2='4-A'
  sym = '4-B'
  DO chkinc
  sym = '1-A'
  DO chkinc
  sym = '1-B'
  DO chkinc
  sym = '2-A'
  DO chkinc

CASE incom_indx='4-B' .OR. incom_ind2='4-B'
  sym = '4-A'
  DO chkinc

CASE incom_indx='5-A' .OR. incom_ind2='5-A'
  sym = '5-B'
  DO chkinc

```

```

    sym = '1-B'
    DO chkinc

CASE incom_indx='5-B' .OR. incom_ind2='5-B'
    sym = '5-A'
    DO chkinc

CASE incom_indx='6-A' .OR. incom_ind2='6-A'
    sym = '6-B'
    DO chkinc
    sym = '2-A'
    DO chkinc
    sym '4-A'
    DO chkinc

CASE incom_indx='6-B' .OR. incom_ind2='6-B'
    sym = '6-A'
    DO chkinc

CASE incom_indx='SAX'
    @ rown,11 SAY 'Check SAX for possible incompatibilities: '
    @ rown+1,15 SAY b->name
    rown = rown + 2

ENDCASE

RETURN
*-----

```

```

*-----
*
*   Module:                SETUP                2/3/86   RAP
*
*               Setup and initialize files
*
*-----

```

```

STORE 0 TO cmax, nmax, cnindx, nchem, nnuc, mhrsindx, mult, pathsel
STORE 0 TO hitp, number, swflow, rown, hiscore, rcno, oldindx, usropt
STORE 0 TO hiphys, hireact, covflg
STORE ' ' TO done, answer, pindx, drive
STORE 'none' TO route, relese, sym, site log
STORE .T. TO notfound, notright, first, firsted, firstq
STORE .F. TO gwp, swp, ap, fep, dcp, past1, edflg, oldflg, redoflg
STORE .F. TO sk1flg, sk2flg, sk3flg, sk4flg, sk5flg
STORE 'ABCDEF' TO gname

```

```

@ 0,0 CLEAR
DO box3.fmt

```

```

STORE ' ' TO readint
DO intro1.fmt
rown = ROW()
DO WHILE .NOT. (UPPER(readint) $ 'YN')
    @ rown,COL()+2 GET readint PICTURE 'X'
    READ
ENDDO
IF UPPER(readint) = 'Y'
    STORE .T. TO rdflg
ELSE
    STORE .F. TO rdflg
    @ 6,6 CLEAR
    @ 10,10 SAY 'Please wait. . .'
ENDIF

```

```

*----- open data base files and display introduction -----

```

```

SELECT 1
    USE mhrs
    COPY STRUCTURE TO mhrstemp

IF rdflg
    @ 6,6 CLEAR
    DO credits.fmt
    @ ROW(),COL()+2 GET done PICTURE 'X'
ENDIF

```

```

SELECT 2
    USE conc
    COPY STRUCTURE TO conctemp

```

```

IF rdflg
    * Read of credits

```

```

READ
@ 6,6 CLEAR
DO intro4.fmt
@ ROW(),COL()+2 GET done PICTURE 'X'
ENDIF

IF rdflg
* Read of intro page 4
READ
@ 5,6 CLEAR
DO intro5.fmt
@ ROW(),COL()+2 GET done PICTURE 'X'
ENDIF

SELECT 5
USE chemical INDEX calpha
GOTO BOTTOM
cmax = RECNO()

IF rdflg
* Read of intro page 5
READ
@ 6,6 CLEAR
DO intro2.fmt
@ ROW(),COL()+2 GET done PICTURE 'X'
ENDIF

SELECT 6
USE nuclides INDEX nalpha
GOTO BOTTOM
nmax = RECNO()

IF rdflg
* Read of intro 2
READ
@ 6,6 CLEAR
DO intro3.fmt
@ ROW(),COL()+2 GET done PICTURE 'X'
ENDIF

SELECT 10
USE cover
INDEX ON site_indx TO covindx
COPY STRUCTURE TO covertmp
GOTO BOTTOM
STORE site_indx+1 TO mhrsindx

IF rdflg
* read of intro3
READ
@ 6,6 CLEAR
DO defs.fmt
@ ROW(),COL()+2 GET done PICTURE 'X'
READ

```

ENDIF

*---- confirm date -----

```
STORE DATE() TO mdate
STORE .T. TO notright
DO WHILE notright
    answer = 'Y'
    @ 6,6 CLEAR
    @ 10,10 SAY 'Date: '+DTC(mdate)
    @ 11,10 SAY 'Is this date correct (Y or N)' GET answer PICTURE 'X'
    READ
    IF UPPER(answer) = 'N'
        @ 6,6 CLEAR
        @ 10,10 SAY 'Enter date: ' GET mdate
        READ
    ELSE
        notright = .F.
    ENDIF
ENDDO
```

*---- print report of facilities and sites in the data base -----

```
@ 6,6 CLEAR
@ 12,10 SAY 'Do you want to see a list of facilities and sites'
answer = ' '
DO WHILE .NOT. (UPPER(answer) $ 'YN')
    @ 13,10 SAY 'in the data base (Y or N)? ' GET answer PICTURE 'X'
    READ
ENDDO

IF UPPER(answer) = 'Y'

    STORE ' ' TO pflg
    STORE ROW() TO rown
    DO WHILE .NOT. (UPPER(pflg) $ 'YN')
        @ 16,10 SAY 'Do you want to print the list (Y or N)? ' GET pflg PICTURE 'X'

        READ
    ENDDO

    SELECT 10
    IF UPPER(pflg) = 'Y'
        DO printon
        CLEAR
        REPORT FORM sitelist TO PRINT
    ELSE
        CLEAR
        REPORT FORM sitelist NOEJECT
        WAIT
    ENDIF
    CLEAR
    DO box3.fmt
ENDIF
```

*---- get drive specification -----

```
drive = ' '
@ 6,6 CLEAR
@ 10,10 SAY 'Which disk drive are your data files stored on?'
DO WHILE .NOT. (UPPER(drive) $ 'ABCDEFGH')
  @ 11,10 SAY '(B if a floppy disk system) ' GET drive PICTURE 'X'
  READ
ENDDO
```

*---- recall of previous record option -----

```
answer = ' '
@ 6,6 CLEAR
@ 12,10 SAY 'Do you want to use the inventory and justifications'
@ 13,10 SAY 'from a previous site or to edit a previously-entered'
@ 14,10 SAY 'site?'
@ 16,10 SAY 'If common information exists between a previous site'
@ 17,10 SAY 'and this one, you may want to use previous site'
@ 18,10 SAY 'information.'
answer = ' '
DO WHILE .NOT. (UPPER(answer) $ 'YN')
  @ 20,10 SAY 'Answer: (Y or N)' GET answer PICTURE 'X'
  READ
ENDDO
```

IF UPPER(answer) = 'Y' .AND. mhrsindx > 1

```
  @ 6,6 CLEAR
  STORE 1 TO usropt
  @ 10,10 SAY 'Do you wish to:'
  @ 12,15 SAY '1 - Use previous site information for this new site'
  @ 13,15 SAY '2 - Edit a previous site'
  @ 15,10 SAY 'Enter index of selected option:' GET usropt PICTURE '9' RANGE
1,2
  READ
```

```
  STORE mhrsindx-1 TO oldindx
  STORE .T. TO notright
  DO WHILE notright
    @ 18,10 SAY 'Enter site index no. in mHRS dBASEIII file:'
    @ ROW(),COL()+1 GET oldindx RANGE 1, mhrsindx
    READ
    SELECT 10
      LOCATE FOR site_indx = oldindx
    IF .NOT. EOF()
      notright = .F.
    ELSE
      @ 19,10 SAY 'Invalid index: try again'
    ENDIF
  ENDDO
```

```
  @ 6,6 CLEAR
```



```

@ 10,10 SAY 'Please wait...'

SELECT 10
LOCATE FOR site_indx = oldindx
COPY TO covertmp NEXT 1
USE covertmp
IF usropt=1
    REPLACE site_indx WITH mhrsindx
    STORE drive+'T:\mhrs\'+'j->site_log TO where
ENDIF

SELECT 1
LOCATE FOR site_indx = oldindx
COPY TO mhrstemp NEXT 1
USE mhrstemp
IF usropt=1
    REPLACE site_indx WITH mhrsindx
ENDIF

SELECT 2
USE conctemp
APPEND FROM conc FOR site_indx = oldindx
IF usropt=1
    REPLACE ALL site_indx WITH mhrsindx
ENDIF

IF usropt=2
    mhrsindx = oldindx
ENDIF

STORE .T. TO ctflag
STORE .T. TO edflg
STORE .T. TO redoflg
ELSE
    STORE .F. TO edflg
    STORE .F. TO redoflg
ENDIF

*----- set up temporary data base files in buffers & initialize fields ----

IF .NOT. ctflag
    SELECT 10
        USE covertmp
        APPEND BLANK
        REPLACE site_indx WITH mhrsindx
    SELECT 1
        USE mhrstemp
        APPEND BLANK
        REPLACE site_indx WITH mhrsindx
    SELECT 2
        USE conctemp
    DO fieldint
ENDIF

```

```
SELECT 10  
  REPLACE m_date WITH mdate
```

```
RETURN
```

```
*-----
```

```

*-----
*
*   Module:                SWCALC                5/8/86   RAP
*
*   Surface Water Route calculations
*
*-----

```

```

STORE 0 TO sc, sr
STORE 2 TO pathsel

```

```

IF sw_observe = 45
  REPLACE sw_slope WITH 0
ELSE
  STORE ' 0 0 0 0 3 0 1 1 2 3 0 1 2 2 3' to mat1
  STORE ' 0 2 2 3 3 0 2 3 3 3' to mat2
  STORE mat1 + mat2 TO mat
  ndx = sw_fslope*15 + sw_tslope*3+1
  STORE SUBSTR(mat,ndx,3) TO strsl
  REPLACE sw_slope WITH VAL(strsl)
ENDIF

```

```

IF chem
  DO perstox
  REPLACE sw_tox_per WITH hitp
ELSE
  REPLACE sw_tox_per WITH 0
ENDIF

```

```

IF sw_observe=0
  STORE 0 to hiphys
  SELECT 2
  GOTO TOP
  DO WHILE .NOT. EOF()
    IF sw_path
      IF sw_phy > hiphys
        hiphys = sw_phy
      ENDIF
    ENDIF
    SKIP
  ENDDO
  SELECT 1
  REPLACE sw_phystat WITH hiphys
ELSE
  REPLACE sw_phystat WITH 0
ENDIF

```

```

IF sw_rad
  release = 'Observed'
  DO radrel
ELSE
  REPLACE sw_rad_mo WITH 0
ENDIF

```

```

IF rad
  relese = 'Potential'
  DO radrel
ELSE
  REPLACE sw_rad_mp WITH 0
ENDIF

IF sw_observe=45
  REPLACE sw_tot_rou WITH 0
ELSE
  REPLACE sw_tot_rou WITH sw_slope + sw_rainfal + 2*sw_dis_sur + sw_phystat
ENDIF

REPLACE sw_ch_wc WITH sw_tox_per + sw_hw_quan

REPLACE sw_rad_mx WITH sw_rad_mo
IF sw_rad_mp > sw_rad_mx
  REPLACE sw_rad_mx WITH sw_rad_mp
ENDIF

REPLACE sw_tot_tar WITH 3*sw_use + 2*sw_dis_env + sw_dis_pop

IF sw_observe=0
  sc = sw_tot_rou*sw_contain*sw_ch_wc*sw_tot_tar
  sr = sw_tot_rou*sw_contain*sw_rad_mx*sw_tot_tar
ELSE
  sc = sw_observe*sw_ch_wc*sw_tot_tar
  sr = sw_observe*sw_rad_mx*sw_tot_tar
ENDIF

REPLACE sw_sc WITH sc / 643.5
REPLACE sw_sr WITH sr / 643.5

SELECT 10
IF a->sw_sc > a->sw_sr
  REPLACE mhrs_s_sw WITH a->sw_sc
ELSE
  REPLACE mhrs_s_sw WITH a->sw_sr
ENDIF

IF hrs

  STORE 0 TO sc

  DO hrstp
  SELECT 10
  REPLACE sw_hrs_tp WITH hitp
  REPLACE sw_hrs_wc WITH sw_hrs_tp + a->sw_hw_quan

  SELECT 1
  IF sw_observe=0
    sc = sw_tot_rou*sw_contain*j->sw_hrs_wc*sw_tot_tar
  ELSE
    sc = sw_observe*j->sw_hrs_wc*sw_tot_tar

```

```
ENDIF  
  
SELECT 10  
REPLACE hrs_s_sw WITH sc / 643.5  
  
ELSE  
SELECT 10  
REPLACE hrs_s_sw WITH 0.0  
ENDIF  
  
SELECT 1  
RETURN  
*-----
```

```

*-----
*
*   Module:                SWCONT                12/16/85
*
*   Surface Water Route: Containment input
*-----

```

STORE 0 TO hicont

```

IF sur_impnd
  @ 6,6 CLEAR
  @ 7,11 SAY "ASSIGNED"
  @ 8,12 SAY "VALUE      SURFACE WATER - SURFACE IMPOUNDMENT"
  @ 10,14 SAY "0          Sound diking or diversion structure, adequate"
  @ 10,69 SAY "freeboard,"
  @ 11,23 SAY "and no erosion evident"
  @ 13,14 SAY "1          Sound diking or diversion structure, but inadequate"
  @ 13,69 SAY "quate"
  @ 14,23 SAY "freeboard"
  @ 16,14 SAY "2          Diking not leaking, but potentially unsound"
  @ 18,14 SAY "3          Diking unsound, leaking, or in danger of collapse"
  @ 18,69 SAY "pse"
  @ 20,11 SAY "Enter assigned value of selected option:"

  @ ROW(),COL()+1 GET sw_con_1 PICTURE '9' RANGE 0,3
  READ
  IF sw_con_1 > hicont
    hicont = sw_con_1
  ENDIF
ENDIF

```

```

IF container
  @ 6,6 CLEAR
  @ 7,11 SAY "ASSIGNED"
  @ 8,12 SAY "VALUE      SURFACE WATER - CONTAINER"
  @ 10,14 SAY "0          Containers sealed, in sound condition, and surface"
  @ 10,69 SAY "rounded"
  @ 11,23 SAY "by sound diversion or containment system"
  @ 13,14 SAY "1          Containers sealed and in sound condition, but"
  @ 13,69 SAY "not surface"
  @ 14,23 SAY "rounded by sound diversion or containment system"
  @ 16,14 SAY "2          Containers leaking and diversion or containment"
  @ 16,69 SAY "structures"
  @ 17,23 SAY "structures potentially unsound"
  @ 19,14 SAY "3          Containers leaking, and no diversion or containment"
  @ 19,69 SAY "structures"
  @ 20,23 SAY "structures or diversion structures leaking or in danger"
  @ 21,23 SAY "of collapse"
  @ 23,11 SAY "Enter assigned value of selected option:"

  @ ROW(),COL()+1 GET sw_con_1 PICTURE '9' RANGE 0,3
  READ
  IF sw_con_1 > hicont

```

```

        hicont = sw_con_1
    ENDIF
ENDIF

IF piles
    @ 6,6 CLEAR
    @ 7,11 SAY "ASSIGNED"
    @ 8,12 SAY "VALUE      SURFACE WATER - PILES"
    @ 10,13 SAY "0          Piles are covered and surrounded by sound div"
    @ 10,68 SAY "ersion or"
    @ 11,23 SAY "containment system"
    @ 13,13 SAY "1          Piles covered, wastes unconsolidated, diversi"
    @ 13,68 SAY "on or"
    @ 14,23 SAY "containment system not adequate"
    @ 16,13 SAY "2          Piles not covered, wastes unconsolidated, and"
    @ 16,69 SAY "diversion"
    @ 17,23 SAY "or containment system potentially unsound"
    @ 19,13 SAY "3          Piles not covered, wastes unconsolidated, and"
    @ 19,69 SAY "no diver-"
    @ 20,23 SAY "sion or containment or diversion system leaking or in"
    @ 21,23 SAY "danger or collapse"
    @ 23,11 SAY "Enter assigned value of selected option:"

    @ ROW(),COL()+1 GET sw_con_3 PICTURE '9' RANGE 0,3
    READ
    IF sw_con_3 > hicont
        hicont = sw_con_3
    ENDIF
ENDIF

IF landfill
    @ 6,6 CLEAR
    @ 7,11 SAY "ASSIGNED"
    @ 8,12 SAY "VALUE      SURFACE WATER - LANDFILL"
    @ 10,14 SAY "0          Landfill slope precludes runoff, landfill surr"
    @ 10,69 SAY "ounded by"
    @ 11,23 SAY "sound diversion system, or landfill has adequate cover"
    @ 12,23 SAY "material"
    @ 14,14 SAY "1          Landfill not adequately covered and diversion"
    @ 14,69 SAY "system"
    @ 15,23 SAY "sound"
    @ 17,14 SAY "2          Landfill not covered and diversion system pote"
    @ 17,69 SAY "ntially"
    @ 18,23 SAY "unsound"
    @ 20,14 SAY "3          Landfill not covered and no diversion system p"
    @ 20,69 SAY "resent,"
    @ 21,23 SAY "or diversion system unsound"
    @ 23,11 SAY "Enter assigned value of selected option:"

    @ ROW(),COL()+1 GET sw_con_4 PICTURE '9' RANGE 0,3
    READ
    IF sw_con_4 > hicont
        hicont = sw_con_4
    ENDIF
ENDIF

```

ENDIF

REPLACE sw_contain WITH hicont

RETURN

*-----


```

*-----
*
*   Module:                SWIN                1/19/86   RAP
*
*   Surface Water Route input
*-----

STORE 2 TO pathsel
STORE .T. TO edflg

done = ' '
CLEAR
DO box4.fmt
@ 12,10 SAY 'The following questions pertain to the SURFACE WATER route.'
@ 13,10 SAY 'Press any key when you are ready to begin...' GET done PICTURE 'X'

READ

DO WHILE edflg

SELECT 1
@ 6,6 CLEAR
@ 7,11 SAY "Direct evidence of release to surface water must be qua"
@ 7,66 SAY "ntitative"
@ 8,11 SAY "evidence that the facility is releasing contaminants in"
@ 8,66 SAY "to surface"
@ 9,11 SAY "water. Quantitative evidence could be the measurement"
@ 9,66 SAY "of levels"
@ 10,11 SAY "of contaminants from a facility in surface water, eithe"
@ 10,66 SAY "r at the"
@ 11,11 SAY "facility or downhill from it, that represents a signifi"
@ 11,66 SAY "cant (in"
@ 12,11 SAY "terms of demonstrating that a release has occurred, not"
@ 12,67 SAY "in terms"
@ 13,11 SAY "of potential effects) increase over background levels."
@ 15,11 SAY "Is there direct evidence of any hazardous waste (chemical"
@ 16,11 SAY "or radiological) from facility to surface water"
@ 17,11 SAY "(Y or N)?"
rown = 17

IF redoflg
    IF sw observe = 45
        @ 23,11 SAY 'Previous value: '+'Y'
    ELSE
        @ 23,11 SAY 'Previous value: '+'N'
    ENDIF
ENDIF
ENDIF

STORE ' ' TO obsflg
DO WHILE .NOT. (UPPER(obsflg) = 'YN')
    @ rown, 11 SAY '(Y or N)?'
    @ rown, COL()+1 GET obsflg PICTURE 'X'

```

```

READ
ENDDO

IF UPPER(obsflg) = 'Y'
  REPLACE sw_observe WITH 45
  IF edj
    pindx = '10'
    DO just
  ENDIF
ELSE
  REPLACE sw_observe WITH 0
ENDIF

IF sw_observe = 0

  @ 6,6 CLEAR
  @ 7,11 SAY "FACILITY SLOPE AND INTERVENING TERRAIN are indicators o"
  @ 7,66 SAY "f the poten-"
  @ 8,11 SAY "tial for contaminated runoff or spills at a facility to"
  @ 8,67 SAY "be trans-"
  @ 9,11 SAY "ported to surface water. The facility slope is an indi"
  @ 9,66 SAY "cator of"
  @ 10,11 SAY "the potential for runoff or spills to leave the facilit"
  @ 10,66 SAY "y."
  @ 12,11 SAY "ASSIGNED"
  @ 13,12 SAY "VALUE          FACILITY SLOPE"
  @ 15,14 SAY "0          Facility is a closed basin"
  @ 16,14 SAY "1          Facility has average slope <3%"
  @ 17,14 SAY "2          Facility has average slope 3-5%"
  @ 18,14 SAY "3          Facility has average slope 5-8%"
  @ 19,14 SAY "4          Facility has average slope >8%"
  @ 21,11 SAY "Enter assigned value of selected facility slope:"

  @ROW(),COL()+1 GET sw_fslope PICTURE '9' RANGE 0,4
  READ

  @ 6,6 CLEAR
  @ 7,11 SAY "Intervening terrain refers to the average slope of the"
  @ 7,66 SAY "shortest path"
  @ 8,11 SAY "which would be followed by runoff between the facility"
  @ 8,66 SAY "boundary"
  @ 9,11 SAY "and the nearest downhill surface water. This rating fa"
  @ 9,66 SAY "ctor can be"
  @ 10,11 SAY "assessed using topographic maps."
  @ 12,13 SAY "ASSIGNED"
  @ 13,14 SAY "VALUE          INTERVENING TERRAIN"
  @ 15,16 SAY "0          Terrain average slope <3%; or site separated f"
  @ 15,71 SAY "rom"
  @ 16,25 SAY "water body by acres of higher elevation"
  @ 17,16 SAY "1          Terrain average slope 3-5%"
  @ 18,16 SAY "2          Terrain average slope 5-8%"
  @ 19,16 SAY "3          Terrain average slope >8%"
  @ 20,16 SAY "4          Site is in surface water"
  @ 22,13 SAY "Enter assigned value of selected intervening terrain:"

```

```
@ ROW(),COL()+1 GET sw_tslope PICTURE '9' RANGE 0,4
```

```
READ
```

```
IF edj
```

```
    pindx = '21'
```

```
    DO just
```

```
ENDIF
```

```
STORE ' 0 0 0 0 3 0 1 1 2 3 0 1 2 2 3' to mat1
```

```
STORE ' 0 2 2 3 3 0 2 3 3 3' to mat2
```

```
STORE mat1 + mat2 TO mat
```

```
ndx = sw_fslope*15 + sw_tslope*3+1
```

```
STORE SUBSTR(mat,ndx,3) TO strsl
```

```
REPLACE sw_slope WITH VAL(strsl)
```

```
@ 6,6 CLEAR
```

```
@ 7,11 SAY "ONE-YEAR 24-HOUR RAINFALL (obtained from Figure 8 of th"
```

```
@ 7,66 SAY "e users"
```

```
@ 8,11 SAY "manual) indicates the potential for area storms to caus"
```

```
@ 8,66 SAY "e surface-"
```

```
@ 9,11 SAY "water contamination as a result of runoff, erosion, or"
```

```
@ 9,66 SAY "flow over"
```

```
@ 10,11 SAY "dikes."
```

```
@ 12,11 SAY "ASSIGNED      AMOUNT OF RAINFALL"
```

```
@ 13,12 SAY "VALUE          INCHES"
```

```
@ 15,14 SAY "0              <1.0"
```

```
@ 16,14 SAY "1              1.0-2.0"
```

```
@ 17,14 SAY "2              2.1-3.0"
```

```
@ 18,14 SAY "3              3.0"
```

```
@ 20,11 SAY "Enter assigned value of amount of rainfall:"
```

```
@ ROW(),COL()+1 GET sw_rainfal PICTURE '9' RANGE 0,3
```

```
READ
```

```
IF edj
```

```
    pindx = '22'
```

```
    DO just
```

```
ENDIF
```

```
@ 6,6 CLEAR
```

```
@ 7,11 SAY "DISTANCE TO THE NEAREST SURFACE WATER is the shortest d"
```

```
@ 7,66 SAY "istance"
```

```
@ 8,11 SAY "from the hazardous substance, (not the facility or prop"
```

```
@ 8,66 SAY "erty boundary)"
```

```
@ 9,11 SAY "to the nearest downhill body of surface water (e.g., la"
```

```
@ 9,66 SAY "ke or stream)"
```

```
@ 10,11 SAY "that is on the course that runoff can be expected to fo"
```

```
@ 10,66 SAY "llow and"
```

```
@ 11,11 SAY "that at least occasionally contains water. Do not incl"
```

```
@ 11,66 SAY "ude man-made"
```

```
@ 12,11 SAY "ditches, which do not connect with other surface-water"
```

```
@ 12,66 SAY "bodies. In"
```

```
@ 13,11 SAY "areas having less than 20 inches of normal annual preci"
```

```
@ 13,66 SAY "pitation"
```

```
@ 14,11 SAY "(see Figure 5 of the HRS Users Manual), consider intermitte"
```

```

@ 14,66 SAY "nt streams."
@ 16,11 SAY "ASSIGNED"
@ 17,12 SAY "VALUE          DISTANCE"
@ 18,14 SAY "0              >2 miles"
@ 19,14 SAY "1              1 to 2 miles"
@ 20,14 SAY "2              1000 feet to 1 mile"
@ 21,14 SAY "3              <1000 feet"
@ 23,11 SAY "Enter assigned value of selected option:"
@ ROW(),COL()+1 GET sw_dis_sur PICTURE '9' RANGE 0,3
READ
IF edj
    pindx = '23'
    DO just
ENDIF

@ 6,6 CLEAR
@ 7,11 SAY "CONTAINMENT is a measure of the means that have been ta"
@ 7,66 SAY "ken to mini-"
@ 8,11 SAY "mize the likelihood of a contaminant entering surface w"
@ 8,66 SAY "ater either"
@ 9,11 SAY "at the facility or beyond the facility boundary. Examp"
@ 9,66 SAY "les of con-"
@ 10,11 SAY "tainment are diversion structures and the use of sealed"
@ 10,67 SAY "containers."
@ 11,11 SAY "If more than one type of containment is used at a facil"
@ 11,66 SAY "ity, evaluate"
@ 12,11 SAY "each separately and assign the highest index."
@ 14,11 SAY "Do either of the following conditions apply:"
@ 16,12 SAY "1) All the waste at the site is surrounded by diversio"
@ 16,67 SAY "n struc-"
@ 17,16 SAY "tures that are in sound condition and adequate to conta"
@ 17,71 SAY "in all"
@ 18,16 SAY "runoff, spills, or leaks from the waste."
@ 20,12 SAY "2) Intervening terrain precludes runoff from entering"
@ 20,67 SAY "surface"
@ 21,16 SAY "water."

STORE ROW() TO rown
IF redoflg
    IF sw_con_log
        @ 23,41 SAY 'Previous value: Y'
    ELSE
        @ 23,41 SAY 'Previous value: N'
    ENDIF
ENDIF
ENDIF

STORE ' ' TO tight
DO WHILE .NOT. (UPPER(tight) $ 'YN')
    @ 23,11 SAY "Enter Y or N: " GET tight PICTURE 'X'
    READ
ENDDO
IF UPPER(tight) = 'N'
    REPLACE sw_con_log WITH .F.
    DO swcont

```

```

ELSE
    REPLACE sw_con_log WITH .T.
    REPLACE sw_contain WITH 0
ENDIF

IF edj
    pindx = '30'
    DO just
ENDIF

ELSE
    REPLACE sw_contain WITH 0
    REPLACE sw_fslope WITH 0
    REPLACE sw_tslope WITH 0
    REPLACE sw_rainfal WITH 0
    REPLACE sw_dis_sur WITH 0
ENDIF

IF chem
    hwq = sw_tons
    DO hwquan
    IF edj
        pindx='42'
        DO just
    ENDIF
    REPLACE sw_tons WITH hwq
    REPLACE sw_hw_quan WITH hwquan
ELSE
    REPLACE sw_hw_quan WITH 0
    REPLACE sw_tons WITH 0
ENDIF

SELECT 1
IF rad

    @ 6,6 CLEAR
    IF redoflg
        IF sw_rad
            @ 23,11 SAY 'Previous value: '+'Y'
        ELSE
            @ 23,11 SAY 'Previous value: '+'N'
        ENDIF
    ENDIF

    @ 10,10 SAY 'Is there evidence of radiological release?'
    STORE ' ' TO radflg
    DO WHILE .NOT. (UPPER(radflg) $ 'YN')
        @ ROW()+1,10 SAY 'Enter Y or N: ' GET radflg PICTURE 'X'
        READ
    ENDDO

    IF UPPER(radflg)='Y'
        REPLACE sw_rad WITH .T.
        DO obsin

```

```

    IF edj
        pindx = '43'
        DO just
    ENDIF
ELSE
    REPLACE sw_rad WITH .F.
ENDIF

IF flunit = 'TL/yr'
    number = 2
ELSE
    number = 1
ENDIF

@ 6,6 CLEAR
@ 7,11 SAY "Enter the average annual flow of the nearest surface st"
@ 7,66 SAY "ream. In"
@ 8,11 SAY "cases where the nearby streams are intermittent and the"
@ 8,67 SAY "average"
@ 9,11 SAY "flow cannot easily be estimated using the method presen"
@ 9,66 SAY "ted in"
@ 10,11 SAY "Appendix C of the mHRS User's Manual."
@ 12,11 SAY "Select input units:"
@ 14,16 SAY "1 - L/yr"
@ 15,16 SAY "2 - TL/yr (tera liters)"
@ 17,11 SAY "Enter index of selected input units:"
@ ROW(),COL()+1 GET number PICTURE '9' RANGE 1,2
READ
IF number = 2
    REPLACE flunit WITH 'TL/yr'
ELSE
    REPLACE flunit WITH 'L/yr'
ENDIF
@ 12,6 CLEAR
@ 12,11 SAY "Enter the average annual flow or estimate of the neares"
@ 12,66 SAY "t surface"
@ 13,11 SAY 'stream in units of '+flunit+: '
@ ROW(),COL()+1 GET sw_flow RANGE 0,
READ

ENDIF

SELECT 1

@ 6,6 CLEAR
@ 7,11 SAY "SURFACE-WATER USE brings into the rating process the us"
@ 7,66 SAY "e being"
@ 8,11 SAY "made of surface water downstream from the facility. Th"
@ 8,66 SAY "e use or"
@ 9,11 SAY "uses of interest are those associated with water taken"
@ 9,66 SAY "from surface"
@ 10,11 SAY "waters within a distance of three miles from the locati"
@ 10,66 SAY "on of the"
@ 11,11 SAY "hazardous substance. Assign a value as follows:"

```

```

@ 13,11 SAY "ASSIGNED"
@ 14,12 SAY "VALUE      SURFACE-WATER USE (FRESH OR SALT WATER)"
@ 16,13 SAY "1          Commercial or industrial"
@ 17,13 SAY "2          Irrigation, economically important resources"
@ 17,68 SAY "(e.g., "
@ 18,23 SAY "shellfish), commercial food preparation, or recreation"
@ 19,23 SAY "(e.g., fishing, boating, swimming)"
@ 20,13 SAY "3          Drinking Water"
@ 22,11 SAY "Enter assigned value of selected option:"

@ROW(),COL()+1 GET sw_use RANGE 1,3
READ
IF edj
    pindx = '51'
    DO just
ENDIF

@ 6,6 CLEAR
DO disenv.fmt
done = ' '
@ROW(),COL()+1 GET done
READ

@ 6,6 CLEAR
DO disenv2.fmt
@ROW(),COL()+1 GET sw_dis_env PICTURE '9' RANGE 0,3
READ
IF edj
    pindx = '52'
    DO just
ENDIF

STORE 0 TO score
STORE 0 TO hiscore
STORE ' 0 0 0 0 0 0 4 6 8 10 0 8 12 16 20' TO mat1
STORE ' 0 12 18 24 30 1 16 24 32 35 0 20 30 35 40' TO mat2
STORE mat1 + mat2 TO mat

@ 6,6 CLEAR
@ 7,11 SAY "POPULATION SERVED BY SURFACE WATER WITH WATER INTAKE WI"
@ 7,66 SAY "THIN THREE"
@ 8,11 SAY "MILES DOWNSTREAM FROM FACILITY (or one mile in static s"
@ 8,66 SAY "urface water"
@ 9,11 SAY "such as a lake) is a rough indicator of the potential h"
@ 9,66 SAY "azard exposure"
@ 10,11 SAY "of the nearby population served by potentially contamin"
@ 10,66 SAY "ated surface"
@ 11,11 SAY "water. Measure the distance from the probably point of"
@ 11,67 SAY "entry to"
@ 12,11 SAY "surface water following the surface-water flow (stream"
@ 12,66 SAY "miles)."
```

"The distance is measured from the hazardous substance,"

"including"

"observations in stream or sediment samples, regardless"

```

@ 15,66 SAY "of facility"
@ 16,11 SAY "boundaries to the point of intake."
@ 18,11 SAY "The population includes residents as well as others who"
@ 18,67 SAY "would"
@ 19,11 SAY "regularly use the water such as workers in factories or"
@ 19,67 SAY "offices"
@ 20,11 SAY "and students. Each water-source population group must"
@ 20,66 SAY "be calculated"
@ 21,11 SAY "separately."
@ 23,11 SAY "Enter the total number of water-source population group"
@ 23,66 SAY "s:"

```

```

STORE sw_pop_all + SPACE(20) TO old
nop = VAL (SUBSTR(old,1,1))
@ ROW(),COL()+1 GET nop PICTURE '9' RANGE 0,9
READ
STORE STR(nop,1) TO new

```

```

n = 1
DO WHILE n < nop+1

```

```

@ 6,6 CLEAR
@ 7,11 SAY "Population Group:"+STR(n)
@ 9,11 SAY "ASSIGNED"
@ 10,12 SAY "VALUE      DISTANCE TO SURFACE WATER"
@ 12,13 SAY "0          >3 miles"
@ 13,13 SAY "1          2 to 3 miles"
@ 14,13 SAY "2          1 to 2 miles"
@ 15,13 SAY "3          2001 feet to 1 mile"
@ 16,13 SAY "4          <2000 ft"
@ 18,11 SAY "Enter assigned value of selected distance:"

```

```

STORE VAL(SUBSTR(old,n*2,1)) TO dindx
@ ROW(),COL()+1 GET dindx PICTURE '9' RANGE 0,4
READ
STORE new + STR(dindx,1) TO new

```

```

IF n=1
@ 6,6 CLEAR
@ 7,11 SAY "INDICATE THE POPULATION SERVED BY SURFACE WATER WITH WA"
@ 7,66 SAY "TER INTAKE"
@ 8,11 SAY "WITHIN THREE MILES DOWNSTREAM FROM FACILITY (or one mil"
@ 8,66 SAY "e in static"
@ 9,11 SAY "surface water such as a lake). The population includes"
@ 9,67 SAY "residents"
@ 10,11 SAY "as well as others who would regularly use the water suc"
@ 10,66 SAY "h as workers"
@ 11,11 SAY "in factories or offices and students. Include employee"
@ 11,66 SAY "s in"
@ 12,11 SAY "restaurants, motels, or campground, but exclude custome"
@ 12,66 SAY "rs and"
@ 13,11 SAY "travelers passing through the area in autos, buses and"
@ 13,66 SAY "trains."
@ 14,11 SAY "Where only residential houses can be counted (e.g., fro"

```



```

@ 14,66 SAY "m an aerial"
@ 15,11 SAY "photograph), and residents are known to be using surfac"
@ 15,66 SAY "e water,"
@ 16,11 SAY "assume 3.8 individuals per dwelling unit. Where surfac"
@ 16,66 SAY "e water is"
@ 17,11 SAY "used for irrigation, convert to population by assuming"
@ 17,66 SAY "1.5 persons"
@ 18,11 SAY "per acre of land irrigated."
@ 20,11 SAY "Press any key to continue . . ."
done = ' '
@ 20,COL()+1 GET done PICTURE 'X'
READ
ENDIF

STORE VAL(SUBSTR(old,n*2+1,1)) TO pndx
@ 6,6 CLEAR
DO popin.fmt
@ 7,10 SAY 'Population group: '+STR(n)
@ 20,10 SAY 'Population served by surface water: '
@ ROW(),COL()+1 GET pndx PICTURE '9' RANGE 0,5
READ
STORE new + STR(pndx,1) TO new

ndx = pndx*15+dindx*3+1
score = VAL ( SUBSTR (mat, ndx, 3))

IF score > hiscore
    hiscore = score
ENDIF

n = n + 1
ENDDO

REPLACE sw_pop_all WITH new
REPLACE sw_dis_pop WITH hiscore
IF edj
    pindx = '53'
    DO just
ENDIF

DO edroute
ENDDO

RETURN
*-----
*-----
*
*   Module:                SWPRINT2                1/21/86  RAP
*
*                           Print mHRS and HRS Surface Water worksheet
*
*-----
STORE ' ' TO x

```

```

SELECT 8
  USE swwork2

GOTO 4
  REPLACE desc WITH j->fac_name
  REPLACE max WITH SPACE(8)+DTC(mdate)
GOTO 5
  REPLACE desc WITH 'Site: '+j->site_name
  REPLACE max WITH 'Site index: '+STR(mhrsindx,4)

GOTO 11
x = STR(a->sw_observe,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 17
x = STR(a->sw_slope,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 19
x = STR(a->sw_rainfal,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 20
REPLACE value WITH STR(a->sw_dis_sur,3)
REPLACE score WITH STR(a->sw_dis_sur*2,5)

GOTO 22
x = STR(a->sw_phystat,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 24
REPLACE score WITH STR(a->sw_tot_rou,5)

GOTO 27
x = STR(a->sw_contain,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 31
x = STR(a->sw_tox_per,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 32
x = STR(a->sw_hw_quan,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 34
x = STR(a->sw_rad_mo,3)

```

```

REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 35
x = STR(a->sw_rad_mp,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 37
REPLACE score WITH STR(a->sw_ch_wc,5)
GOTO 38
REPLACE score WITH STR(a->sw_rad_mx,5)

GOTO 41
REPLACE value WITH STR(a->sw_use,3)
REPLACE score WITH STR(a->sw_use*3,5)

GOTO 42
REPLACE value WITH STR(a->sw_dis_env,3)
REPLACE score WITH STR(a->sw_dis_env*2,5)

GOTO 44
REPLACE value WITH STR(a->sw_dis_pop,3)
REPLACE score WITH STR(a->sw_dis_pop,5)

GOTO 48
REPLACE score WITH STR(a->sw_tot_tar,6)

GOTO 50
REPLACE score WITH STR(a->sw_sc*643.5,6)

GOTO 51
REPLACE score WITH STR(a->sw_sr*643.5,6)

GOTO 53
REPLACE mult WITH STR(a->sw_sc,6,2)
REPLACE score WITH 'Sr(sw)=T'
REPLACE max WITH STR(a->sw_sr,6,2)

IF pm2 .OR. iwf
  IF pm2
    SET PRINT ON
    ? CHR(12)
  ENDIF
  GOTO TOP
  DO WHILE .NOT. EOF()
    ? desc+value+mult+score+max
    SKIP
  ENDDO
  SET PRINT OFF
ENDIF

IF hrs .AND. (ph2 .OR. iwf)

```

```

IF ph2
  SET PRINT ON
  ? CHR(12)
ENDIF

GOTO 31
x = STR(j->sw_hrs_tp,3)
REPLACE value WITH x
REPLACE score WITH ' '+x

GOTO 53
REPLACE mult WITH STR(j->hrs_s_sw,6,2)
REPLACE score WITH ' '
REPLACE max WITH ' '

? CHR(12)
GOTO TOP
? desc+value+mult+score+max
?'          HRS Surface Water Route Work Sheet'
?'          ====='
GOTO 4
DO WHILE RECNO() < 33
  ? desc+value+mult+score+max
  SKIP
ENDDO
?
?
?
?
GOTO 36
? desc+value+mult+score+max
?'      Total Waste Characteristics Score          ',j->sw_hrs_wc,'      26'

GOTO 39
DO WHILE RECNO() < 50
  ? desc+value+mult+score+max
  SKIP
ENDDO
?'6. If line 1=45 (1x4x5)'
?'  If line 1=0 (2x3x4x5)'
??j->hrs_s_sw*643.5,' 64350'
GOTO 52
DO WHILE .NOT. EOF()
  ? desc+value+mult+score+max
  SKIP
ENDDO
SET PRINT OFF
ENDIF

RETURN
*-----

```


APPENDIX B

mHRS/HRS USER-GENERATED DATA FILE STRUCTURES

APPENDIX B

mHRS/HRS USER-GENERATED DATA FILE STRUCTURES

Each of the user-generated data files has its own dBASE III structure. These structures are listed on the following pages. The data files are listed in alphabetical order and the fields in each by field number.

*-----
 STRUCTURE FOR DATABASE : COVER

Field	Field Name	Type	Width	Dec
1	FAC NAME	Character	60	
2	SITE NAME	Character	60	
3	IDENT	Character	60	
4	SITE INDX	Numeric	4	
5	SITE LOG	Character	8	
6	FAC LOCATE	Character	60	
7	EPA REGION	Character	40	
8	PER_CONTC1	Character	40	
9	PER_CONTC2	Character	40	
10	PER_CONTC3	Character	40	
11	REVIEWER	Character	40	
12	REV DATE	Date	8	
13	FAC TYPE	Character	60	
14	HS TYPE	Character	60	
15	MAJOR ROUT	Character	60	
16	INFO NEEDS	Character	60	
17	DESC_COM1	Character	60	
18	DESC_COM2	Character	60	
19	DESC_COM3	Character	60	
20	HRS S M	Numeric	8	3
21	HRS S GW	Numeric	8	3
22	HRS S SW	Numeric	8	3
23	HRS S A	Numeric	8	3
24	HRS S FE	Numeric	8	3
25	HRS S DC	Numeric	8	3
26	MHRS S M	Numeric	8	3
27	MHRS S GW	Numeric	8	3
28	MHRS S SW	Numeric	8	3
29	MHRS S A	Numeric	8	3
30	MHRS S FE	Numeric	8	3
31	MHRS S DC	Numeric	8	3
32	M DATE	Date	8	
33	SWP	Logical	1	
34	SWP	Logical	1	
35	AP	Logical	1	
36	FEP	Logical	1	
37	DCP	Logical	1	
38	GW HRS TP	Numeric	3	
39	GW HRS WC	Numeric	3	
40	SW HRS TP	Numeric	3	
41	SW HRS WC	Numeric	3	
42	A HRS RE	Numeric	3	
43	A HRS IN	Numeric	3	
44	A HRS RI	Numeric	3	
45	A HRS TX	Numeric	3	
46	A HRS WC	Numeric	3	
47	DC HRS WC	Numeric	3	

** Total **

1020

STRUCTURE FOR DATABASE : MHRS

Field	Field Name	Type	Width	Dec
1	SITE_INDX	Numeric	4	
2	SITE_AREA	Numeric	10	2
3	CF	Numeric	3	1
4	GW_OBSERVE	Numeric	2	
5	GW_DEPTH	Numeric	1	
6	GW_PRECIP	Numeric	1	
7	GW_PERMBIL	Numeric	1	
8	GW_PHYSTAT	Numeric	1	
9	GW_TOT_ROU	Numeric	3	
10	GW_CON_1	Numeric	1	
11	GW_CON_2	Numeric	1	
12	GW_CON_3	Numeric	1	
13	GW_CON_4	Numeric	1	
14	GW_CONTAIN	Numeric	1	
15	GW_TOX_PER	Numeric	3	
16	GW_TONS	Numeric	10	2
17	GW_HW_QUAN	Numeric	1	
18	GW_CH_WC	Numeric	3	
19	GW_USE	Numeric	1	
20	GW_POP_ALL	Character	20	
21	GW_DIS_POP	Numeric	2	
22	GW_TOT_TAR	Numeric	3	
23	GW_RAD	Logical	1	
24	GW_RAD_MO	Numeric	10	5
25	GW_RAD_MP	Numeric	10	5
26	GW_RAD_MX	Numeric	10	5
27	SW_OBSERVE	Numeric	2	
28	SW_FSLOPE	Numeric	1	
29	SW_TSLOPE	Numeric	1	
30	SW_SLOPE	Numeric	1	
31	SW_RAINFAL	Numeric	1	
32	SW_DIS_SUR	Numeric	1	
33	SW_PHYSTAT	Numeric	1	
34	SW_TOT_ROU	Numeric	3	
35	SW_CON_1	Numeric	1	
36	SW_CON_2	Numeric	1	
37	SW_CON_3	Numeric	1	
38	SW_CON_4	Numeric	1	
39	SW_CON_LOG	Logical	1	
40	SW_CONTAIN	Numeric	1	
41	SW_TOX_PER	Numeric	3	
42	SW_TONS	Numeric	10	2
43	SW_HW_QUAN	Numeric	1	
44	SW_RAD	Logical	1	
45	SW_RAD_MO	Numeric	10	5
46	SW_RAD_MP	Numeric	10	5
47	SW_RAD_MX	Numeric	10	5
48	SW_FLOW	Numeric	16	4

(Contd)

Field	Field Name	Type	Width	Dec
49	FLUNIT	Character	6	
50	SW_CH WC	Numeric	5	
51	SW_USE	Numeric	1	
52	SW_DIS ENV	Numeric	3	
53	SW_POP ALL	Character	20	
54	SW_DIS POP	Numeric	3	
55	SW_TOT TAR	Numeric	3	
56	A_OBSERVE	Numeric	3	
57	A_DATE	Character	8	
58	A_LOC	Character	60	
59	A_SAM PRO	Character	60	
60	A_REACT	Numeric	1	
61	A_INCOMP	Numeric	1	
62	A_RE IN	Numeric	3	
63	A_TOX	Numeric	3	
64	A_TONS	Numeric	10	2
65	A_HW QUAN	Numeric	1	
66	A_RAD	Logical	1	
67	A_RAD MO	Numeric	10	5
68	A_CH WC	Numeric	3	
69	A_POP 1	Numeric	8	
70	A_POP 2	Numeric	8	
71	A_POP 3	Numeric	8	
72	A_POP 4	Numeric	8	
73	A_POP	Numeric	3	
74	A_DIST	Numeric	1	
75	A_LAND ALL	Character	5	
76	A_LAND USE	Numeric	1	
77	A_TOT TAR	Numeric	3	
78	FE CONTAIN	Numeric	1	
79	FE DIR EVI	Numeric	1	
80	FE IGNITE	Numeric	1	
81	FE REACT	Numeric	1	
82	FE_INCOMP	Numeric	1	
83	FE_TONS	Numeric	10	2
84	FE MEAS	Logical	1	
85	FE VOL	Numeric	19	4
86	FE_HW QUAN	Numeric	1	
87	FE_CH WC	Numeric	3	
88	FE_RAD MP	Numeric	10	3
89	FE_RD WC	Numeric	3	
90	FE_DIS POP	Numeric	3	
91	FE_DIS BLD	Numeric	3	
92	FE_SEN 1	Logical	1	
93	FE_SEN 2	Numeric	1	
94	FE_SEN 3	Logical	1	
95	FE_DIS ENV	Numeric	3	
96	FE_LAN ALL	Character	5	
97	FE_USE	Numeric	3	
98	FE_POP	Numeric	3	

(Contd)

Field	Field Name	Type	Width	Oec
99	FE_BLDG	Numeric	3	
100	FE_TOT_TAR	Numeric	3	
101	OC_OBSERVE	Numeric	3	
102	DC_ACCESS	Numeric	1	
103	DC_CONTAIN	Numeric	2	
104	DC_CH_WC	Numeric	3	
105	DC_MEAS	Logical	1	
106	DC_VOL	Numeric	19	2
107	DC_RAD_MP	Numeric	10	5
108	DC_POP	Numeric	3	
109	DC_DIS	Numeric	3	
110	DC_TOT_TAR	Numeric	3	
111	RAD	Logical	1	
112	CHEM	Logical	1	
113	SUR_IMPND	Logical	1	
114	CONTAINER	Logical	1	
115	PILES	Logical	1	
116	LANDFILL	Logical	1	
117	GW_SC	Numeric	10	5
118	GW_SR	Numeric	10	5
119	SW_SC	Numeric	10	5
120	SW_SR	Numeric	10	5
121	A_SC	Numeric	10	5
122	A_SR	Numeric	10	5
123	FE_SC	Numeric	10	5
124	FE_SR	Numeric	10	5
125	DC_SC	Numeric	10	5
126	DC_SR	Numeric	10	5
** Total **			669	

STRUCTURE FOR DATABASE : CONC

Field	Field Name	Type	Width	Dec
1	SITE INDX	Numeric	4	
2	CHEM_NUC	Character	1	
3	CN INDX	Numeric	3	
4	NAME	Character	30	
5	TOX INDX	Numeric	1	
6	PERS INDX	Numeric	1	
7	IGNIT INDX	Numeric	1	
8	REACT INDX	Numeric	1	
9	INCOM INDX	Character	3	
10	INCOM IND2	Character	3	
11	AIR GROUP	Character	1	
12	SW GROUP	Character	1	
13	GW GROUP	Character	1	
14	FE GROUP	Character	1	
15	DC GROUP	Character	1	
16	GW PHY	Numeric	1	
17	SW PHY	Numeric	1	
18	CONC	Numeric	10	3
19	CONC UNIT	Character	8	
20	GW CONC	Numeric	19	4
21	SW CONC	Numeric	19	4
22	A CONC	Numeric	19	4
23	FE CONC	Numeric	19	4
24	DC CONC	Numeric	19	4
25	TP SCORE	Numeric	2	
26	GW PATH	Logical	1	
27	SW PATH	Logical	1	
28	A PATH	Logical	1	
29	FE PATH	Logical	1	
30	DC PATH	Logical	1	
31	TRCD	Numeric	3	
32	HW QUAN	Numeric	16	4
33	QU UNITS	Character	8	
** Total **			203	

STRUCTURE FOR DATABASE : JUST

Field	Field Name	Type	Width	Dec
1	SITE INDX	Numeric	4	
2	USEFLG	Logical	1	
3	R_INDX	Character	1	
4	P_INDX	Character	2	
5	NOTES	Memo	10	
** Total **			19	

APPENDIX C

mHRS/HRS PROGRAM DATA FILE STRUCTURES

APPENDIX C

mHRS/HRS PROGRAM DATA FILE STRUCTURES

Each program data file is structured for dBASE III. The structures are listed on the following pages. The data files are listed in alphabetical order, the data fields in numerical order.

STRUCTURE FOR DATABASE : CHEMICAL

Field	Field Name	Type	Width	Dec
1	CHEM NAME	Character	45	
2	NEW FLG	Logical	1	
3	TOX INDX	Numeric	1	
4	PERS INDX	Numeric	1	
5	IGNIT INDX	Numeric	1	
6	REACT INDX	Numeric	1	
7	INCOM INDX	Character	3	
8	INCOM IND2	Character	3	
9	C INDX	Numeric	3	
** Total **			60	

STRUCTURE FOR DATABASE : NUCLIDES

Field	Field Name	Type	Width	Dec
1	N INDX	Numeric	3	
2	ELEMENT	Character	2	
3	ISOTOPE	Character	8	
4	AIR GROUP	Character	1	
5	SW GROUP	Character	1	
6	GW GROUP	Character	1	
7	FE GROUP	Character	1	
8	DC GROUP	Character	1	
9	TRCO	Numeric	3	
10	TOX INDX	Numeric	1	
11	PERS INDX	Numeric	1	
12	IGNIT INDX	Numeric	1	
13	REACT INDX	Numeric	1	
14	INCOM INDX	Character	3	
15	INCOM IND2	Character	3	
** Total **			32	

STRUCTURE FOR DATABASE : SUBPARA

Field	Field Name	Type	Width	Dec
1	R INDX	Character	1	
2	P INDX	Character	2	
3	DESC	Character	35	
** Total **			39	

STRUCTURE FOR DATABASE : MATRIX

Field	Field Name	Type	Width	Dec
1	RTINDX	Numeric	1	
2	GROUP	Character	1	
3	ATMINUS3	Numeric	2	
4	ATMINUS2	Numeric	2	
5	ATMINUS1	Numeric	2	
6	ATZERO	Numeric	2	
7	ATPLUS1	Numeric	2	
8	ATPLUS2	Numeric	2	
9	ATPLUS3	Numeric	2	
10	ATPLUS4	Numeric	2	
11	ATPLUS5	Numeric	2	
12	ATPLUS6	Numeric	2	
13	ATPLUS7	Numeric	2	
14	ATPLUS8	Numeric	2	
15	ATPLUS9	Numeric	2	
** Total **			29	

STRUCTURE FOR DATABASE : WORK

Field	Field Name	Type	Width	Dec
1	WORK	Character	20	
2	CSCORE	Numeric	2	
** Total **			22	

STRUCTURE FOR DATABASE : WORK2

Field	Field Name	Type	Width	Dec
1	NAME	Character	30	
2	ID1	Numeric	3	
3	ID2	Character	3	
4	ID3	Character	3	
** Total **			40	

STRUCTURE FOR DATABASE : AWORK2

Field	Field Name	Type	Width	Dec
1	DESC	Character	36	
2	VALUE	Character	3	
3	MULT	Character	11	
4	SCORE	Character	6	
5	MAX	Character	18	
** Total **			75	

STRUCTURE FOR DATABASE : DCWORK2

Field	Field Name	Type	Width	Dec
1	DESC	Character	36	
2	VALUE	Character	3	
3	MULT	Character	11	
4	SCORE	Character	6	
5	MAX	Character	18	
** Total **			75	

STRUCTURE FOR DATABASE : FEWORK2

Field	Field Name	Type	Width	Dec
1	DESC	Character	36	
2	VALUE	Character	3	
3	MULT	Character	11	
4	SCORE	Character	6	
5	MAX	Character	18	
** Total **			75	

STRUCTURE FOR DATABASE : GWORK2

Field	Field Name	Type	Width	Dec
1	DESC	Character	36	
2	VALUE	Character	3	
3	MULT	Character	11	
4	SCORE	Character	6	
5	MAX	Character	18	
** Total **			75	

STRUCTURE FOR DATABASE : SWWORK2

Field	Field Name	Type	Width	Dec
1	DESC	Character	36	
2	VALUE	Character	3	
3	MULT	Character	11	
4	SCORE	Character	6	
5	MAX	Character	18	
** Total **			75	

APPENDIX D

mHRS/HRS PROGRAM DATA FILE LISTING

APPENDIX D

mHRS/HRS PROGRAM DATA FILE LISTING

This file is used by the program as a library of data to be used in calculating scores.

LISTING OF DATABASE : CHEMICAL

1	1,1,1-trichloroethane	2	2	1	2 0	0
2	1,1,2,3,4,4-hexachloro-1,3-butadiene	3	3	1	1 0	0
3	1,1,2-trichloroethane	3	3	0	1 2-B	0
4	1,1,3,3-tetrachloroacetone	3	3	0	0 0	0
5	1,1-dichloro-2-chloro ethylene	3	2	2	1 4-A	0
6	1,2,2-trichloroethane	1	3	0	1 2-B	0
7	1,2,3,4,5,6-hexachlorocyclohexane	3	3	1	0 0	D
8	1,2,4-trichlorobenzene	2	3	1	0 6-B	0
9	1,2-benzene dicarboxylic acid anhydride	3	1	0	1 6-B	0
10	1,2-dichloroethane	2	1	3	0 2-B	0
11	1,2-dichloroethylene	2	1	0	1 D	0
12	1,2-dimethoxy benzene	2	1	0	1 6-B	0
13	1,3-dioxophthalan	3	1	0	1 6-B	0
14	1,3-isobenzofurandione	3	1	0	1 6-B	0
15	1,3-phthalandione	3	1	0	1 6-B	0
16	1,4-dichlorobenzene	3	3	1	1 6-B	0
17	1,4-dicyano butane	3	2	1	1 6-B	0
18	1,6-hexolactam	3	1	0	0 0	0
19	1-aminopropane	2	0	3	1 6-B	2-B
20	1-chloro-2,2-dichloro ethylene	3	2	2	1 4-A	0
21	1-chloro-3-nitrobenzene	3	3	1	0 6-B	0
22	1-hydroxy methyl propane	3	0	2	1 4-A	3-A
23	1-hydroxy-2-methoxybenzene	2	2	1	1 6-B	0
24	1-phenyl ethanone	3	0	1	1 6-B	0
25	1-phenyl propane	2	1	2	1 6-B	0
26	1-phenylbutane	1	1	2	1 6-B	0
27	1-phenylethanol	3	1	0	1 6-B	0
28	1-propanol	3	0	3	1 6-B	4-A
29	1-propyl alcohol	3	0	3	1 6-B	4-A
30	1-terpineol	1	1	0	0 0	0
31	2,2-dichloroethyl ether	3	2	2	1 1-A	6-B
32	2,4,6-trichlorophenol	3	3	0	0 0	0
33	2,4,6-trinitrotoluene	3	2	2	3 4-A	0
34	2,6-dimethyl-4-heptanol	2	0	1	1 6-B	0
35	2,6-dinitrotoluene	3	2	0	D 6-B	0
36	2-azacycloheptanone	3	1	0	0 0	0
37	2-bromo-2-methylpropane	3	1	0	0 0	0
38	2-bromoisobutane	3	1	0	0 0	0
39	2-butanone	3	0	3	0 6-B	0
40	2-camphanol	2	2	1	1 6-B	0
41	2-ethyl-2-methyl-1,3-dioxolane	2	2	0	0 0	0
42	2-ethylhexyl phthalate	2	3	0	0 0	0
43	2-hydroxy camphane	2	2	1	1 6-B	0
44	2-hydroxyanisole	2	2	1	1 6-B	0
45	2-ketohexamethylenimine	3	1	0	0 0	0
46	2-methoxy phenol	2	2	1	1 6-B	0
47	2-methoxy-4-propenyl phenol	2	2	1	1 6-B	0
48	2-methyl butanol	2	0	2	1 SAX	0

49	2-methyl butanol-1	2	0	2	1 SAX	0
50	2-methyl propyl alcohol	3	0	2	1 4-A	3-A
51	2-methyl-1-propanol	3	0	2	1 4-A	3-A
52	2-methyl-5-ethyl pyridine	2	1	1	1 6-B	0
53	2-methyl-5-ethyl-pyridine	2	1	1	1 6-B	0
54	2-methylpropanol	3	0	2	1 4-A	3-A
55	2-oxohexamethylenimine	3	1	0	0 0	0
56	2-pentanol	2	0	2	1 6-B	0
57	2-perhydroazepinone	3	1	0	0 0	0
58	2-phenylpropene	3	2	0	1 0	0
59	2-phenylpropylene	3	2	0	1 0	0
60	2-propanol	2	0	3	1 6-B	4-A
61	3,4-dimethyl phenol	1	1	0	1 0	0
62	3,4-xlenol	1	1	0	1 0	0
63	3-chlorochlordene	3	3	0	0 0	0
64	3-ethyl-6-methyl pyridine	2	1	1	1 6-B	0
65	4,6-dinitro-2-aminophenol	3	3	0	0 0	0
66	4-propenylguaiaicol	2	2	1	1 6-B	0
67	5,5-diethylbarbituric acid	3	2	0	0 0	0
68	5-ethyl-2-methyl pyridine	2	1	1	1 6-B	0
69	5-ethyl-2-picoline	2	1	1	1 6-B	0
70	5-ethyl-alpha-picoline	2	1	1	1 6-B	0
71	6-aminohexanoic acid cyclic lactam	3	1	0	0 0	0
72	6-methyl-3-ethyl pyridine	2	1	1	1 6-B	0
73	BHC	3	3	0	0 0	0
74	Celluflex TPP	2	3	1	0 0	0
75	ODT	3	3	0	0 0	0
76	OMP	3	3	0	1 6-B	0
77	DMSO	3	2	0	1 4-A	6-B
78	DOP	2	3	0	0 0	0
79	Dow-tri	3	2	2	1 4-A	0
80	Dowicide 2s	3	3	0	0 0	0
81	Freon 11	2	3	0	2 2-B	0
82	Gamasol 90	3	2	0	1 4-A	6-B
83	Julin's carbon chloride	3	3	0	1 SAX	0
84	MEK	3	0	3	0 6-B	0
85	PCB	3	3	0	0 0	0
86	Seneca oil	3	1	2	0 0	0
87	Shellsol 140	3	1	2	1 6-B	0
88	TNT	3	2	2	3 4-A	0
89	Thompson's Wood Fix	3	3	0	0 0	0
90	Tri-clene	3	2	2	1 4-A	0
91	absolute ethanol	3	0	3	1 4-A	3-A
92	acenaphthylene	2	2	0	0 0	0
93	acetaldehyde	2	0	3	2 4-B	3-B
94	acetic acid	2	0	2	1 6-B	0
95	acetic acid methyl ester	2	1	3	1 6-B	0
96	acetone	2	0	3	0 4-A	0
97	acetophenone	3	0	1	1 6-B	0
98	acetyl benzene	3	0	1	1 6-B	0
99	acetylene dichloride	2	1	0	1 0	0

100	acetylene trichloride	3	2	2	1 4-A	0
101	adipic acid bis(2-ethylhexyl)ester	2	1	0	0 0	0
102	adipic acid dinitrile	3	2	1	1 6-B	0
103	adipic acid nitrile	3	2	1	1 6-B	0
104	adipodinitrile	3	2	1	1 6-B	0
105	adiponitrile	3	2	1	1 6-B	0
106	alcohol	3	0	3	1 4-A	3-A
107	alcohol, anhydrous	3	0	3	1 4-A	3-A
108	alcohol, dehydrated	3	0	3	1 4-A	3-A
109	aldehyde collidine	2	1	1	1 6-B	0
110	aldrin	3	3	1	0 0	0
111	alpha-methylbenzyl alcohol	3	1	0	1 6-B	0
112	alpha-methylstyrene	3	2	0	1 0	0
113	alpha-phenethyl alcohol	3	1	0	1 6-B	0
114	alpha-trichloroethane	2	2	1	0 0	0
115	aminocaproic lactam	3	1	0	0 0	0
116	aminoethane	3	0	3	2 6-B	0
117	ammonia, anhydrous	3	0	1	0 4-A	3-A
118	anhydrol	3	0	3	1 4-A	3-A
119	aniline	3	1	2	0 6-A	1-A
120	aromatic hydrocarbons, mixed	2	1	3	0 6-B	0
121	azotic acid	3	0	0	0 6-A	0
122	barbital	3	2	0	0 0	0
123	baros camphor	2	2	1	1 6-B	0
124	base oil	3	1	2	0 0	0
125	benzene	3	1	3	0 6-B	0
126	benzene carboxylic acid	2	0	0	1 6-B	0
127	benzene hexachloride	3	3	0	0 0	0
128	benzene sulfonic acid	3	1	0	1 0	0
129	benzoic acid	2	0	0	1 6-B	0
130	benzopyrene	3	3	0	0 0	0
131	benzothiazole	3	3	0	0 0	0
132	benzoyl methide	3	0	1	1 6-B	0
133	benzyl butyl phthalate	2	3	0	0 6-B	0
134	beta-phenylpropene	3	2	0	1 0	0
135	beta-phenylpropylene	3	2	0	1 0	0
136	beta-trichloroethane	3	3	0	1 2-B	0
137	bhimsaim camphor	2	2	1	1 6-B	0
138	bihexyl	3	1	1	1 6-B	0
139	bis(2-chloroethyl)ether	3	2	2	1 1-A	6-B
140	bis(2-chloroisopropyl)ether	3	3	1	1 6-B	0
141	bis(2-ethylhexyl)adipate	2	1	0	0 0	0
142	bis(2-ethylhexyl)phthalate	2	3	0	0 0	0
143	bis(beta-chloroethyl)ether	3	2	2	1 1-A	6-B
144	bis(chloromethyl)ether	3	2	3	3 6-B	0
145	borneo camphor	2	2	1	1 6-B	0
146	borneol	2	2	1	1 6-B	0
147	bornyl alcohol	2	2	1	1 6-B	0
148	bromobenzene	2	2	2	1 6-B	0
149	bromodichloromethane	2	3	0	0 0	0
150	bromoform	3	3	0	0 2-B	4-B

151	camphor	3	2	1	1 6-B	0
152	camphor tar	3	1	2	0 6-B	0
153	caprolactam	3	1	0	0 0	0
154	carbinol	3	0	3	1 6-B	0
155	carbolic acid	3	1	2	0 6-B	0
156	carbon bisulfide	3	1	3	2 6-B	2-B
157	carbon hexachloride	3	3	2	1 1-B	2-B
158	carbon sulfide	3	1	3	2 6-B	2-B
159	carbon tetrachloride	3	3	0	0 SAX	0
160	carbon-disulfide	3	1	3	2 6-B	2-B
161	chlordane	3	3	0	0 0	0
162	chlorobenzene	2	2	3	0 6-B	0
163	chloroethene	2	2	1	0 0	0
164	chloroform	3	3	0	0 4-B	2-B
165	chlorohydric acid	3	0	0	0 1-B	0
166	chloromethane	3	2	3	2 2-B	6-B
167	chloromethyl ether	3	2	3	3 6-B	0
168	chlorothene	2	2	1	0 0	0
169	cinnamene	3	1	2	1 6-B	4-A
170	cinnamenol	3	1	2	1 6-B	4-A
171	coal oil	3	1	2	0 0	0
172	cologne spirits	3	0	3	1 4-A	3-A
173	colonial spirit	3	0	3	1 6-B	0
174	columbian spirits	3	0	3	1 6-B	0
175	compound 666	3	3	0	0 0	0
176	crude oil	3	1	2	0 0	0
177	cyclohexane	2	2	3	0 6-B	0
178	cyclohexanone iso-oxime	3	1	0	0 0	0
179	d-limonene	3	1	0	1 SAX	0
180	decane	3	1	2	1 6-B	0
181	di(2-ethylhexyl)phthalate	2	3	0	0 0	0
182	di-2-ethylhexyl adipate	2	1	0	0 0	0
183	di-isobutyl carbinol	2	0	1	1 6-B	0
184	di-isobutyl phthalate	3	3	0	1 0	0
185	di-n-butylphthalate	3	3	0	1 6-B	0
186	di-n-hexyl phthalate	1	3	1	1 6-B	0
187	dibutyl phthalate	3	3	0	1 6-B	0
188	dichlorobromomethane	2	3	0	0 0	0
189	dichlorodifluoroethane	2	3	0	0 0	0
190	dichlorodiisopropyl ether	3	3	1	1 6-B	0
191	dichloroethane	2	1	3	0 2-B	0
192	dichloroethyl oxide	3	2	2	1 1-A	6-B
193	dieldrin	3	3	0	0 0	0
194	diethyl phthalate	3	3	0	0 0	0
195	diethylbarbitone	3	2	0	0 0	0
196	diethylmalonylurea	3	2	0	0 0	0
197	dihexyl	3	1	1	1 6-B	0
198	dihexyl phthalate	1	3	1	1 6-B	0
199	dimethyl carbinol	2	0	3	1 6-B	4-A
200	dimethyl parathion	3	0	3	2 0	0
201	dimethyl phthalate	3	3	0	1 6-B	0
202	dimethyl sulfoxide	3	2	0	1 4-A	6-B
203	dioctyl adipate	2	1	0	0 0	0

204	dithiocarbonic anhydride	3	1	3	2 6-B	2-B
205	dryobalanops camphor	2	2	1	1 6-B	0
206	duodecane	3	1	1	1 6-B	0
207	e-caprolactam	3	1	0	0 0	0
208	endrin	3	3	1	0 0	0
209	epoxy heptachlor	3	3	0	0 0	0
210	ethanamine	3	0	3	2 6-B	0
211	ethane hexachloride	3	3	2	1 1-B	2-B
212	ethane trichloride	3	3	0	1 2-B	0
213	ethanol	3	0	3	1 4-A	3-A
214	ethanol 200 proof	3	0	3	1 4-A	3-A
215	ethers	2	1	9	9 0	0
216	ethyl alcohol	3	0	3	1 4-A	3-A
217	ethyl alcohol anhydrous	3	0	3	1 4-A	3-A
218	ethyl benzene	2	1	3	0 6-B	0
219	ethyl carbinol	3	0	3	1 6-B	4-A
220	ethyl hydrate	3	0	3	1 4-A	3-A
221	ethyl hydroxide	3	0	3	1 4-A	3-A
222	ethyl methyl ketone	3	0	3	0 6-B	0
223	ethylamine	3	0	3	2 6-B	0
224	ethylbenzol	2	1	3	0 6-B	0
225	ethylene acetic acid	2	2	0	0 0	0
226	ethylene hexachloride	3	3	2	1 1-B	2-B
227	ethylene trichloride	3	2	2	1 4-A	0
228	ethylphthalate	3	3	0	0 0	0
229	fannoform	3	0	2	0 6-B	0
230	fermentation alcohol	3	0	3	1 4-A	3-A
231	fermentation butyl alcohol	3	0	2	1 4-A	3-A
232	fluorotrichloromethane	2	3	0	2 2-B	0
233	formaldehyde	3	0	2	0 6-B	0
234	formalin	3	0	2	0 6-B	0
235	formalith	3	0	2	0 6-B	0
236	formic acid	2	0	2	0 6-B	0
237	formic aldehyde	3	0	2	0 6-B	0
238	formol	3	0	2	0 6-B	0
239	formylic acid	2	0	2	0 6-B	0
240	fuel oil	3	1	2	0 0	0
241	gammexane	3	3	0	0 0	0
242	grain alcohol	3	0	3	1 4-A	3-A
243	guaiacol	2	2	1	1 6-B	0
244	guaicol	2	2	1	1 6-B	0
245	hendecane	2	0	1	1 6-B	0
246	heptachlor	3	3	0	0 0	0
247	heptachlor epoxide	3	3	0	0 0	0
248	hexachlorbutadiene	3	3	1	1 0	0
249	hexachloro-1,3-butadiene	3	3	1	1 0	0
250	hexachlorobenzene	3	3	0	1 SAX	0
251	hexachlorocyclohexane	3	3	0	0 0	0
252	hexachloroethane	3	3	2	1 1-B	2-B
253	hexachloroethylene	3	3	2	1 1-B	2-B
254	hexahydro-2-azepinone	3	1	0	0 0	0
255	hexahydro-2H-azepin-2-one)	3	1	0	0 0	0

256	hexahydrobenzene	2	2	3	0 6-B	0
257	hexamethylene	2	2	3	0 6-B	0
258	hexanaphthene	2	2	3	0 6-B	0
259	hexane dioic acid dinitrile	3	2	1	1 6-B	0
260	hexanedinitrile	3	2	1	1 6-B	0
261	hexanedioic acid, bis(2-ethylhexyl)ester	2	1	0	0 0	0
262	hexanone isoxime	3	1	0	0 0	0
263	hydrochloric acid	3	0	0	0 1-B	0
264	hydrochloride	3	0	0	0 1-B	0
265	hydrogen carboxylic acid	2	0	2	0 6-B	0
266	hydrogen nitrate	3	0	0	0 6-A	0
267	hydroxybenzene	3	1	2	0 6-B	0
268	hypnone	3	0	1	1 6-B	0
269	indene	2	2	0	1 6-B	1-A
270	indonaphthene	2	2	0	1 6-B	1-A
271	isoacetophorone	2	2	1	1 6-B	0
272	isoborneol	2	2	0	1 0	0
273	isobornyl alcohol	2	2	0	1 0	0
274	isobutanol	3	0	2	1 4-A	3-A
275	isobutyl alcohol	3	0	2	1 4-A	3-A
276	isocamphol	2	2	0	1 0	0
277	isocumene	2	1	2	1 6-B	0
278	isohol	2	0	3	1 6-B	4-A
279	isophorone	2	2	1	1 6-B	0
280	isopropanol	2	0	3	1 6-B	4-A
281	isopropenyl benzene	3	2	0	1 0	0
282	isopropyl alcohol	2	0	3	1 6-B	4-A
283	isopropyl carbinol	3	0	2	1 4-A	3-A
284	isopropyl ether	2	1	3	1 6-B	0
285	karsan	3	0	2	0 6-B	0
286	kerosene	3	1	2	0 0	0
287	lindane	3	3	1	0 0	0
288	m-chloronitrobenzene	3	3	1	0 6-B	0
289	m-cresol	3	1	1	0 1-A	0
290	m-methyl phenol	3	1	1	0 1-A	0
291	malayan camphor	2	2	1	1 6-B	0
292	methanal	3	0	2	0 6-B	0
293	methane	1	1	3	0 6-B	0
294	methanoic acid	2	0	2	0 6-B	0
295	methanol	3	0	3	1 6-B	0
296	methenyl tribromide	3	3	0	0 2-B	4-B
297	methyl acetate	2	1	3	1 6-B	0
298	methyl acetone	3	0	3	0 6-B	0
299	methyl alcohol	3	0	3	1 6-B	0
300	methyl aldehyde	3	0	2	0 6-B	0
301	methyl benzene	3	1	3	0 6-B	0
302	methyl benzene carboxylate	2	0	1	1 6-B	0
303	methyl benzoate	2	0	1	1 6-B	0
304	methyl benzol	3	1	3	0 6-B	0
305	methyl benzothiazole	3	3	0	0 0	0
306	methyl carbinol	3	0	3	1 4-A	3-A

307	methyl chloride	3	2	3	2 2-B	6-B
308	methyl chloroform	2	2	1	0 0	0
309	methyl ethyl ketone	3	0	3	0 6-B	0
310	methyl ethyl pyridine	2	1	1	1 6-B	0
311	methyl hydroxide	3	0	3	1 6-B	0
312	methyl naphthalene	1	1	0	1 0	0
313	methyl parathion	3	0	3	2 0	0
314	methyl phenyl carbinol	3	1	0	1 6-B	0
315	methyl phenyl ketone	3	0	1	1 6-B	0
316	methyl phthalate	3	3	0	1 6-B	0
317	methyl propyl carbinol	2	0	2	1 6-B	0
318	methyl sulfoxide	3	2	0	1 4-A	6-B
319	methylene oxide	3	0	2	0 6-B	0
320	methylnaftalen	1	1	0	1 0	0
321	methyltrichloromethane	2	2	1	0 0	0
322	mixture of p-methenols	1	1	0	0 0	0
323	molasses alcohol	3	0	3	1 4-A	3-A
324	mono-n-propylamine	2	0	3	1 6-B	2-B
325	monofluorotrichloromethane	2	3	0	2 2-B	0
326	monohydroxybenzene	3	1	2	0 6-B	0
327	monohydroxymethane	3	0	3	1 6-B	0
328	moth balls	3	1	2	0 6-B	0
329	moth flakes	3	1	2	0 6-B	0
330	n-butyl benzene	1	1	2	1 6-B	0
331	n-dodecane	3	1	1	1 6-B	0
332	n-nonane	3	1	2	1 6-B	0
333	n-pentadecane	2	0	0	0 0	0
334	n-propanol	3	0	3	1 6-B	4-A
335	n-propyl alcohol	3	0	3	1 6-B	4-A
336	n-propylamine	2	0	3	1 6-B	2-B
337	n-propylbenzene	2	1	2	1 6-B	0
338	n-tridecane	2	0	0	0 0	0
339	n-undecane	2	0	1	1 6-B	0
340	naphthalene	3	1	2	0 6-B	0
341	naphthaline	3	1	2	0 6-B	0
342	naphthene	3	1	2	0 6-B	0
343	niobe oil	2	0	1	1 6-B	0
344	nitrates	2	2	3	3 6-A	0
345	nitric acid	3	0	0	0 6-A	0
346	nitrobenzene	3	2	1	1 4-A	6-B
347	nitrobenzol	3	2	1	1 4-A	6-B
348	o-cresol	2	1	2	0 1-A	0
349	o-dimethoxybenzene	2	1	0	1 6-B	0
350	o-ethylmethyl benzene	1	1	0	1 6-B	0
351	o-ethyltoluene	1	1	0	1 6-B	0
352	o-ethyltoluene	1	1	0	1 6-B	0
353	o-hydroxyanisole	2	2	1	1 6-B	0
354	o-methoxy phenol	2	2	1	1 6-B	0
355	o-methyl phenol	2	1	2	0 1-A	0
356	octane	1	1	3	1 6-B	0
357	octoil	2	3	0	0 0	0
358	octyl adipate	2	1	0	0 0	0

359	oil of vitriol	3	0	0	2 1-B	0
360	omega-caprolactam	3	1	0	0 0	0
361	oxomethane	3	0	2	0 6-B	0
362	oxybenzene	3	1	2	0 6-B	0
363	oxymethylene	3	0	2	0 6-B	0
364	p-cresol	3	1	1	0 1-A	0
365	p-dichlorobenzene	3	3	1	1 6-B	0
366	p-dichlorobenzol	3	3	1	1 6-B	0
367	p-methyl phenol	3	1	1	0 1-A	0
368	paradichlorobenzol	3	3	1	1 6-B	0
369	parathion	3	0	1	2 0	0
370	pentachlorophenol	3	3	0	0 0	0
371	pentachlorophenyl chloride	3	3	0	1 SAX	0
372	pentane	2	1	3	2 6-B	0
373	perchlorobenzene	3	3	0	1 SAX	0
374	perchlorobutadiene	3	3	1	1 0	0
375	perchloroethane	3	3	2	1 1-B	2-B
376	petrohol	2	0	3	1 6-B	4-A
377	petroleum	3	1	2	0 0	0
378	phenic acid	3	1	2	0 6-B	0
379	phenol	3	1	2	0 6-B	0
380	phenyl benzoate	2	1	0	1 0	0
381	phenyl bromide	2	2	2	1 6-B	0
382	phenyl carboxylic acid	2	0	0	1 6-B	0
383	phenyl chloride	2	2	3	0 6-B	0
384	phenyl ethene	3	1	2	1 6-B	4-A
385	phenyl formic acid	2	0	0	1 6-B	0
386	phenyl hydrate	3	1	2	0 6-B	0
387	phenyl hydroxide	3	1	2	0 6-B	0
388	phenyl methyl ketone	3	0	1	1 6-B	0
389	phenyl perchloryl	3	3	0	1 SAX	0
390	phenylethane	2	1	3	0 6-B	0
391	phenylethylene	3	1	2	1 6-B	4-A
392	phenylic acid	3	1	2	0 6-B	0
393	phenylic alcohol	3	1	2	0 6-B	0
394	phenylmethane	3	1	3	0 6-B	0
395	phenylmethylcarbinol	3	1	0	1 6-B	0
396	phenylsulfonic acid	3	1	0	1 0	0
397	phthalic acid anhydride	3	1	0	1 6-B	0
398	phthalic acid methyl ester	3	3	0	1 6-B	0
399	phthalic anhydride	3	1	0	1 6-B	0
400	polychlorinated biphenyls	3	3	0	0 0	0
401	potato alcohol	3	0	3	1 4-A	3-A
402	propanamine	2	0	3	1 6-B	2-B
403	propenylguaiaacol	2	2	1	1 6-B	0
404	propyl alcohol	3	0	3	1 6-B	4-A
405	propylamine	2	0	3	1 6-B	2-B
406	propylic alcohol	3	0	3	1 6-B	4-A
407	pyrocatechol dimethyl ether	2	1	0	1 6-B	0
408	pyroguaiac acid	2	2	1	1 6-B	0
409	pyroxylic spirit	3	0	3	1 6-B	0
410	rock oil	3	1	2	0 0	0

411	s-trinitrotoluene	3	2	2	3 4-A	0
412	s-trinitrotoluol	3	2	2	3 4-A	0
413	sec-amyl alcohol	2	0	2	1 6-B	0
414	sec-butylcarbinol	2	0	2	1 SAX	0
415	sec-pentyl alcohol	2	0	2	1 6-B	0
416	sec-propyl alcohol	2	0	3	1 6-B	4-A
417	sedeval	3	2	0	0 0	0
418	spirits of wine	3	0	3	1 4-A	3-A
419	styrallyl alcohol	3	1	0	1 6-B	0
420	styrene	3	1	2	1 6-B	4-A
421	sulfuric acid	3	0	0	2 1-B	0
422	sulphocarbonic anhydride	3	1	3	2 6-B	2-B
423	sumatra camphor	2	2	1	1 6-B	0
424	sym-dichloroethyl ether	3	2	2	1 1-A	6-B
425	sym-dichloroethylene	2	1	0	1 0	0
426	sym-trinitrotoluene	3	2	2	3 4-A	0
427	sym-trinitrotoluol	3	2	2	3 4-A	0
428	tert-butyl bromide	3	1	0	0 0	0
429	tetrachloroethane	3	3	0	0 0	0
430	tetradecane	3	0	0	1 6-B	0
431	tetramethylene cyanide	3	2	1	1 6-B	0
432	toluene	3	1	3	0 6-B	0
433	toluol	3	1	3	0 6-B	0
434	trans-borneol	2	2	1	1 6-B	0
435	tribromomethane	3	3	0	0 2-B	4-B
436	trichlorobenzene	2	3	1	0 6-B	0
437	trichlorobiphenyl	3	3	0	0 0	0
438	trichloroethylene	3	2	2	1 4-A	0
439	trichlorofluoromethane	2	3	0	2 2-B	0
440	trichloromonofluoromethane	2	3	0	2 2-B	0
441	tridecane	2	0	0	0 0	0
442	trimethylbromomethane	3	1	0	0 0	0
443	trinitrotoluene	3	2	2	3 4-A	0
444	triphenyl phosphate	2	3	1	0 0	0
445	veratrol	2	1	0	1 6-B	0
446	veronal	3	2	0	0 0	0
447	vestrol	3	2	2	1 4-A	0
448	vinyl benzene	3	1	2	1 6-B	4-A
449	vinyl trichloride	3	3	0	1 2-B	0
450	vinylbenzol	3	1	2	1 6-B	4-A
451	white tar	3	1	2	0 6-B	0
452	wood alcohol	3	0	3	1 6-B	0
453	wood naphtha	3	0	3	1 6-B	0
454	wood spirit	3	0	3	1 6-B	0
455	xylene	2	1	3	0 6-B	0
456	xlenol	1	1	0	1 0	0
457	aluminum fluoride nitrate	3	2	3	3 6-A	0
458	aluminum nitrate	3	3	3	3 6-A	0
459	ammonium nitrate	1	0	3	3 6-A	0
460	cadmium nitrate	3	3	3	3 6-A	0
461	calcium nitrate	3	2	3	3 6-A	0
462	dibutyl butyl phosphonate	0	2	0	0 0	0

463	ferric nitrate	2	2	3	3 6-A	0
464	ferrocyanide	1	3	0	0 0	0
465	fluorides	3	3	0	0 0	0
466	gluconate	0	0	1	0 0	0
467	cagesium nitrate	3	2	3	3 6-A	0
468	methyl isobutyl ketone	3	1	3	0 6-B	0
469	nitrites	3	0	3	3 6-A	0
470	oxalate	3	0	1	0 0	0
471	paraffin hydrocarbon	2	1	2	0 6-B	0
472	phosphates	0	0	0	0 0	0
473	sodium aluminate	1	3	0	0 0	0
474	sodium dichromate	3	3	0	1 6-A	0
475	sodium hydroxide	1	3	0	1 1-A	2-B
476	sodium silicate	1	3	0	0 0	0
477	sulfates	0	0	0	0 0	0
478	tributyl phosphate	2	2	1	0 0	0
479	potassium (ion)	0	3	0	0 0	0
480	sodium (ion)	0	3	0	0 0	0
481	mercury	3	3	9	9 SAX	

LISTINGS OF DATABASE : NUCLIDES

1	1	Ac	225	B E E B C	0	3	0	1	1	0	0
2	2	Am	241	A C C A C	3	3	3	1	1	0	0
3	3	Am	243	A C C A C	3	3	3	1	1	0	0
4	4	C	14	E E E E E	100	3	3	1	1	4-A	0
5	5	Cd	109	D E E O D	0	3	1	1	1	6-B	0
6	6	Cm	243	A D D A C	3	3	2	1	1	0	0
7	7	Cm	244	A D D A C	3	3	2	1	1	0	0
8	8	Co	60	B D D B A	10	3	1	1	2	6-B	1-B
9	9	Cs	134	C C C C B	20	3	1	3	2	3-B	6-B
10	10	Cs	135	E D D E E	20	3	3	3	2	3-B	6-B
11	11	Cs	137+D	C D D C B	20	3	2	3	2	3-B	6-B
12	12	Eu	152	C D D C B	1	3	2	1	1	0	0
13	13	Eu	154	D D D D B	1	3	1	1	1	0	0
14	14	Fe	55	E E E E E	10	3	1	2	1	6-B	0
15	15	H	3	F F F F F	100	3	2	3	3	6-B	0
16	16	I	129	C B B C D	100	3	3	0	0	6-A	0
17	17	Mo	93	D E E D D	0	3	3	2	1	6-B	0
18	18	Na	22	C D D C B	100	3	1	3	3	SAX	0
19	19	Nb	94	B D D B A	10	3	3	2	1	6-B	0
20	20	Ni	59	E E E E E	10	3	3	0	0	6-B	2-B
21	21	Ni	63	E D D E E	10	3	2	0	0	6-B	2-B
22	22	Np	237+D	A C C A B	2	3	3	1	1	0	0
23	23	Np	239	D E E D C	2	3	0	1	1	0	0
24	24	Pb	210+D	A B B A C	20	3	2	2	1	6-B	0
25	25	Pu	238	A D D A C	1	3	2	0	0	4-B	3-B
26	26	Pu	239	A D D A C	1	3	3	0	0	4-B	3-B
27	27	Pu	240	A D D A C	1	3	3	0	0	4-B	3-B
28	28	Pu	241+D	C E E C D	1	3	3	0	0	4-B	3-B
29	29	Pu	242	A D D A C	1	3	3	0	0	4-B	3-B
30	30	Pu	244	A D D A C	1	3	3	0	0	4-B	3-B
31	31	Ra	225	B D D B C	20	3	0	0	0	0	0
32	32	Ra	226+D	A A A A C	20	3	3	0	0	0	0
33	33	Sb	125+D	C E E C B	20	3	1	2	1	6-B	0
34	34	Sm	151	E D D E E	1	3	2	2	2	4-B	3-B
35	35	Sr	90+D	C B B C D	10	3	2	2	2	6-B	3-B
36	36	Tc	99	D D D D E	100	3	3	2	1	6-B	0
37	37	Th	228+D	A D D A B	1	3	1	2	2	6-B	0
38	38	Th	229+D	A B B A B	1	3	3	2	2	6-B	0
39	39	Th	230+D	A C C A C	1	3	3	2	2	6-B	0
40	40	Th	232+D	C C C C B	1	3	3	2	2	6-B	0
41	41	U	233+D	A B B A C	20	3	3	2	2	6-B	3-B
42	42	U	234	A D D A C	20	3	3	2	2	6-B	3-B
43	43	U	235+D	A D D A B	20	3	3	2	2	6-B	3-B
44	44	U	238+D	A D D A C	20	3	3	2	2	6-B	3-B
45	45	U	240	E E E E E	20	3	3	2	2	6-B	3-B
46	46	U	depleted	A D D A C	20	3	3	2	2	6-B	3-B
47	47	U	enriched	A D D A B	20	3	3	2	2	6-B	3-B
48	48	U	natural	A D D A B	20	3	3	2	2	6-B	3-B
49	49	un	id alpha	A A A A B	20	3	3	0	0	0	0
50	50	un	id beta	B B B B A	100	3	3	0	0	0	0
51	51	un	id gamma	B B B B A	100	3	3	0	0	0	0

LISTING OF DATABASE : SUBPARA

1	0	00	Waste Constituent Inventory
2	0	01	Physical State of Constituent
3	0	02	Incompatibility of Constituents
4	1	10	Observed Release
5	1	21	Depth to Aquifer of Concern
6	1	22	Net Precipitation
7	1	23	Permeability of Unsaturated Zone
8	1	30	Containment
9	1	42	Hazardous Waste Quantity
10	1	43	Max. Observed Radioactive Release
11	1	51	Ground Water Use
12	1	52	Distance to the Nearest Well
13	1	53	Population Served by Ground Water
14	2	10	Observed Release
15	2	21	Facility Slope/Intervening Terrain
16	2	22	1-yr. 24-hr. Rainfall
17	2	23	Distance to Nearest Surface Water
18	2	30	Containment
19	2	42	Hazardous Waste Quantity
20	2	43	Max. Observed Radioactive Release
21	2	51	Surface Water Use
22	2	52	Distance to a Sensitive Environment
23	2	53	Population Served by Surface Water
24	3	10	Observed Release
25	3	23	Hazardous Waste Quantity
26	3	24	Max. Observed Radioactive Release
27	3	31	Population Within 4-Mile Radius
28	3	32	Distance to Sensitive Environment
29	3	33	Land Use
30	4	10	Containment
31	4	21	Direct Evidence
32	4	25	Hazardous Waste Quantity
33	4	28	Waste Concentration or Site Size
34	4	31	Dist. to Nearest Population
35	4	32	Dist. to Nearest Building
36	4	33	Dist. to Sensitive Environment
37	4	34	Land Use
38	4	35	Population Within 2-mi Radius
39	4	36	Buildings Within 2-mi Radius
40	5	10	Observed Release
41	5	20	Accessibility
42	5	28	Waste Concentration or Site Size
43	5	30	Containment
44	5	51	Population Within 1-mi Radius
45	5	52	Dist. to Critical Habitat

LISTING OF DATABASE : MATRIX

1	1	A	0	1	3	7	11	15	21	26	26	26	26	26	26
2	1	B	0	0	1	3	7	11	15	21	26	26	26	26	26
3	1	C	0	0	0	1	3	7	11	15	21	26	26	26	26
4	1	D	0	0	0	0	1	3	7	11	15	21	26	26	26
5	1	E	0	0	0	0	0	1	3	7	11	15	21	26	26
6	1	F	0	0	0	0	0	0	1	3	7	11	15	21	26
7	2	A	0	1	3	7	11	15	21	26	26	26	26	26	26
8	2	B	0	0	1	3	7	11	15	21	26	26	26	26	26
9	2	C	0	0	0	1	3	7	11	15	21	26	26	26	26
10	2	D	0	0	0	0	1	3	7	11	15	21	26	26	26
11	2	E	0	0	0	0	0	1	3	7	11	15	21	26	26
12	2	F	0	0	0	0	0	0	1	3	7	11	15	21	26
13	3	A	0	1	2	5	8	12	16	20	20	20	20	20	20
14	3	B	0	0	1	2	5	8	12	16	20	20	20	20	20
15	3	C	0	0	0	1	2	5	8	12	16	20	20	20	20
16	3	D	0	0	0	0	1	2	5	8	12	16	20	20	20
17	3	E	0	0	0	0	0	1	2	5	8	12	16	20	20
18	3	F	0	0	0	0	0	0	1	2	5	8	12	16	20
19	4	A	0	1	1	2	3	5	6	8	8	8	8	8	8
20	4	B	0	0	1	1	2	3	5	6	8	8	8	8	8
21	4	C	0	0	0	1	1	2	3	5	6	8	8	8	8
22	4	D	0	0	0	0	1	1	2	3	5	6	8	8	8
23	4	E	0	0	0	0	0	1	1	2	3	5	6	8	8
24	4	F	0	0	0	0	0	0	1	1	2	3	5	6	8
25	5	A	0	1	2	4	6	9	12	15	15	15	15	15	15
26	5	B	0	0	1	2	4	6	9	12	15	15	15	15	15
27	5	C	0	0	0	1	2	4	6	9	12	15	15	15	15
28	5	D	0	0	0	0	1	2	4	6	9	12	15	15	15
29	5	E	0	0	0	0	0	1	2	4	6	9	12	15	15
30	5	F	0	0	0	0	0	0	1	2	4	6	9	12	15
31															

LISTING OF DATABASE : AWORK2

mHRS Air Route Work Sheet

OOE/RL - Hanford Site

02/26/85

Site: Hanford Reservation

Site index:

2

Ref. Rating Factor	Assigned Value	Multiplier	Score	Max. Score (Section)
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1. Observed Release	0	1	0	45 5.1
---------------------	---	---	---	--------

Date and Location: 01/03/84

Sampling Protocol:

If observed release is given a score of 45, proceed to line 2.
If observed release is given a score of 0, the Sa=0. Enter on Line 5.

2. Waste Characteristics 5.2

a. Chemical Reactivity and Incompatibility	0	1	0	3
Toxicity	0	3	0	9
Hazardous Waste Quantity	0	1	0	8
b. Radioactive	0	1	0	20
Total Waste Characteristics Score	2.a	0	20	2.b 0

3. Targets 5.3

Population Within 4-Mile Radius	0	1	0	30
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Distance to Sensitive Environment	0	2	0	6
Land Use	0	1	0	3
Total Targets Score				0 39
4. Multiply 1 x 2 x 3	Chemical		0	
	Radioactive		0	
5. Line 4/35100 * 100	Sc(a)=	0.00	Sr(a)=	0.00

LISTING OF DATABASE : DCWORK2

----- mHRS Direct Contact Route Work Sheet -----					
DOE/RL Hanford			01/30/86		
Site: 216-A-20			Site index: 26		
Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
=====					
1. Observed Release	0	1	0	45	8.1

If observed release is given a score of 45, proceed to line 4.					
If observed release is given a score of 0, proceed to line 2.					

2. Accessibility	2	1	2	3	8.2

3. Containment	0	1	0	15	8.3

4. Waste Characteristics					8.4
a. Chemical Toxicity	2	5	10	15	
b. Radioactive	15	1	15	15	

5. Targets					8.5

Population Within a 1-Mi Radius	3	4	12	20	
Distance to a Critical Habitat	3	4	12	12	

Total Targets Score			24	32	

6. If line 1=45 (1x4x5)	Chemical		0		
If line 1=0 (2x3x4x5)	Radioactive		0	21600	

7. Line 6/21600 * 100	Sc(dc)	0.00	Sr(dc)	0.00	

LISTING OF DATA BASE : FEWORK2

mHRS Fire and Explosion Route Work Sheet					
DOE/RL - Hanford Site			02/26/85		
Site: Hanford Reservation			Site index: 2		
Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Containment	1	1	1	3	7.1
2. Waste Characteristics					7.2
Direct Evidence	3	1	3	3	
Ignitability	3	1	3	3	
Reactivity	2	1	2	3	
Incompatibility	0	1	0	3	
Subtotal			8	12	
Chemical					
Hazardous Waste Quantity	4	1	4	8	
Radioactive	8	1	8	8	
Total Waste Characteristics Score	2.a		12	20	
(2a + Subtotal, 2b + Subtotal)	2.b		16		
3. Targets					7.3
Distance to Nearest Population	3	1	3	5	
Distance to Nearest Building	1	1	1	3	
Distance to Sensitive Environment	0	1	0	3	
Land Use	3	1	3	3	
Population Within 2-Mi Radius	5	1	5	5	
Buildings Within 2-Mi Radius	5	1	5	5	
Total Targets Score			17	24	
4. Multiply 1 x 2 x 3	Chemical		204		
	Radioactive		272	1440	
5. Line 4/1440 * 100	Sc(fe)	14.17	Sr(fe)	18.89	

LISTING OF DATABASE : GWWORK2

mHRS Ground Water Route Work Sheet

DDE/RL Hanford
Site: 216-A-20

01/30/86
Site index: 26

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	0	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2. Route Characteristics					3.2
Depth to Aquifer of Concern	0	2	0	6	
Net Precipitation	0	1	0	3	
Permeability of the Unsaturated Zone	3	1	3	3	
Physical State	3	1	3	3	
Total Route Characteristics Score			6	15	
3. Containment	2	1	2	3	3.3
4. Waste Characteristics					3.4
Chemical					
a. Toxicity/Persistence	12	1	12	18	
Hazardous Waste Quantity	1	1	1	8	
Radioactive					
b.1 Maximum Observed	0	1	0	26	
b.2 Maximum Potential	11	1	11	26	
Total Waste Characteristics Score	4.a		13	26	
(Largest of 4a, b.1, b.2)	4.b		11		
5. Targets					3.5
Ground Water Use	2	3	6	9	
Distance to Nearest Well/ Population Served	0	1	0	40	
Total Targets Score			6	59	
6. If line 1=45 (1x4x5)	Chemical		936		
If line 1=0 (2x3x4x5)	Radioactive		792	57330	
7. Line 6/57330 * 100	Sc(gw)=	1.63	Sr(gw)	1.38	

LISTING OF DATABASE: SWWORK2

mHRS Surface Water Route Work Sheet					
DOE/RL - Hanford Site				02/26/85	
Site: Hanford Reservation				Site index: 2	
Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	0	1	0	45	4.1
If observed release is given a score of 45, proceed to line 4.					
If observed release is given a score of 0, proceed to line 2.					
2. Route Characteristics					4.2
Facility Slope & Intervening	1	1	1	3	
Terrain					
1-yr. 24-hr. Rainfall	1	1	1	3	
Distance to Nearest Surface	2	2	4	6	
Water					
Physical State	3	1	3	3	
Total Route Characteristics Score			9	15	
3. Containment	3	1	3	3	4.3
4. Waste Characteristics					4.4
a. Chemical					
Toxicity/Persistence	18	1	18	18	
Hazardous Waste Quantity	4	1	4	8	
Radioactive					
b.1 Maximum Observed	0	1	0	26	
b.2 Maximum Potential	1	1	1	26	
Total Waste Characteristics Score			22	26	
(Largest of 4a, b.1, b.2)			1		
5. Targets					4.5
Surface Water Use	2	3	6	9	
Distance to a Sensitive	0	2	0	6	

Environment

Population Served/Distance to Water Intake	35	1	35	40
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Downstream

Total Targets Score	41
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55

6. If line 1=45 (1x4x5)	Chemical
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24354

If line 1=0 (2x3x4x5)	Radioact ive	1107
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64350

7. Line 6/64350 * 100	Sc(sw)=
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37.85

APPENDIX E

mHRS/HRS HAND CALCULATIONS TO COMPARE WITH PROGRAM RUNS
FOR VERIFICATION OF PROGRAM CALCULATIONS

APPENDIX E

mHRS/HRS HAND CALCULATIONS TO COMPARE WITH PROGRAM RUNS FOR VERIFICATION OF PROGRAM CALCULATIONS

To verify that the mHRS/HRS program package runs properly and calculates accurate scores, three example runs were checked against hand calculations. Example Run #1 represents mHRS calculations for a case with releases to the environment, Example Run #2 represents a case without any releases to the environment, and Example Run #3 represents HRS calculations for a case with releases to the environment. The hand calculations for these three example runs are contained in this appendix. The program runs are located in Appendix F.

Throughout the calculations, values assigned were taken from the tables and matrices provided in the HRS and mHRS user's manuals (EPA 1984, Hawley et al. 1986).

The mHRS/HRS assigns three scores to a hazardous facility:

- S_M reflects the potential for harm to humans or the environment from migration of a hazardous substance away from the facility by routes involving ground water, surface water, or air. It is a composite of separate scores for each of the three routes.
- S_{FE} reflects the potential for harm from substances that are explosive or flammable.
- S_{DC} reflects the potential for harm from direct contact with hazardous substances at the facility (i.e., no migration need be involved).

The score for each hazard mode (migration, fire and explosion, and direct contact) or route is obtained by considering a set of factors that characterize the potential of the facility to cause harm (see Table 1.1). Each factor is assigned a numerical value (on a scale of 0 to 3, 5, or 8) according to prescribed guidelines. This value is then multiplied by a weighting factor yielding the factor score. The factor scores are then combined as follows:

1) scores within a factor category are added; then 2) the total scores for each factor category are multiplied together to derive a score for ground water, surface water, air, fire and explosion, and direct contact.

In computing S_{FE} or S_{DC} , or an individual migration route score, the product of its factor category scores is divided by the maximum possible score, and the resulting ratio is multiplied by 100 so that all scores will be on a scale of 0 to 100.

S_M is a composite of the scores for the three possible migration routes:

$$S_M = 1/1.73 \sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$$

where S_{gw} = ground water route score
 S_{sw} = surface water route score
 S_a = air route score

mHRS PROGRAM EXAMPLE RUN #1 (SITES WITH RELEASES TO ENVIRONMENT)

HAND CALCULATIONS

This is an example scenario used to test the accuracy of the program calculations involving sites with releases considering mHRS scores.

Results-Example

$$S_m = \frac{\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}}{1.73} = \frac{\sqrt{(70.8)^2 + (63.08)^2 + (40.9)^2}}{1.73}$$

$$S_m = 59.69$$

$$S_{fe} = 46.04$$

$$S_{dc} = 62.50$$

EXAMPLE RUN #1 (Contd)

Chemical Inventory:

<u>Chem Index #</u>	<u>Chemical</u>	<u>Quantity</u>	<u>Pathways</u>
455	xylene	5 gal (3785 cm ³ /gal)(0.86 g/cm ³) $\approx$ 16 kg	GW, SW, A, FE, DC
75	DDT	25 gal (3785 cm ³ /gal)(0.99 g/cm ³) $\approx$ 94 kg	GW, SW, DC
330	n-butyl benzene	0.5 gal (3785 cm ³ /gal)(0.86 g/cm ³) $\approx$ 1.6 kg	GW, SW, A, FE, DC
240	fuel oil (kerosene)	500 gal (3785 cm ³ /gal)(0.78 g/cm ³) $\approx$ 1.5 Mg	GW, SW
85	PCB	0.05 gal (3785 cm ³ /gal)(1.44 g/cm ³) $\approx$ 270 g	GW, SW, DC

A chemical that was not on the chemical database was added to test handling of a new chemical:

mercury	0 (used to test handling of "0" inventory entry)	GW, SW, DC
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Radionuclide Inventory:

<u>Radionuclide</u>	<u>Ci Content</u>	<u>Pathway</u>
Plutonium-239	11 Ci	GW, A, DC
Natural Uranium	500 kg (10 ³ g/kg)(3.34 x 10 ⁻⁷ Ci/g) $\approx$ 0.2 Ci	GW, SW, DC, FE

Hazardous Waste Quantity: 200 tons

Storage Methods: Surface Impoundment
Containers
Landfill

EXAMPLE RUN #1 (Contd)

GROUND-WATER ROUTE

1) Observed Release: Yes Assigned Value = 45

2) Route Characteristics:

Note: When observed release is present, the values for route characteristics and containment are zero.

Depth to Aquifer of Concern: assume 21' to 75' Assigned Value = 0

Net Precipitation: assume -10" to +5" Assigned Value = 0

Permeability of Unsaturated Zone: assume fine sand and silty sand
Assigned Value = 0

Physical State: assume some liquids Assigned Value = 0

3) Containment: Assigned Value = 0

Surface Impoundment Assigned Value = 0

Containers Assigned Value = 0

Landfill Assigned Value = 0

4) Waste Characteristics:

a) Chemical

Toxicity/Persistence (Max. Tox. = 3, Max. Pers. = 3)

Assigned Value = 18

	<u>Tox</u>	<u>Pers</u>
xylene	2	1
DDT	3	3
n-butyl benzene	1	1
Fuel Oil	3	1
PCB	3	3

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

EXAMPLE RUN #1 (Contd)

b) Radioactive

1) Maximum Observed Assigned Value = 7

Plutonium concentration observed = 150 pCi/L - Group D

Uranium concentration observed = 156 pCi/L - Group D

Total 306 pCi/L - Group D

= 3.06×10^2 pCi/L

2) Maximum Potential Assigned Value = 3

(Ci)(Transport Coefficient) = pCi/L

Plutonium = (11 Ci)(1) = 11 pCi/L - Group D

Uranium = (0.2 Ci)(20) = 4 pCi/L - Group D

Total 15 pCi/L - Group D

= 1.5×10^1 pCi/L

5) Targets:

Ground Water Use Assigned Value = 2

Drinking water with municipal water from alternate unthreatened sources currently available

Distance to nearest well and population served Assigned Value = 35

Distance to nearest well = 2500 feet

Population served = 30,000

and using matrix of HRS user's manual yields 35

6) Score:

$$S_{gw}^C = 45(22)(41) = 40590; (40590/57330)(100) = 70.80$$

$$S_{gw}^R = 45(7)(41) = 12915; (12915/57330)(100) = 22.53$$

S_{gw} = largest of S_{gw}^C or S_{gw}^R

$$S_{gw} = 70.80$$

EXAMPLE RUN #1 (Contd)

SURFACE-WATER ROUTE

1) Observed Release: Yes Assigned Value = 45

2) Route Characteristics:

Note: When observed release is present, the values for route characteristics and containment are zero.

Facility Slope and Intervening Terrain Assigned Value = 0

Slope = 3% to 5%

Intervening terrain = 3% to 5%

1-year 24-hour Rainfall Assigned Value = 0

Amount of rainfall = 1.5"

Distance to Nearest Surface Water Assigned Value = 0

Distance to nearest surface water = 0.5 miles

Physical State Assigned Value = 0

Physical state assumes some liquids

3) Containment: Assigned Value = 0

Surface Impoundment Assigned Value = 0

Containers Assigned Value = 0

Landfill Assigned Value = 0

4) Waste Characteristics:

a) Chemical

Toxicity/Persistence (Max. Tox. = 3, Max. Pers = 3)

Assigned Value = 18

	<u>Tox</u>	<u>Pers</u>
xylene	2	1
DDT	3	3
n-butyl benzene	1	1
Fuel Oil	3	1
PCB	3	3

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

EXAMPLE RUN #1 (Contd)

b) Radioactive

1) Maximum Observed Assigned Value = 7

Natural Uranium concentration observed = 156 pCi/L - Group D

Total = 1.56×10^2 pCi/L - Group D

2) Maximum Potential Assigned Value = 1

$$\frac{(\text{Ci})(1.0 \times 10^{-4})(1.0 \times 10^{12})}{\text{flow, L/yr}} = \text{pCi/L}$$

$$\text{Uranium} = \frac{(0.2)(1.0 \times 10^{-4})(1.0 \times 10^{12})}{(5.0 \times 10^6)} = 4.0 \times 10^0 \text{ pCi/L} - \text{Group D}$$

$$\text{Flow of river} = 0.000005 \text{ TL/yr} = 5 \times 10^6 \text{ L/yr}$$

5) Targets:

Surface Water Use Assigned Value = 2

use = irrigation and recreation

Distance to sensitive environment Assigned Value = 0

distance >20 miles

Distance to Water Intake Downstream and Population Served

Assigned Value = 35

distance = 0.5 miles

population = 33,000 people downstream

6) Score:

$$S_{\text{SW}}^{\text{C}} = (45)(22)(41) = 40590; (40590/64350)(100) = 63.08$$

$$S_{\text{SW}}^{\text{r}} = (45)(7)(41) = 12915; (12915/64350)(100) = 20.07$$

$$S_{\text{SW}} = 63.08$$

EXAMPLE RUN #1 (Contd)

AIR ROUTE

1) Observed Release: Yes Assigned Value = 45

2) Waste Characteristics:

a) Chemical

Reactivity and incompatibility Assigned Value = 1

	<u>React</u>	<u>Incomp</u>
xylene	0	0
n-butyl benzene	1	0

Highest score = 1

Toxicity Assigned Value = 2

	<u>Tox</u>
xylene	2
n-butyl benzene	1

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

b) Radioactive Assigned Value = 1

Max. observed concentration of plutonium = 2×10^{-3} pCi/m³ -

Group A

Total = 2×10^{-3} pCi/m³ - Group A

EXAMPLE RUN #1 (Contd)

3) Targets:

Population within 4-mile radius Assigned Value = 27

Population 1/4 mile = 5,000

Population 1/2 mile = 10,000

Population 1 mile = 15,000

Population 4 miles = 33,000

Distance to Sensitive Environment Assigned Value = 0

Distance >20 miles

Land Use Assigned Value = 2

Distance to commercial/industrial = 1/4 mile

Distance to natural park = 120 miles

Distance to agricultural lands = 1/2 mile

Distance to historic landmark sites = 120 miles

4) Score:

$$S_a^c = (45)(11)(29) = 14355; (14355/35100)(100) = 40.90$$

$$S_a^r = (45)(1)(29) = 1305; (1305/35100)(100) = 3.72$$

$$S_a = 40.90$$

EXAMPLE RUN #1 (Contd)

FIRE AND EXPLOSION ROUTE

1) Containment:

Containment Assigned Value = 3

2) Waste Characteristics:

Direct Evidence Assigned Value = 0

Ignitability Assigned Value = 3

xylene = 3

DDT = 0

n-butyl benzene = 2

fuel oil = 2

PCB = 0

Pu = 0

Reactivity Assigned Value = 2

xylene = 0

DDT = 0

n-butyl benzene = 1

fuel oil = 0

PCB = 0

Pu = 0

Incompatibility Assigned Value = 0

a) Chemical:

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

b) Radioactive: Assigned Value = 8

Without known concentrations of radionuclides at the waste site
(answer no on screen)

EXAMPLE RUN #1 (Contd)

Radionuclide Grouping:

^{239}Pu → Group A
Natural Uranium

Maximum Radionuclide Concentration:

Volume of the waste site = 900 m x 900 m x 1 m = 810,000 m³

^{239}Pu = 11 Ci = 1.1×10^{13} pCi

Natural Uranium = 0.2 Ci = 2.0×10^{11} pCi

Total = 11.2×10^{12} pCi - Group A

$$\frac{11.2 \times 10^{12} \text{ pCi}}{8.1 \times 10^5 \text{ m}^3} (1.0 \times 10^3) = 1.38 \times 10^{10} \text{ pCi/m}^3$$

3) Targets:

Distance to Nearest Population Assigned Value = 3

Distance = 250 feet

Distance to Nearest Building Assigned Value = 1

Distance = 250 feet

Distance to Sensitive Environment Assigned Value = 0

Distance to wetlands >100 ft

Distance to critical habitat >1/2 mile

Could fire be expected to spread to sensitive environment? No

Land Use Assigned Value = 3

EXAMPLE RUN #1 (Contd)

Distance to nearest industrial complex <0.25 mile

Distance to nearest national park = >2 miles

Distance to nearest agricultural land = 0.50 mile

Historic landmark not in view of site

No historic landmarks are subject to impacts

Population Within 2-Mile Radius Assigned Value = 5

Population within 2 miles = 20,000 people

Buildings Within 2-Mile Radius Assigned Value = 5

Buildings within 2 miles = 3000 buildings

4) Score:

$$S_{fe}^c = \frac{(3)(9)(17)}{1440} (100) = 31.88$$

$$S_{fe}^r = \frac{(3)(13)(17)}{1440} (100) = 46.04$$

$$S_{fe} = 46.04$$

EXAMPLE RUN #1 (Contd)

DIRECT-CONTACT ROUTE

- 1) Observed Incident: Assigned Value = 0
No injury, illness, or death known
- 2) Accessibility: Assigned Value = 3
Barriers do not completely surround the facility
- 3) Containment: Assigned Value = 15
Waste in containers, impoundments, and landfills with less than 2 feet of cover

4) Waste Characteristics:

Measured concentrations of radionuclides are not known for the site

Volume of waste site = 810,000 m³

a) Chemical Toxicity Assigned Value = 3

	<u>Toxicity</u>
xylene	2
DDT	3
n-butyl benzene	1
Fuel Oil	3
PCB	3

b) Radioactive Assigned Value = 15

Without known concentrations of radionuclides at the waste site

Radionuclide grouping:

²³⁹Pu
Natural Uranium → Group A

EXAMPLE RUN #1 (Contd)

Maximum radionuclide concentration:

Volume = 810,000 m³

²³⁹Pu = 11 Ci = 1.1×10^{13} pCi

Natural Uranium = 0.2 Ci = 2.0×10^{11} pCi

Total = 11.2×10^{12} pCi - Group A

$$\frac{11.2 \times 10^{12} \text{ pCi}}{8.1 \times 10^5 \text{ m}^3} (1.0 \times 10^3) = 1.38 \times 10^{10} \text{ pCi/m}^3$$

Considering that the site area = 810,000 m² = 81 hectares, the correction factor is 1.0

5) Targets:

Population Within a 1-Mile Radius Assigned Value = 5

Population = 15,000 people

Distance to a Critical Habitat Assigned Value = 0

Distance >1 mile

6) Score:

$$S_{dc}^c = \frac{(3)(15)(15)(20)}{21,600} (100) = 62.50$$

$$S_{dc}^r = \frac{(3)(15)(15)(20)}{21,600} (100) = 62.50$$

$$S_{dc} = 62.50$$

mHRS PROGRAM EXAMPLE RUN #2 (SITES WITHOUT RELEASES TO THE ENVIRONMENT)
HAND CALCULATIONS

This is an example scenario used to test the accuracy of the program calculations involving sites without releases considering mHRS scores.

Results Example - Run #2

$$S_m = \frac{\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}}{1.73} = \frac{\sqrt{(47.2)^2 + (37.85)^2 + 0^2}}{1.73}$$

$$S_m = 34.97$$

$$S_{fe} = 18.89$$

$$S_{dc} = 62.50$$

EXAMPLE RUN #2 (Contd)

Chemical Inventory:

<u>Chem Index #</u>	<u>Chemical</u>	<u>Quantity</u>	<u>Pathways</u>
455	xylene	5 gal (3785 cm ³ /gal)(0.86 g/cm ³) $\approx$ 16 kg	GW, SW, A, FE, DC
75	DDT	25 gal (3785 cm ³ /gal)(0.99 g/cm ³) $\approx$ 94 kg	GW, SW, DC
330	n-butyl benzene	0.5 gal (3785 cm ³ /gal)(0.86 g/cm ³) $\approx$ 1.6 kg	GW, SW, A, FE, DC
240	fuel oil (kerosene)	500 gal (3785 cm ³ /gal)(0.78 g/cm ³) $\approx$ 1.5 Mg	GW, SW
85	PCB	0.05 gal (3785 cm ³ /gal)(1.44 g/cm ³) $\approx$ 270 g	GW, SW, DC

A chemical that was not on the chemical database was added to test handling of a new chemical:

mercury	0 (to test handling of "0" entry)	GW, SW, DC
---------	-----------------------------------	---------------

Radionuclide Inventory:

<u>Radionuclide</u>	<u>Ci Content</u>	<u>Pathways</u>
plutonium-239	11 Ci	GW, A, DC
natural uranium	500 kg (10 ³ g/kg)(3.34 x 10 ⁻⁷ Ci/g) $\approx$ 0.2 Ci	GW, SW, DC, FE

Hazardous Waste Quantity: 200 tons

Storage Methods: Surface Impoundment
Containers
Landfill

EXAMPLE RUN #2 (Contd)

GROUND-WATER ROUTE

1) Observed Release: No Assigned Value = 0

2) Route Characteristics:

Depth to Aquifer of Concern: assume 21' to 75' Assigned Value = 2

Net Precipitation: assume -10" to +5" Assigned Value = 1

Permeability of Unsaturated Zone: assume fine sand and silty sand
Assigned Value = 2

Physical State: assume some liquids Assigned Value = 3

3) Containment: Assigned Value = 3

Surface Impoundment Assigned Value = 2

Containers Assigned Value = 1

Landfill Assigned Value = 3

4) Waste Characteristics:

a) Chemical

Toxicity/Persistence (Max. Tox. = 3, Max. Pers. = 3)

Assigned Value = 18

	<u>Tox</u>	<u>Pers</u>
xylene	2	1
DDT	3	3
n-butyl benzene	1	1
fuel oil	3	1
PCB	3	3

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

EXAMPLE RUN #2 (Contd)

Radioactive

1) Maximum Observed Assigned Value = 0

Plutonium concentration observed = 150 pCi/L - Group D

Uranium concentration observed = 156 pCi/L - Group D

Total = 306 pCi/L - Group D

= 3.06×10^2 pCi/L

and using Table yields 7

2) Maximum Potential Assigned Value = 3

(Ci)(Transport Coefficient) = pCi/L

Plutonium = (11 Ci)(1) = 11 pCi/L - Group D

Uranium = (0.2 Ci)(20) = 4 pCi/L - Group D

Total 15 pCi/L - Group D

= 1.5×10^1 pCi/L

5) Targets:

Ground Water Use Assigned Value = 2

Drinking water with municipal water from alternate unthreatened sources currently available

Distance to nearest well and population served Assigned Value = 35

Distance to nearest well = 2500 feet

Population served = 30,000

6) Score: $S_{gw}^C = (10)(3)(22)(41) = 27060$; $(27060/57330)(100) = 47.20$

$S_{gw}^r = (10)(3)(3)(41) = 3690$; $(3690/57330)(100) = 6.44$

$S_{gw} = 47.20$

EXAMPLE RUN #2 (Contd)

SURFACE-WATER ROUTE

1) Observed Release: No Assigned Value = 0

2) Route Characteristics:

Facility Slope and Intervening Terrain Assigned Value = 1

Slope = 3% to 5%

Intervening Terrain = 3% to 5% Assigned Value = 1

1-year 24-hour Rainfall Assigned Value = 1

Amount of rainfall = 1.5"

Distance to Nearest Surface Water Assigned Value = 2

Distance to nearest surface water = 0.5 miles

Physical State Assigned Value = 3

Physical state assumes some liquids

3) Containment: Assigned Value = 3

Surface Impoundment Assigned Value = 2

Containers Assigned Value = 1

Landfill Assigned Value = 3

4) Waste Characteristics:

a) Chemical

Toxicity/Persistence (Max. Tox. = 3, Max. Pers = 3)

Assigned Value = 18

	<u>Tox</u>	<u>Pers</u>
xylene	2	1
DDT	3	3
n-butyl benzene	1	1
fuel oil	3	1
PCB	3	3

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

EXAMPLE RUN #2 (Contd)

b) Radioactive

- 1) Maximum observed Assigned Value = 0

Natural Uranium concentration observed = 156 pCi/L - Group D

Total = 1.56×10^2 pCi/L - Group D

- 2) Maximum Potential Assigned Value = 1

$$\frac{(Ci)(1 \times 10^{-4})(1 \times 10^{12})}{\text{flow, L/yr}} = \text{pCi/L}$$

$$\text{Uranium} = \frac{(0.2)(1 \times 10^{-4})(1 \times 10^{12})}{(5.0 \times 10^6)} = 4.0 \times 10^0 \text{ pCi/L} - \text{Group D}$$

$$\text{Flow of river} = 0.000005 \text{ TL/yr} = 5 \times 10^6 \text{ L/yr}$$

5) Targets:

Surface Water Use Assigned Value = 2

Use = irrigation and recreation

Distance to sensitive environment Assigned Value = 0

Distance >20 miles

Distance to Water Intake Downstream and Population Served

Assigned Value = 35

Distance = 0.5 miles

Population = 33,000 people downstream

6) Score: $S_{sw}^C = (9)(3)(22)(41) = 24354$; $(24354/64350)(100) = 37.85$
 $S_{sw}^r = (9)(3)(1)(41) = 1107$; $(1107/64350)(100) = 1.72$
 $S_{sw} = 37.85$

EXAMPLE RUN #2 (Contd)

AIR ROUTE

- 1) Observed Release: No Assigned Value = 0
- 2) Waste Characteristics: (Note: If observed release is 0, all the remaining assigned values are 0)
 - a) Chemical
Reactivity and Incompatibility Assigned Value = 0

Toxicity Assigned Value = 0

Hazardous Waste Quantity Assigned Value = 0
200 tons of hazardous waste
 - b) Radioactive Assigned Value = 0
- 3) Targets:
Population within 4-mile radius Assigned Value = 0
Distance to sensitive environment Assigned Value = 0
Land Use Assigned Value = 0
- 4) Score:
 $S_a^c = 0$
 $S_a^r = 0$
 $S_a = 0$

EXAMPLE RUN #2 (Contd)

FIRE AND EXPLOSION ROUTE

1) Containment:

Containment Assigned Value = 1

2) Waste Characteristics:

Direct Evidence Assigned Value = 3

Ignitability Assigned Value = 3

xylene = 3

DDT = 0

n-butyl benzene = 2

fuel oil = 2

PCB = 0

Pu = 0

natural uranium = 2

Reactivity Assigned Value = 2

xylene = 0

DDT = 0

n-butyl benzene = 1

fuel oil = 0

PCB = 0

natural uranium = 2

Incompatibility Assigned Value = 0

a) Chemical:

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

b) Radioactive: Assigned Value = 8

With known measured radionuclide concentrations (answer "Yes" on screen)

EXAMPLE RUN #2 (Contd)

Radionuclide Grouping:

Natural Uranium Group → A; U natural concentration = 2.4×10^9
pCi/m³

3) Targets:

Distance to nearest population Assigned Value = 3

Distance = 250 feet

Distance to nearest building Assigned Value = 1

Distance = 250 feet

Distance to sensitive environment Assigned Value = 0

Distance to wetlands >100 ft

Distance to critical habitat >1/2 mile

Could fire be expected to spread to sensitive environment? No

Land Use Assigned Value = 3

Distance to nearest industrial complex <0.25 mile

Assigned Value = 3

Distance to nearest national park >2 miles

Distance to nearest agricultural land = 0.5 mile

Historic landmark not in view of site

No historic landmarks are subject to impacts

Population Within 2-Mile Radius Assigned Value = 5

Population within 2 miles = 20,000 people

Buildings Within 2-Mile Radius Assigned Value = 5

Buildings within 2 miles = 3000 buildings

4) Score:

$$S_{fe}^c = \frac{(1)(12)(17)}{1440} (100) = 14.17$$

$$S_{fe}^r = \frac{(1)(16)(17)}{1440} (100) = 18.89$$

$$S_{fe} = 18.89$$

EXAMPLE RUN #2 (Contd)

DIRECT CONTACT ROUTE

- 1) Observed Incident: Assigned Value = 45

Yes, injury, illness, or death occurred

- 2) Accessibility: Assigned Value = 0

Accessibility is automatically 0 if observed incident is 45

- 3) Containment: Assigned Value = 0

Containment is automatically 0 if observed incident is 45

- 4) Waste Characteristics:

Volume of waste site = 810,000 m³

- a) Chemical

Toxicity Assigned Value = 3

	<u>Toxicity</u>
xylene	2
DDT	3
n-butyl benzene	1
fuel oil	3
PCB	3

- b) Radioactive Assigned Value = 15

With known concentrations of radionuclides at the waste site

Radionuclide grouping:

Natural Uranium Group A; U natural = 2.4×10^9 pci/m³

EXAMPLE RUN #2 (Contd)

Maximum radionuclide concentration:

Volume = 810,000 m³

Natural Uranium = 0.2 Ci = 2.0×10^{11} pCi

$$\frac{2.0 \times 10^{11} \text{ pCi}}{8.1 \times 10^5 \text{ m}^3} (1.0 \times 10^3) = 2.47 \times 10^8 \text{ pCi/m}^3$$

Considering that the site area = 810,000 m² = 81 hectares, the correction factor is 1.0

5) Targets:

Population Within a 1-Mile Radius Assigned Value = 5

Population = 15,000 people

Distance to a Critical Habitat Assigned Value = 0

Distance >1 mile

6) Score:

$$S_{dc}^c = \frac{(45)(15)(20)}{21,600} (100) = 62.50$$

$$S_{dc}^r = \frac{(45)(15)(20)}{21,600} (100) = 62.50$$

$$S_{dc} = 62.50$$

HRS PROGRAM EXAMPLE RUN #3 (STRAIGHT HRS CALCULATIONS ON
SITES WITH RELEASES TO THE ENVIRONMENT)

HAND CALCULATIONS

This is an example scenario used to test the accuracy of the program calculations involving sites with releases considering HRS scores.

Results Example - Run #3

$$S_m = \frac{\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}}{1.73} = \frac{\sqrt{(70.8)^2 + (63.08)^2 + (52.05)^2}}{1.73}$$

$$S_m = 62.53$$

$$S_{fe} = 31.88$$

$$S_{dc} = 62.50$$

EXAMPLE RUN #3 (Contd)

Chemical Inventory:

<u>Chem Index #</u>	<u>Chemical</u>	<u>Quantity</u>	<u>Pathways</u>
455	xylene	5 gal (3785 cm ³ /gal)(0.86 g/cm ³) $\approx$ 16 kg	GW, SW, A, FE, DC
75	DDT	25 gal (3785 cm ³ /gal)(0.99 g/cm ³) $\approx$ 94 kg	GW, SW, DC
330	n-butyl benzene	0.5 gal (3785 cm ³ /gal)(0.86 g/cm ³) $\approx$ 1.6 kg	GW, SW, A, FE, DC
240	fuel oil (kerosene)	500 gal (3785 cm ³ /gal)(0.78 g/cm ³) $\approx$ 1.5 Mg	GW, SW
85	PCB	0.05 gal (3785 cm ³ /gal)(1.44 g/cm ³) $\approx$ 270 g	GW, SW, DC
	mercury	0.25 gal (3785 cm ³ /gal)(13.55 g/cm ³) $\approx$ 12.8 kg	GW, SW, DC

Radionuclide Inventory:

<u>Radionuclide</u>	<u>Ci Content</u>	<u>Pathways</u>
plutonium-239	11 Ci	GW, A, DC
natural uranium	500 kg (10 ³ g/kg)(3.34 x 10 ⁻⁷ Ci/g) $\approx$ 0.2 Ci	GW, SW, DC, FE

Hazardous Waste Quantity: 200 tons

Storage Methods: Surface Impoundment
Containers
Landfill

EXAMPLE RUN #3 (Contd)

GROUND-WATER ROUTE

1) Observed Release: Yes Assigned Value = 45

2) Route Characteristics:

Note: When observed release is present, the values for route characteristics and containment are zero

Depth to Aquifer of Concern: assume 21' to 75' Assigned Value = 0

Net Precipitation: assume -10" to +5" Assigned Value = 0

Permeability of Unsaturated Zone: assume fine sand and silty sand
Assigned Value = 0

Physical State: assume some liquids Assigned Value = 0

3) Containment: Assigned Value = 0

Surface Impoundment Assigned Value = 0

Containers Assigned Value = 0

Landfill Assigned Value = 0

4) Waste Characteristics:

a) Chemical

Toxicity/Persistence (Max. Tox. = 3, Max. Pers. = 3)

Assigned Value = 18

	<u>Tox</u>	<u>Pers</u>
xylene	2	1
DDT	3	3
n-butyl benzene	1	1
fuel oil	3	1
PCB	3	3
²³⁹ Pu	3	3
natural uranium	3	3

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

EXAMPLE RUN #3 (Contd)

5) Targets:

Ground Water Use Assigned Value = 2

Drinking water with municipal water from alternate unthreatened sources currently available

Distance to nearest well and population served Assigned Value = 35

Distance to nearest well = 2500 feet

Population served = 30,000

6) Score: $S_{gw} = (45)(22)(41) = 40590; (40590/57330)(100) = 70.80$

EXAMPLE RUN #3 (Contd)

SURFACE WATER ROUTE

1) Observed Release: Yes Assigned Value = 45

2) Route Characteristics:

Note: When observed release is present, the values of route characteristics and containment are zero

Facility Slope and Intervening Terrain Assigned Value = 0

Slope = 3% to 5% Assigned Value = 0

Intervening Terrain = 3% to 5%

1-year 24-hour Rainfall Assigned Value = 0

Amount of rainfall = 1.5"

Distance to Nearest Surface Water Assigned Value = 0

Distance to nearest surface water = 0.5 miles

Physical State Assigned Value = 0

Physical state assumes some liquids

3) Containment: Assigned Value = 0

Surface Impoundment Assigned Value = 0

Containers Assigned Value = 0

Landfill Assigned Value = 0

4) Waste Characteristics:

a) Chemical

Toxicity/Persistence (Max. Tox. = 3, Max. Pers = 3)

Assigned Value = 18

EXAMPLE RUN #3 (Contd)

	<u>Tox</u>	<u>Pers</u>
xylene	2	1
DDT	3	3
n-butyl benzene	1	1
fuel oil	3	1
PCB	3	3
²³⁹ Pu	3	3
natural uranium	3	3

Hazardous Waste Quantity Assigned Value = 4
200 tons of hazardous waste

5) Targets:

Surface Water Use Assigned Value = 2

Use = irrigation and recreation

Distance to Sensitive Environment Assigned Value = 0

Distance >20 miles

Distance to Water Intake Downstream and Population Served

Assigned Value = 35

Distance = 0.5 miles

Population = 33,000 people downstream

6) Score: $S_{sw} = (45)(22)(41) = 40590$; $(40590/64350)(100) = 63.08$

EXAMPLE RUN #3 (Contd)

AIR ROUTE

1) Observed Release: Yes Assigned Value = 45

2) Waste Characteristics:

a) Chemical

Reactivity and Incompatibility Assigned Value = 1

	<u>React.</u>	<u>Incomp.</u>
xylene	0	0
n-butyl benzene	1	0
²³⁹ Pu	0	0

Highest score = 1

Toxicity Assigned Value = 3

	<u>Tox</u>
xylene	2
n-butyl benzene	1
²³⁹ Pu	3

Highest score = 3

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

EXAMPLE RUN #3 (Contd)

3) Targets:

Population within 4-mile radius Assigned Value = 27

Population 1/4 mile = 5,000

Population 1/2 mile = 10,000

Population 1 mile = 15,000

Population 4 miles = 33,000

Distance to Sensitive Environment Assigned Value = 0

Distance >20 miles

Land Use Assigned Value = 2

Distance to commercial/industrial = 1/4 mile

Distance to natural park = 120 miles

Distance to agricultural lands = 1/2 mile

Distance to historic landmark sites = 120 miles

4) Score: $S_a = (45)(14)(29) = 18270$; $(18270/35100)(100) = 52.05$

EXAMPLE RUN #3 (Contd)

FIRE AND EXPLOSION ROUTE

1) Containment:

Containment Assigned Value = 3

2) Waste Characteristics:

Direct Evidence Assigned Value = 0

Ignitability Assigned Value = 3

xylene = 3

DDT = 0

n-butyl benzene = 2

fuel oil = 2

PCB = 0

Pu = 0

natural uranium = 2

Reactivity Assigned Value = 2

xylene = 0

DDT = 0

n-butyl benzene = 1

fuel oil = 0

PCB = 0

natural uranium = 2

Incompatibility Assigned Value = 0

a) Chemical:

Hazardous Waste Quantity Assigned Value = 4

200 tons of hazardous waste

EXAMPLE RUN #3 (Contd)

3) Targets:

Distance to Nearest Population Assigned Value = 3

Distance = 250 feet

Distance to Nearest Building Assigned Value = 1

Distance = 250 feet

Distance to Sensitive Environment Assigned Value = 0

Distance to wetlands >100 ft

Distance to critical habitat >1/2 mile

Could fire be expected to spread to sensitive environment? No

Land Use Assigned Value = 3

Distance to nearest industrial complex <1/4 mile

Distance to nearest national park >2 miles

Distance to nearest agricultural land 1/2 mile

Historic landmark not in view of site

No historic landmarks are subject to impacts

Population Within 2-Mile Radius Assigned Value = 5

Population within 2 miles = 20,000 people

Buildings Within 2-Mile Radius Assigned Value = 5

Buildings within 2 miles = 3000 buildings

4) Score:

$$S_{fe} = \frac{(3)(9)(17)}{1440} (100) = 31.88$$

EXAMPLE RUN #3 (Contd)

DIRECT CONTACT ROUTE

- 1) Observed Incident: Assigned Value = 0

No injury, illness, or death known

- 2) Accessibility: Assigned Value = 3

Barriers do not completely surround the facility

- 3) Containment: Assigned Value = 15

Waste in containers, impoundments, and landfills with less than 2 feet of cover

- 4) Waste Characteristics:

Measured concentrations of radionuclides are not known for the site

Volume of waste site = 810,000 m³

- a) Chemical

Toxicity Assigned Value = 3

	<u>Toxicity</u>
xylene	2
ODT	3
n-butyl benzene	1
fuel oil	3
PCB	3
²³⁹ Pu	3
natural uranium	3

EXAMPLE RUN #3 (Contd)

5) Targets:

Population Within a 1-Mile Radius Assigned Value = 5

Population = 15,000 people

Distance to a Critical Habitat Assigned Value = 0

Distance >1 mile

6) Score:

$$S_{dc} = \frac{(3)(15)(15)(20)}{21,600} (100) = 62.50$$

REFERENCES

- Hawley, K. A., R. A. Peloquin, and R. D. Stenner. 1986. Modified Hazard Ranking System for Sites with Mixed Radioactive and Hazardous Wastes - User Manual. PNL-5841, Pacific Northwest Laboratory. Richland, Washington.
- U.S. Environmental Protection Agency (EPA). 1984. Uncontrolled Hazardous Waste Site Ranking System - A Users Manual. 1984. HW-10. Federal Register (July 16, 1982).

APPENDIX F

mHRS/HRS EXAMPLE PROGRAM VERIFICATION RUNS (OUTPUT)

APPENDIX F

mHRS/HRS EXAMPLE PROGRAM VERIFICATION RUNS (OUTPUT)

To verify that the mHRS/HRS program package is running properly and calculating accurate scores, three example runs were checked against hand calculations. Example Run #1 represents mHRS calculations for a case with releases to the environment, Example Run #2 represents a case without any releases to the environment, and Example Run #3 represents HRS calculations for a case with releases to the environment. This appendix contains the three example program run outputs. The hand calculations to be compared with the scores of the three runs are provided in Appendix E.

EXAMPLE RUN #1

mHRS Hazardous Ranking System Facility Report

Date: 02/26/85
Site name: Hanford Reservation

Identification number: #1EXMPL

Site index in mHRS dBaseIII file: 1
Site log file name: #1EXMPL.TXT

DOE Operations Office and location:
DOE/RL - Hanford Site
Location: Richland, Washington
EPA Region: X
Person(s) in charge of facility: Battelle Northwest Laboratories

Reviewer: R. D. Stenner

Type of facility: R&D LABORATORY

Types of hazardous wastes:

MIXED WASTE

Contamination route of concern:

ALL ROUTES

Additional descriptive comments:

THIS IS A CALCULATION VERIFICATION TEST EXAMPLE ONLY!

Waste storage types:

Surface Impoundments

Containers

Landfills

Constituent Name	-----Routes-----					Constituent Quantity	
	GW	SW	A	FE	DC		
xylene	.T.	.T.	.T.	.T.	.T.	16000.0000	g
DOT	.T.	.T.	.F.	.F.	.T.	94000.0000	g
n-butyl benzene	.T.	.T.	.T.	.T.	.T.	1600.0000	g
fuel oil	.T.	.T.	.F.	.F.	.F.	1.5000	Mg
PCB	.T.	.T.	.F.	.F.	.T.	270.0000	g
mercury	.T.	.T.	.F.	.F.	.T.	0.0000	g
Pu239	.T.	.F.	.T.	.F.	.T.	11.0000	Ci
U natural	.T.	.T.	.F.	.T.	.T.	0.2000	Ci

Constituent Data Base Values

EXAMPLE RUN #1 (Contd)

Name: xylene

Assigned toxicity value:	2	
Assigned persistence value:	1	
Assigned ignitability value:	3	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	6-B	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: DDT

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	0	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: n-butyl benzene

Assigned toxicity value:	1	
Assigned persistence value:	1	
Assigned ignitability value:	2	
Assigned reactivity value:	1	
Assigned incompatibility value(s):	6-B	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: fuel oil

Assigned toxicity value:	3	
Assigned persistence value:	1	
Assigned ignitability value:	2	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: PCB

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	0	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: mercury

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	9	
Assigned reactivity value:	9	
Assigned incompatibility value(s):	SAX	
Physical state ground water route:	3	
Physical state surface water route:	3	

EXAMPLE RUN #1 (Contd)

Name: Pu239

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	0	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	4-B	3-B
Ground water group:	D	
Ground water transfer coefficient:	1	
Surface water group:	D	
Air group:	A	
Fire and explosion group:	A	
Direct contact group:	C	
Physical state ground water route:	2	
Physical state surface water route:	0	

Name: U natural

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	2	
Assigned reactivity value:	2	
Assigned incompatibility value(s):	6-B	3-B
Ground water group:	D	
Ground water transfer coefficient:	20	
Surface water group:	D	
Air group:	A	
Fire and explosion group:	A	
Direct contact group:	B	
Physical state ground water route:	3	
Physical state surface water route:	3	

EXAMPLE RUN #1 (Contd)

mHRS Hazardous Ranking System Facility Report

Facility name: Hanford Reservation
DOE/RL - Hanford Site

Location: Richland, Washington

EPA Region: X

Person(s) in charge of facility: Battelle Northwest Laboratories

Reviewer: R. D. Stenner

Date: 02/26/85

Facility Description:

Type of facility: R&D LABORATORY

Types of hazardous wastes:

MIXED WASTE

Contamination route of concern:

ALL ROUTES

Additional descriptive comments:

THIS IS A CALCULATION VERIFICATION TEST EXAMPLE ONLY!

Waste storage types:

Surface Impoundments

Containers

Landfills

The following worksheets are included for this facility:

Ground Water

Surface Water

Air

Fire and Explosion

Direct Contact

Scores: Sm = 59.69 (Sgw = 70.80 Ssw = 63.08 Sa = 40.90)

Sfe = 46.04

Sdc = 62.50

EXAMPLE RUN #1 (Contd)

mHRS Ground Water Route Work Sheet					
=====					
DOE/RL - Hanford Site			02/26/85		
Site: Hanford Reservation			Site index: 1		
Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
=====					
1. Observed Release	45	1	45	45	3.1

If observed release is given a score of 45, proceed to line 4.					
If observed release is given a score of 0, proceed to line 2.					

2. Route Characteristics					3.2
Depth to Aquifer of Concern	0	2	0	6	
Net Precipitation	0	1	0	3	
Permeability of the Unsaturated Zone	0	1	0	3	
Physical State	0	1	0	3	
Total Route Characteristics Score			0	15	

3. Containment	0	1	0	3	3.3

4. Waste Characteristics					3.4
Chemical					
a. Toxicity/Persistence	18	1	18	18	
Hazardous Waste Quantity	4	1	4	8	
Radioactive					
b.1 Maximum Observed	7	1	7	26	
b.2 Maximum Potential	3	1	3	26	
Total Waste Characteristics Score			22	26	
(Largest of 4a, b.1, b.2)	4.a	4.b	7		

5. Targets					3.5
Ground Water Use	2	3	6	9	
Distance to Nearest Well/Population Served	35	1	35	40	
Total Targets Score			41	59	

6. If line 1=45 (1x4x5)	Chemical		40590		
If line 1=0 (2x3x4x5)	Radioactive		12915	57330	

7. Line 6/57330 * 100	Sc(gw)=	70.80	Sr(gw)	22.53	

EXAMPLE RUN #1 (Contd)

mHRS Surface Water Route Work Sheet					
DOE/RL - Hanford Site				02/26/85	
Site: Hanford Reservation				Site index: 1	
Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	45	1	45	45	4.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2. Route Characteristics					4.2
Facility Slope & Intervening Terrain	0	1	0	3	
1-yr. 24-hr. Rainfall	0	1	0	3	
Distance to Nearest Surface Water	0	2	0	6	
Physical State	0	1	0	3	
Total Route Characteristics Score			0	15	
3. Containment	0	1	0	3	4.3
4. Waste Characteristics					4.4
a. Chemical					
Toxicity/Persistence	18	1	18	18	
Hazardous Waste Quantity	4	1	4	8	
Radioactive					
b.1 Maximum Observed	7	1	7	26	
b.2 Maximum Potential	1	1	1	26	
Total Waste Characteristics Score	4.a		22	26	
(Largest of 4a, b.1, b.2)	4.b		7		
5. Targets					4.5
Surface Water Use	2	3	6	9	
Distance to a Sensitive Environment	0	2	0	6	
Population Served/Distance to Water Intake Downstream	35	1	35	40	
Total Targets Score			41	55	
6. If line 1=45 (1x4x5)	Chemical		40590		
If line 1=0 (2x3x4x5)	Radioactive		12915	64350	
7. Line 6/64350 * 100	Sc(sw)=	63.08	Sr(sw)	20.07	

EXAMPLE RUN #1 (Contd)

```

-----
                                mHRS Air Route Work Sheet
                                =====
DOE/RL - Hanford Site                                02/26/85
Site: Hanford Reservation                            Site index: 1
-----
Rating Factor                Assigned Value    Multi-plier    Score    Max. Score    Ref. (Section)
=====
1. Observed Release                45          1          45      45          5.1
-----
Date and Location:                                01/03/84
    2400 Stevens Building
-----
Sampling Protocol:
    Method #5
-----
If observed release is given a score of 45, proceed to line 2.
If observed release is given a score of 0, the Sa=0. Enter on Line 5.
-----

2. Waste Characteristics                                                    5.2

a. Chemical
    Reactivity and Incompatibility                1          1          1          3
    Toxicity                                       2          3          6          9
    Hazardous Waste Quantity                      4          1          4          8

b. Radioactive                1          1          1          20
-----
Total Waste Characteristics Score  2.a          11          20
                                   2.b          1
-----

3. Targets                                                    5.3

Population Within 4-Mile Radius                27          1          27          30
Distance to Sensitive Environment              0          2          0          6
Land Use                                       2          1          2          3
-----
Total Targets Score                29          39
-----

4. Multiply 1 x 2 x 3    Chemical    14355
                        Radioactive   1305
-----

5. Line 4/35100 * 100    Sc(a)=    40.90    Sr(a)=    3.72
-----

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EXAMPLE RUN #1 (Contd)

mHRS Fire and Explosion Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

02/26/85
Site index: 1

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Containment	3	1	3	3	7.1
2. Waste Characteristics					7.2
Direct Evidence	0	1	0	3	
Ignitability	3	1	3	3	
Reactivity	2	1	2	3	
Imcompatibility	0	1	0	3	
Subtotal			5	12	
Chemical					
Hazardous Waste Quantity	4	1	4	8	
Radioactive	8	1	8	8	
Total Waste Characteristics Score (2a + Subtotal, 2b + Subtotal)	2.a 2.b		9 13	20	
3. Targets					7.3
Distance to Nearest Population	3	1	3	5	
Distance to Nearest Building	1	1	1	3	
Distance to Sensitive Environment	0	1	0	3	
Land Use	3	1	3	3	
Population Within 2-Mi Radius	5	1	5	5	
Buildings Within 2-Mi Radius	5	1	5	5	
Total Targets Score			17	24	
4. Multiply 1 x 2 x 3	Chemical Radioactive		459 663	1440	
5. Line 4/1440 * 100	Sc(fe)	31.88	Sr(fe)	46.04	

EXAMPLE RUN #1 (Contd)

mHRS Direct Contact Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

02/26/85
Site index: 1

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
---------------	----------------	------------	-------	------------	----------------

1. Observed Release	0	1	0	45	8.1
---------------------	---	---	---	----	-----

If observed release is given a score of 45, proceed to line 4.
If observed release is given a score of 0, proceed to line 2.

2. Accessibility	3	1	3	3	8.2
------------------	---	---	---	---	-----

3. Containment	15	1	15	15	8.3
----------------	----	---	----	----	-----

4. Waste Characteristics					8.4
--------------------------	--	--	--	--	-----

a. Chemical Toxicity	3	5	15	15	
b. Radioactive	15	1	15	15	

5. Targets					8.5
------------	--	--	--	--	-----

Population Within a 1-Mi Radius	5	4	20	20	
Distance to a Critical Habitat	0	4	0	12	

Total Targets Score			20	32	
---------------------	--	--	----	----	--

6. If line 1=45 (1x4x5)	Chemical		13500		
If line 1=0 (2x3x4x5)	Radioactive		13500	21600	

7. Line 6/21600 * 100	Sc(dc)	62.50	Sr(dc)	62.50	
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EXAMPLE RUN #2

mHRS Hazardous Ranking System Facility Report

Date: 07/23/86
Site name: Hanford Reservation
Identification number: #2EXMPL

Site index in mHRS dBaseIII file: 2
Site log file name: #2EXMPL .TXT

DOE Operations Office and location:
DOE/RL - Hanford Site
Location: Richland, Washington
EPA Region: X
Person(s) in charge of facility: Battelle Northwest Laboratories

Reviewer: R. D. Stenner

Type of facility: R&D LABORATORY

Types of hazardous wastes:
MIXED WASTE

Contamination route of concern:
ALL ROUTES

Additional descriptive comments:
THIS IS A CALCULATION VERIFICATION TEST EXAMPLE ONLY!
This test case considers sites without any release of
contamination.

Waste storage types:
Surface Impoundments
Containers
Landfills

Constituent Name	-----Routes-----					Constituent Quantity
	GW	SW	A	FE	DC	
xylene	.T.	.T.	.T.	.T.	.T.	16000.0000 g
DOT	.T.	.T.	.F.	.F.	.T.	94000.0000 g
n-butyl benzene	.T.	.T.	.T.	.T.	.T.	1600.0000 g
fuel oil	.T.	.T.	.F.	.F.	.F.	1.5000 Mg
PCB	.T.	.T.	.F.	.F.	.T.	270.0000 g
mercury	.T.	.T.	.F.	.F.	.T.	0.0000 g
Pu239	.T.	.F.	.T.	.F.	.T.	11.0000 Ci
U natural	.T.	.T.	.F.	.T.	.T.	0.2000 Ci

EXAMPLE RUN #2 (Contd)

Constituent Data Base Values

Name: xylene

Assigned toxicity value:	2	
Assigned persistence value:	1	
Assigned ignitability value:	3	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	6-B	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: DDT

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	0	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: n-butyl benzene

Assigned toxicity value:	1	
Assigned persistence value:	1	
Assigned ignitability value:	2	
Assigned reactivity value:	1	
Assigned incompatibility value(s):	6-B	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: fuel oil

Assigned toxicity value:	3	
Assigned persistence value:	1	
Assigned ignitability value:	2	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: PCB

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	0	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

EXAMPLE RUN #2 (Contd)

Name: mercury

Assigned toxicity value:	3
Assigned persistence value:	3
Assigned ignitability value:	9
Assigned reactivity value:	9
Assigned incompatibility value(s):	SAX
Physical state ground water route:	3
Physical state surface water route:	3

Name: Pu239

Assigned toxicity value:	3
Assigned persistence value:	3
Assigned ignitability value:	0
Assigned reactivity value:	0
Assigned incompatibility value(s):	4-B 3-B
Ground water group:	D
Ground water transfer coefficient:	1
Surface water group:	D
Air group:	A
Fire and explosion group:	A
Direct contact group:	C
Physical state ground water route:	2
Physical state surface water route:	0

Name: U natural

Assigned toxicity value:	3
Assigned persistence value:	3
Assigned ignitability value:	2
Assigned reactivity value:	2
Assigned incompatibility value(s):	6-B 3-B
Ground water group:	D
Ground water transfer coefficient:	20
Surface water group:	D
Air group:	A
Fire and explosion group:	A
Direct contact group:	B
Physical state ground water route:	3
Physical state surface water route:	3

EXAMPLE RUN #2 (Contd)

mHRS Hazardous Ranking System Facility Report

Facility name: Hanford Reservation
DOE/RL - Hanford Site
Location: Richland, Washington
EPA Region: X
Person(s) in charge of facility: Battelle Northwest Laboratories
Reviewer: R. D. Stenner
Date: 07/23/86
Facility Description:
Type of facility: R&D LABORATORY
Types of hazardous wastes:
MIXED WASTE
Contamination route of concern:
ALL ROUTES
Additional descriptive comments:
THIS IS A CALCULATION VERIFICATION TEST EXAMPLE ONLY!
This test case considers sites without any release of
contamination.

Waste storage types:
Surface Impoundments
Containers
Landfills

The following worksheets are included for this facility:
Ground Water
Surface Water
Air
Fire and Explosion
Direct Contact

Scores: Sm = 34.97 (Sgw= 47.20 Ssw= 37.85 Sa= 0.00)
Sfe = 18.89
Sdc = 62.50

EXAMPLE RUN #2 (Contd)

mHRS Ground Water Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

07/23/86
Site index: 2

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	0	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2. Route Characteristics					3.2
Depth to Aquifer of Concern	2	2	4	6	
Net Precipitation	1	1	1	3	
Permeability of the Unsaturated Zone	2	1	2	3	
Physical State	3	1	3	3	
Total Route Characteristics Score			10	15	
3. Containment	3	1	3	3	3.3
4. Waste Characteristics					3.4
Chemical					
a. Toxicity/Persistence	18	1	18	18	
Hazardous Waste Quantity	4	1	4	8	
Radioactive					
b.1 Maximum Observed	0	1	0	26	
b.2 Maximum Potential	3	1	3	26	
Total Waste Characteristics Score	4.a		22	26	
(Largest of 4a, b.1, b.2)	4.b		3		
5. Targets					3.5
Ground Water Use	2	3	6	9	
Distance to Nearest Well/ Population Served	35	1	35	40	
Total Targets Score			41	59	
6. If line 1=45 (1x4x5)	Chemical		27060		
If line 1=0 (2x3x4x5)	Radioactive		3690	57330	
7. Line 6/57330 * 100	Sc(gw)=	47.20	Sr(gw)	6.44	

EXAMPLE RUN #2 (Contd)

mHRS Surface Water Route Work Sheet					
DOE/RL - Hanford Site			07/23/86		
Site: Hanford Reservation			Site index: 2		
Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	0	1	0	45	4.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2. Route Characteristics					4.2
Facility Slope & Intervening Terrain	1	1	1	3	
1-yr. 24-hr. Rainfall	1	1	1	3	
Distance to Nearest Surface Water	2	2	4	6	
Physical State	3	1	3	3	
Total Route Characteristics Score			9	15	
3. Containment	3	1	3	3	4.3
4. Waste Characteristics					4.4
a. Chemical					
Toxicity/Persistence	18	1	18	18	
Hazardous Waste Quantity	4	1	4	8	
Radioactive					
b.1 Maximum Observed	0	1	0	26	
b.2 Maximum Potential	1	1	1	26	
Total Waste Characteristics Score	4.a		22	26	
(Largest of 4a, b.1, b.2)	4.b		1		
5. Targets					4.5
Surface Water Use	2	3	6	9	
Distance to a Sensitive Environment	0	2	0	6	
Population Served/Distance to Water Intake Downstream	35	1	35	40	
Total Targets Score			41	55	
6. If line 1=45 (1x4x5)	Chemical		24354		
If line 1=0 (2x3x4x5)	Radioactive		1107	64350	
7. Line 6/64350 * 100	Sc(sw)=	37.85	Sr(sw)	1.72	

EXAMPLE RUN #2 (Contd)

mHRS Air Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

07/23/86
Site index: 2

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	0	1	0	45	5.1

Date and Location: 01/03/84

Sampling Protocol:

If observed release is given a score of 45, proceed to line 2.
If observed release is given a score of 0, the Sa=0. Enter on Line 5.

2. Waste Characteristics 5.2

a. Chemical				
Reactivity and Incompatibility	0	1	0	3
Toxicity	0	3	0	9
Hazardous Waste Quantity	0	1	0	8
b. Radioactive	0	1	0	20

Total Waste Characteristics Score 2.a 0 20
2.b 0

3. Targets 5.3

Population Within 4-Mile Radius	0	1	0	30
Distance to Sensitive Environment	0	2	0	6
Land Use	0	1	0	3

Total Targets Score 0 39

4. Multiply 1 x 2 x 3 Chemical 0
Radioactive 0

5. Line 4/35100 * 100 Sc(a)= 0.00 Sr(a)= 0.00

EXAMPLE RUN #2 (Contd)

mHRS Fire and Explosion Route Work Sheet					
DOE/RL - Hanford Site			07/23/86		
Site: Hanford Reservation			Site index: 2		
Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)

1. Containment	1	1	1	3	7.1

2. Waste Characteristics					7.2
Direct Evidence	3	1	3	3	
Ignitability	3	1	3	3	
Reactivity	2	1	2	3	
Incompatibility	0	1	0	3	
Subtotal			8	12	
Chemical					
Hazardous Waste Quantity	4	1	4	8	
Radioactive	8	1	8	8	

Total Waste Characteristics Score	2.a		12	20	
(2a + Subtotal, 2b + Subtotal)	2.b		16		

3. Targets					7.3
Distance to Nearest Population	3	1	3	5	
Distance to Nearest Building	1	1	1	3	
Distance to Sensitive Environment	0	1	0	3	
Land Use	3	1	3	3	
Population Within 2-Mi Radius	5	1	5	5	
Buildings Within 2-Mi Radius	5	1	5	5	

Total Targets Score			17	24	

4. Multiply 1 x 2 x 3	Chemical		204		
	Radioactive		272	1440	

5. Line 4/1440 * 100	Sc(fe)	14.17	Sr(fe)	18.89	

EXAMPLE RUN #2 (Contd)

mHRS Direct Contact Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

07/23/86
Site index: 2

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	45	1	45	45	8.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2. Accessibility	0	1	0	3	8.2
3. Containment	0	1	0	15	8.3
4. Waste Characteristics					8.4
a. Chemical Toxicity	3	5	15	15	
b. Radioactive	15	1	15	15	
5. Targets					8.5
Population Within a 1-Mi Radius	5	4	20	20	
Distance to a Critical Habitat	0	4	0	12	

Total Targets Score			20	32	
6. If line 1=45 (1x4x5)	Chemical		13500		
If line 1=0 (2x3x4x5)	Radioactive		13500	21600	
7. Line 6/21600 * 100	Sc(dc)	62.50	Sr(dc)	62.50	

EXAMPLE RUN #3

HRS Hazardous Ranking System Facility Report

Date: 02/26/85

Site name: Hanford Reservation

Identification number: #1EXMPL

Site index in mHRS dBaseIII file: 1

Site log file name: #1EXMPL.TXT

OOE Operations Office and location:

OOE/RL - Hanford Site

Location: Richland, Washington

EPA Region: X

Person(s) in charge of facility: Battelle Northwest Laboratories

Reviewer: R. D. Stenner

Type of facility: R&O LABORATORY

Types of hazardous wastes:

MIXED WASTE

Contamination route of concern:

ALL ROUTES

Additional descriptive comments:

THIS IS A CALCULATION VERIFICATION TEST EXAMPLE ONLY!

Waste storage types:

Surface Impoundments

Containers

Landfills

Constituent Name	-----Routes-----					Constituent	
	GW	SW	A	FE	DC	Quantity	
xylene	.T.	.T.	.T.	.T.	.T.	16000.0000	g
ODT	.T.	.T.	.F.	.F.	.T.	94000.0000	g
n-butyl benzene	.T.	.T.	.T.	.T.	.T.	1600.0000	g
fuel oil	.T.	.T.	.F.	.F.	.F.	1.5000	Mg
PCB	.T.	.T.	.F.	.F.	.T.	270.0000	g
mercury	.T.	.T.	.F.	.F.	.T.	0.0000	g
Pu239	.T.	.F.	.T.	.F.	.T.	11.0000	Ci
U natural	.T.	.T.	.F.	.T.	.T.	0.2000	Ci

Constituent Data Base Values

EXAMPLE RUN #3 (Contd)

Name: xylene

Assigned toxicity value:	2	
Assigned persistence value:	1	
Assigned ignitability value:	3	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	6-8	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: DDT

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	0	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: n-butyl benzene

Assigned toxicity value:	1	
Assigned persistence value:	1	
Assigned ignitability value:	2	
Assigned reactivity value:	1	
Assigned incompatibility value(s):	6-8	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: fuel oil

Assigned toxicity value:	3	
Assigned persistence value:	1	
Assigned ignitability value:	2	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: PCB

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	0	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	0	0
Physical state ground water route:	3	
Physical state surface water route:	3	

Name: mercury

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	9	
Assigned reactivity value:	9	
Assigned incompatibility value(s):	SAX	
Physical state ground water route:	3	
Physical state surface water route:	3	

EXAMPLE RUN #3 (Contd)

Name: Pu239

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	0	
Assigned reactivity value:	0	
Assigned incompatibility value(s):	4-B	3-B
Ground water group:	D	
Ground water transfer coefficient:	1	
Surface water group:	D	
Air group:	A	
Fire and explosion group:	A	
Direct contact group:	C	
Physical state ground water route:	2	
Physical state surface water route:	0	

Name: U natural

Assigned toxicity value:	3	
Assigned persistence value:	3	
Assigned ignitability value:	2	
Assigned reactivity value:	2	
Assigned incompatibility value(s):	6-B	3-B
Ground water group:	D	
Ground water transfer coefficient:	20	
Surface water group:	D	
Air group:	A	
Fire and explosion group:	A	
Direct contact group:	B	
Physical state ground water route:	3	
Physical state surface water route:	3	

EXAMPLE RUN #3 (Contd)

HRS Ground Water Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

02/26/85
Site index: 1

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	45	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2. Route Characteristics					3.2
Depth to Aquifer of Concern	0	2	0	6	
Net Precipitation	0	1	0	3	
Permeability of the Unsaturated Zone	0	1	0	3	
Physical State	0	1	0	3	
Total Route Characteristics Score			0	15	
3. Containment	0	1	0	3	3.3
4. Waste Characteristics					3.4
Chemical					
a. Toxicity/Persistence	18	1	18	18	
Hazardous Waste Quantity	4	1	4	8	
Total Waste Characteristics Score			22	26	
5. Targets					3.5
Ground Water Use	2	3	6	9	
Distance to Nearest Well/ Population Served	35	1	35	40	
Total Targets Score			41	59	
6. If line 1=45 (1x4x5) If line 1=0 (2x3x4x5)			40590	57330	
7. Line 6/57330 * 100	Sc(gw)=	70.80			

EXAMPLE RUN #3 (Contd)

HRS Surface Water Route Work Sheet					
DOE/RL - Hanford Site			02/26/85		
Site: Hanford Reservation			Site index: 1		
Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Observed Release	45	1	45	45	4.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2. Route Characteristics					4.2
Facility Slope & Intervening Terrain	0	1	0	3	
1-yr. 24-hr. Rainfall	0	1	0	3	
Distance to Nearest Surface Water	0	2	0	6	
Physical State	0	1	0	3	
Total Route Characteristics Score			0	15	
3. Containment	0	1	0	3	4.3
4. Waste Characteristics					4.4
a. Chemical					
Toxicity/Persistence	18	1	18	18	
Hazardous Waste Quantity	4	1	4	8	
Total Waste Characteristics Score			22	26	
5. Targets					4.5
Surface Water Use	2	3	6	9	
Distance to a Sensitive Environment	0	2	0	6	
Population Served/Distance to Water Intake Downstream	35	1	35	40	
Total Targets Score			41	55	
6. If line 1=45 (1x4x5) If line 1=0 (2x3x4x5)			40590	64350	
7. Line 6/64350 * 100	Sc(sw)=	63.08			

EXAMPLE RUN #3 (Contd)

HRS Air Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

02/26/85
Site index: 1

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
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1. Observed Release	45	1	45	45	5.1
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Date and Location: 01/03/84
2400 Stevens Building

Sampling Protocol:
Method #5

If observed release is given a score of 45, proceed to line 2.
If observed release is given a score of 0, the Sa=0. Enter on Line 5.

2. Waste Characteristics 5.2

a. Chemical					
Reactivity and Incompatibility	1	1	1	3	
Toxicity	3	3	9	9	
Hazardous Waste Quantity	4	1	4	8	

Total Waste Characteristics Score 14 20

3. Targets 5.3

Population Within 4-Mile Radius	27	1	27	30
Distance to Sensitive Environment	0	2	0	6
Land Use	2	1	2	3

Total Targets Score 29 39

4. Multiply 1 x 2 x 3 18270 35100

5. Line 4/35100 S= 52.05

EXAMPLE RUN #3 (Contd)

HRS Fire and Explosion Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

02/26/85
Site index: 1

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
1. Containment	3	1	3	3	7.1
2. Waste Characteristics					7.2
Direct Evidence	0	1	0	3	
Ignitability	3	1	3	3	
Reactivity	2	1	2	3	
Incompatibility	0	1	0	3	
Hazardous Waste Quantity	4	1	4	8	
Total Waste Characteristics Score			9	20	
3. Targets					7.3
Distance to Nearest Population	3	1	3	5	
Distance to Nearest Building	1	1	1	3	
Distance to Sensitive Environment	0	1	0	3	
Land Use	3	1	3	3	
Population Within 2-Mi Radius	5	1	5	5	
Buildings Within 2-Mi Radius	5	1	5	5	
Total Targets Score			17	24	
4. Multiply 1 x 2 x 3		459	1440		
5. Line 4/1440 * 100		S(fe)=	31.88		

EXAMPLE RUN #3 (Contd)

HRS Direct Contact Route Work Sheet

DOE/RL - Hanford Site
Site: Hanford Reservation

02/26/85
Site index: 1

Rating Factor	Assigned Value	Multiplier	Score	Max. Score	Ref. (Section)
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1. Observed Release	0	1	0	45	8.1
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If observed release is given a score of 45, proceed to line 4.

If observed release is given a score of 0, proceed to line 2.

2. Accessibility	3	1	3	3	8.2
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3. Containment	15	1	15	15	8.3
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4. Waste Characteristics					8.4
Chemical Toxicity	3	5	15	15	

5. Targets					8.5
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Population Within a
1-Mi Radius

5	4	20	20
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Distance to a

Critical Habitat

0	4	0	12
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Total Targets Score

20	32
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6. If line 1=45 (1x4x5)

If line 1=0 (2x3x4x5)

13500	21600
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7. Line 6/21600 * 100

Sc(dc) 62.50

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