Hanford Environmental Dosimetry Upgrade Project

**GENII - The Hanford
Environmental Radiation
Dosimetry Software System**

Volume 3: Code Maintenance Manual

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September 1988

**Prepared for the U.S. Department of Energy
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**Pacific Northwest Laboratory
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HANFORD ENVIRONMENTAL DOSIMETRY UPGRADE PROJECT
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DOSIMETRY SOFTWARE SYSTEM
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ABSTRACT

The Hanford Environmental Dosimetry Upgrade Project was undertaken to incorporate the internal dosimetry models recommended by the International Commission on Radiological Protection (ICRP) in updated versions of the environmental pathway analysis models used at Hanford. The resulting second generation of Hanford environmental dosimetry computer codes is compiled in the Hanford Environmental Dosimetry System (Generation II, or GENII). This coupled system of computer codes is intended for analysis of environmental contamination resulting from acute or chronic releases to, or initial contamination of, air, water, or soil, on through the calculation of radiation doses to individuals or populations. GENII is described in three volumes of documentation. This volume is a Code Maintenance Manual for the serious user, including code logic diagrams, global dictionary, worksheets to assist with hand calculations, and listings of the code and its associated data libraries. The first volume describes the theoretical considerations of the system. The second volume is a Users' Manual, providing code structure, users' instructions, required system configurations, and QA-related topics.

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1.0 INTRODUCTION

At the direction of U.S. Department of Energy, The Hanford Environmental Dosimetry Upgrade Project was undertaken by Pacific Northwest Laboratory (PNL)^(a) to incorporate the internal dosimetry models recommended by the International Commission on Radiological Protection (ICRP) in updated versions of the environmental pathway analysis models used at Hanford. The resulting second generation of Hanford environmental dosimetry computer codes is compiled in the Hanford Environmental Dosimetry System (Generation II, or GENII). The GENII system was developed through tasks designed to provide a state-of-the-art, technically peer-reviewed, documented set of programs for calculating radiation doses from radionuclides released to the environment.

The general requirements of the system to be designed included the capabilities for calculating radiation doses for acute releases, with options for annual dose, committed dose, and accumulated dose; for calculating the same types of doses from chronic releases; for evaluating exposure pathways including direct exposure via water (swimming, boating, and fishing), soil (surface and buried sources), air (semi-infinite cloud and finite cloud geometries), inhalation pathways, and ingestion pathways. The release scenarios to be included were acute releases to air from ground level or elevated sources, or to water; chronic releases to air from ground level or elevated sources, or to water; and initial contamination of soil or surfaces. Source term variations to be accounted for included decay of radionuclides to the start of the exposure scenario, input of total radioactivity or specified fractions, and input of measured concentrations in specified environmental media. Interfaces were to be provided for external calculations of atmospheric dispersion, geohydrology, biotic transport, and surface water transport. Target populations were to be allowed by distance and direction for individuals, populations, and for intruders into contained sources.

The Hanford Environmental Dosimetry System (GENII) is composed of seven

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linked computer codes and their associated data libraries. These codes and their linkages are illustrated in Figure 1.1.

GENII is described in three volumes of documentation. This volume is a Code Maintenance Manual for the serious user, including code logic diagrams, global dictionary, worksheets and example hand calculations, and listings of the code and its associated data libraries. The first volume describes the theoretical considerations of the system. Included are the conceptual diagrams, mathematical representation of the solutions, and descriptions of solution techniques, where appropriate. The second volume is a Users' Manual, providing code structure, users' instructions, required system configurations, and QA-related topics.

FIGURE 1.1. Current User/Computer Program Interaction
In the GENII Software Package

2.0 CODE STRUCTURE AND LOGIC DIAGRAMS

The GENII Software Package is composed of several computer programs and data libraries. The computer programs fall into three categories: 1) user interface (i.e., interactive menu-driven program to assist the user with scenario generation), 2) internal and external dose factor generators, and 3) the environmental dosimetry programs. APPRENTICE is the user interface for the short-term environmental dosimetry programs. INTDF and EXTDF generate internal and external dose rate factors, respectively. Long-term environmental dosimetry is handled by DITTY. For maximum flexibility, the short-term environmental dosimetry portion has been divided into three interrelated but separate programs (ENVIN, ENV, and DOSE) that handle input organization and checking, environmental exposure, and dose calculations, respectively.

Two user interaction levels are defined for the GENII software package. The first, Level 0, interacts with the user interface; the second, Level 1, interacts directly with the text input files. Level 0 helps both the novice and the experienced user of the software package. Level 1 is intended for the experienced user of the software. DITTY, EXTDF, and INTDF are available to only the Level 1 user at this time.

This third volume of the documentation is intended for those who maintain and control the GENII Software Package and for Level 1 Users who wish a deeper understanding of the operation, structure, mechanics, and programming of GENII. This volume contains summaries of the code structure and logic, a global dictionary of parameters, worksheets intended for hand calculation, verification of the equations as implemented, and listings of the codes and data libraries.

Structurally, all the GENII computer programs described above are part of an integrated design/maintenance environment, with the exception of APPRENTICE. This integrated environment includes common parameter definition across all the codes, use of a pool of FORTRAN COMMON BLOCKS, and use of general purpose code modules, herein referred to as GENERAL modules. Figure 2.1 depicts the structural organization of the software package.

FIGURE 2.1. Structural Organization of the GENII Software Package

Structure and logic of the primary programs have been summarized in Figures 2.2 through 2.6 for computer programs ENVIN, ENV, DOSE, INTDF, and DITTY, respectively. Table 2.1 shows FORTRAN LOGICAL parameter names and parameter interrelationships of the exposure pathways as used to control exposure calculations throughout the codes. Subroutine hierarchy and usage is summarized in Table 2.2 for each of the codes and GENERAL modules. Common block usage is shown in Table 2.3.

2.1 SOFTWARE CONFIGURATION CONTROL, TESTING, AND VERIFICATION

The integrity of the GENII software system is maintained by two systems: 1) software configuration control and 2) software testing and verification. Both systems consist of numbering, documentation, and signature procedures. Each of the systems is tracked with a data base.

Software configuration control of the GENII Software Package reflects the integrated nature of the structure. When any code module or data file of the design/maintenance environment is modified, a new version number is applied to each code of the package. New versions of the entire GENII

Software Package are then released as deemed necessary by the designated GENII expert. Because APPRENTICE is outside the integrated design/maintenance environment, new versions of APPRENTICE may be released between releases of the entire package. Version numbering reflects change packet number. Each change packet contains changes relating to a particular enhancement or modification. Each version will reflect one or more specific change packet(s). This volume corresponds to the GENII Software Package as configured in Version 1.351 and APPRENTICE as configured in Version 1.357.

The GENII Software Package has been under configuration control since March 24, 1987. The developmental version of GENII was called Version 0 and contains 195 change packets. Version 1 of GENII was released on October 1, 1987 for testing. To date there have been 351 change packets to Version 1 and 24 releases.

There are 43 test and verification packets to date. Each packet contains hand calculations and/or alternate code/document comparisons for specified codes, pathways, radionuclides, etc.

Get system time and date Read file names		MAKDA2 OPNFIL
Read GENII input file		READIN
Read master radionuclide library		RLIBIN
Identify and order inventory		ORDER IDNUC
Test input parameters for ranges and option logic		CHECK XQIN
Read environmental data libraries		ENVLIB
Write input parameter report to GENII output file		RITQA
Read and check default environmental parameters		REDFLT
If Acute:	Calculate E/Q values, if requested	ACCMOD OPNFIL XQIN SIGMA PLMRIZ DRFBIV BSORT PROB HEAONG FILERR RWAKE PROFILE
Else Chronic:	Calculate Chf/Q values, if requested	CRONMOD OPNFIL XQIN SIGMA PLMRIZ FNTDRF FILERR PROFILE
Write input file for ENV		RITENV

FIGURE 2.2. Program ENVIN Logic Structure

Get system time and date, read file names		MAKDA2	OPNFIL
Read case-specific parameters from ENV input file			REDCAS
Population and production file input and calculation		XQIN XQCAL	INTPOL
For each radionuclide chain--			
Initialize chain parameters, read radionuclide chain data set		INITNV	REDCHA
If Acute:	For each season--		
	Calculate time-integrated media concentration		ACUTE1
	Calculate exposure/uptake this season		EXPOS
	If carbon or tritium:		CANDH
	Else:		ACUTEC ACUTEA
	For each subsequent year of intake		
	Calculate transport: Soil/waste decay, harvest removal Deposition/removal soil Write media report		TRNSPT DKHARV EDRNON EDRRES EDRCRP RITMED
	Calculate exposure/uptake:		EXPOS
	If carbon/tritium:		CANDH
	Else:	INHCAL EXTICAL CRPCAL ANMCAL DRKCAL AQUICAL	
	Write exposure data set to output file		RITENV
Else Chronic:	Transport pre-calculations		BIOCAL SWCAL AIRCAL
	For each year of optional decay/buildup period		
	Calculate transport through environment: Waste package availability If not first year, decay soils and buried waste Deposition/removal to soil		TRNSPT PACKAG DKSOIL EDRNON EDRRES EDRCRP EDRANM
	Manual redist. in soil, land use change		PRIOR
	For each year of intake--		
	Calculate transport through environment: Waste package availability If not first year, decay soils and buri Deposition/removal to soil		TRNSPT PACKAG DKSOIL EDRNON EDRRES EDRCRP EDRANM
	Calculate exposure/uptake rates:		EXPOS
	If carbon or tritium:		CANDH
	Else:	Inhalation External exposure Terrestrial foods Animal products Drinking water Aquatic foods	INHCAL EXTICAL CRPCAL ANMCAL DRKCAL AQUICAL
	Write exposure data set to ENV output file		RITEXP

FIGURE 2.3. Program ENV Logic Structure

Get system time and date, read file names Read input files, external dose factors		MAKDA2	DPNFIL REDFIL
If Acute:	For each season--		DOSCTL
	For each year of the dose commitment period--		DOSCAL
	For each radionuclide considered--		DOSCAL
	Read ingestion and inhalation dose factors		REDSET
	For each organ--		DOSCAL
	For each selected exposure pathway--		DOSCAL
	Read exposure for each year of intake		DOSCAL
	For each year of intake--		DOSCAL
	Calculate internal dose increments		DOSCAL
	Calculate external dose increment for each pathway		DOSCAL
	For each organ--		DOSCAL
	Determine if this year's dose to organ is maximum		DOSCAL
	Calculate totals and set flags Calculate whole body effective dose equivalent Write dose summary report If selected, write dose by pathway report If selected, write dose by radionuclide report Write dose by radionuclide report		TOTCAL WBEDE DOSSUM RITBYP RITBYR RITEDE
Else Chronic:	For each year of the dose commitment period--		DOSCAL
	For each radionuclide considered--		DOSCAL
	Read ingestion and inhalation dose factors		REDSET
	For each organ--		DOSCAL
	For each selected exposure pathway--		DOSCAL
	Read exposure for each year of intake		DOSCAL
	For each year of intake--		DOSCAL
	Calculate internal dose increments, total		DOSCAL
	Calculate external dose increment for each pathways and accumulate totals		DOSCAL
	For each organ--		DOSCAL
	Determine if this year's dose to organ is maximum		DOSCAL
	Calculate totals and set flags Calculate whole body effective dose equivalent Write dose summary report If selected, write dose by pathway report If selected, write dose by radionuclide report Write dose by radionuclide report		TOTCAL WBEDE DOSSUM RITBYP RITBYR RITEDE

FIGURE 2.4. Program DOSE Logic Structure

Get system time and date	MAKDA2
Read file names	OPNFIL
Read INTDF input file, count inventory	
Read master radionuclide library	RLIBIN
Check input radionuclide list for validity	IDNUC
Calculate lung deposition fractions	DEP
Open output and report files, print headings	
For each radionuclide in the input list--	
Identify radionuclide and find daughters	ORDIN
Read Sij factor library	SIJLIB
Read metabolic data for this radionuclide chain	METLIB
Set organ parameters	SETPAR
Write input parameter report	RITINT
Calculate ingestion dose factors:	
Initialize organ compartments	SETPAR
For each year of the dose commitment period--	
Perform integration of contamination remaining in each organ model compartment as a result of ingestion; use specified model	LS2 GEN ALK IOD
Calculate yearly dose increment	CDECAL
Write reports	RITEND
Calculate inhalation dose factors:	
Initialize organ compartments	SETPAR
For each year of the dose commitment period--	
Perform integration of contamination remaining in each organ model compartment as a result of inhalation; use specified model	LS2 GEN ALK IOD
Calculate yearly dose increment	CDECAL
Write reports	RITEND
Write CDE increment data set for this radionuclide	RITINC

FIGURE 2.5. Program INTDF Logic Structure

Get system time and date	MAKDA2
Read file names	OPNFIL
Read master radionuclide library	RLIBIN
Read master radionuclide list	IDNUC
Check master radionuclide list	SETNUC
Read inhalation and ingestion dose factors	AIRLIN
Read food transfer data	FOOLIN
Read external exposure dose factors	GRDLIN
Read input file for one case	CASE2
Read bioaccumulation factors	BIOLIN
Read and set airborne release data, if considered	ACTIN
Read and set waterborne release data, if considered	ACTIN
Write input parameter report	QAPAGE
Initialize parameters	CONTRL
Calculate doses for acute release, if considered	APATHS WPATHS DOSADD
For each 70-yr time step for 10,000 years	CONTRL
Calculate concentrations from airborne pathways	APATHS
Calculate concentrations from waterborne pathways	WPATHS
Calculate dose increments this time period	DOSADD
Calculate EDE	WBEDE2 WBEDE4
Write results report	DITBYP DITBYR REPORT
Read title for next case	CASE2
Continue until end of input file	

FIGURE 2.6. Program DITTY Logic Structure

TABLE 2.1. Standardized Array Positions for
Environmental Exposure Pathways

Index	Exposure Pathway	Selection Flag	Group Flag
1	Plume, external	AIREXT	
2	Inhalation uptake	INHAL	
3	Ground, external	GROUND	
4	Leafy vegetable ingestion	TDF(1)	TFOOD
5	Root vegetable ingestion	TDF(2)	TFOOD
6	Grain ingestion	TDF(3)	TFOOD
7	Fruit ingestion	TDF(4)	TFOOD
8	Beef ingestion	ANF(1)	ANFOOD
9	Poultry ingestion	ANF(2)	ANFOOD
10	Cow milk ingestion	ANF(3)	ANFOOD
11	Egg ingestion	ANF(4)	ANFOOD
12	Inadvertent soil ingestion	SLING	
13	Water ingestion/swimming	SWING	RECRE
14	Swimming, external	REC(1)	RECRE
15	Boating, external	REC(2)	RECRE
16	Shoreline, external	REC(3)	RECRE
17	Drinking water ingestion	DRINK	
18	Fish ingestion	AQF(1)	AQFOOD
19	Mollusc ingestion	AQF(2)	AQFOOD
20	Crustacea ingestion	AQF(3)	AQFOOD
21	Aquatic plants ingestion	AQF(4)	AQFOOD
22	Deep soil, external	DEEP	
23	Buried waste, external	BURWAS	

TABLE 2.2. Subroutine Hierarchy and Usage

ENVIN

ENVIN	CRONMOD	PROFILE
MAKDA2	OPNFIL	USTAR
OPNFIL	XQIN	INVMOL
READIN	SIGMA	
RLIBIN	PLMRIZ	READIN
ORDER	FNTDRF	OPNFIL
CHECK	FILERR	DUMRED
ENVLIB	PROFILE	FILERR
RITQA		
REDFLT	DRFBIV	REDFLT
ACCMOD	none	FILERR
CRONMOD		
RITENV	DRFSEC	RITENV
	none	OPNFIL
ACCMOD		FILERR
OPNFIL	ENVLIB	
XQIN	OPNFIL	RITQA
SIGMA	FILERR	OPNFIL
PLMRIZ		HEADNG
DRFBIV	FNTDRF	GETDAT
BSORT	DRFSEC	FILERR
PROB		SYSTEM (system)
HEADNG	INVMOL	
FILERR	none	RWAKE
RWAKE		SIGMA
PROFILE	ORDER	
	IDNUC	USTAR
BSORT	EXIT (system)	INVMOL
none		
CHECK	PLMRIZ	
HEADNG	USTAR	
XQIN		
OPNFIL	PROB	
EXIT (system)	none	

TABLE 2.2. (contd)

ENV

ENV		
MAKDA2	CRPCAL	INTPOL
OPNFIL	CHAIN	EXIT
REDCAS		
XQCAL	DKHARV	PACKAG
OPNFIL	CHAIN	none
HEADNG		
INITNV	DRKCAL	PRIOR
REDCHA	CHAIN	none
ACUTE1		
EXPOSR	EDRANM	REDCAS
TRNSPT	CHAIN	OPNFIL
RITMED		FILERR
RITEXP	EDRCRP	
BIOCAL	CHAIN	REDCHA
SWCAL		none
AIRCAL	EDRNON	
PRIOR	CHAIN	REDIST
		none
ACUTE1	EDRRES	
CHAIN	CHAIN	RITEXP
		FILERR
ACUTEA	EXPOSR	
CHAIN	CANDH	RITMED
	ACUTEC	none
ACUTEC	ACUTEA	
CHAIN	CRPCAL	SWCAL
	ANMCAL	CHAIN
AIRCAL	DRKCAL	EXIT (system)
CHAIN	AQUCAL	
EXIT (system)	INHCAL	TRNSPT
FILERR	EXTCAL	PACKAG
		REDIST
ANMCAL	EXTCAL	DKHARV
CHAIN	OPNFIL	EDRNON
	HEADNG	EDRRES
AQUCAL	CHAIN	EDRCRP
CHAIN		EDRANM
	INHCAL	
CANDH	none	XQCAL
CHAIN		XQIN
	INITNV	OPNFIL
CHAIN	none	HEADNG
		FILERR
		EXIT

TABLE 2.2. (contd)

DOSE

DOSE	DOSSUM	RITBYR
MAKDA2	MAKDA2	SUBHED
OPNFIL	OPNFIL	
REDFIL	SUBHED	RITEDE
DOSCTL		SUBHED
TOTCAL	REDFIL	
DOSSUM	OPNFIL	SUBHED
RITBYP	BIOCAL	HEADNG
RITBYR	EXIT (system)	
RITEDE	FILERR	TOTCAL
		WBEDE
DOSCAL	REDSET	
none	none	WBEDE
		EXIT (system)
DOSCTL	RITBYP	
REDSET	SUBHED	
DOSCAL		

INTDF

INTDF	DEP	ORDIN
DIFEQ2	none	EXIT
MAKDA2		
OPNFIL	DGCHAIN	RITEND
RLIBIN	none	HEADNG
IDNUC		
DEP	DIFEQ2	RITINC
OPNFIL	DGCHAIN	none
ORDIN	GEN	
METLIB	ALK	RITINT
HEADNG	IOD	HEADNG
SIJLIB		FILERR
SETORG	GEN	
RITINT	IOD	SEERED
SETPAR		FILERR
LS2	IOD	
CDECAL	none	SETORG
RITEND		none
RITINC	LS2	
FILERR	LSODES2	SETPAR
	DIFEQ2	none
ALK		
none	METLIB	SIJLIB
	OPNFIL	OPNFIL
CDECAL	EXIT (system)	SEERED
none	FILERR	EXIT (system)

TABLE 2.2. (contd)

EXTDF

EXTDF	BETA
OPNFIL	BYIELD (in ISOSUB)
MAKDA2	
RLIBIN	
NRGLIB	ISOSUB
HEADNG	ADJUST (in ISOSUB)
BETA	
POINT (in ISOSUB)	NRGLIB
LINE (in ISOSUB)	none
SPHERE (in ISOSUB)	
TCONE (in ISOSUB)	SHORT
DISC (in ISOSUB)	none
CYL (in ISOSUB)	
ENDCYL (in ISOSUB)	
RECT (in ISOSUB)	
ANCYL (in ISOSUB)	
SHORT	

DITTY

DITTY	TRITUM	
MAKDA2	CARBON	CONTRL
OPNFIL	BCHAIN	APATHS
RLIBIN		WPATHS
SETNUC	BCHAIN	DOSADD
AIRLIN		
FOOLIN	BIOLIN	DITBYP
GRDLIN	OPNFIL	HEADIT
CASE2	FILERR	
BIOLIN		DITBYR
ACTIN	BLOCK2	HEADIT
QAPAGE		
CONTRL	CARBON	DOSADD
REPORT	none	ZEROR
FILERR		WBEDE2
	CASE2	
ACTIN	ZEROR	EOVRQ
OPNFIL	OPNFIL	ZEROR
CONSET	EOVRQ	EXIT (system)
EXIT (system)	PMEQ	SIGMA
FILERR	PMSET	
	PMINT	
AIRLIN	PMAC	FILLUP
DPNFIL	FILERR	none
ZEROR		
ZEROI		
APATHS	CONSET	
	none	

TABLE 2.2. (contd)

FOOLIN	PMINT	TRITUM
OPNFIL	none	none
FILERR		
	PMSET	WBEDE2
GRAPH	none	EXIT (system)
SETUP		
FILLUP	QAPAGE	WBEDE4
HEADIT	HEADIT	none
	GRAPH	
	ZEROR	WPATHS
GRDLIN		TRITUM
OPNFIL	REPORT	CARBON
FILERR	GRAPH	BCHAIN
	HEADIT	ZEROR
GRFIL	WBEDE4	
none	DITBYR	ZEROI
	DITBYP	none
HEADIT	OPNFIL	
FILERR		ZEROR
		none
NUCTST	SETNUC	
EXIT (system)	ZEROI	
	NUCTST	
PMAC		
none	SETUP	
	none	
PMEQ		
none		

GENERAL

BIOCAL	HEADNG	RLIBIN
none	FILERR	OPNFIL
		EXIT (system)
BLKORG	IDNUC	FILERR
none	EXIT (system)	
BLOCKD		SIGMA
none	MAKDA2	none
	DATE (system)	
DUMRED	TIME (system)	XQIN
none		OPNFIL
FILERR	OPNFIL	FILERR
EXIT (system)	EXIT (system)	
	FILERR	

TABLE 2.3. COMMON BLOCK Usage

AFPPAR:	XQCAL		APATHS	INTDF
ACUTE1	XQIN	DAY:	BLOCK2	OPNFIL
ACUTEA		HEADIT	DITTY	REDFIL
ACUTEC	AQUPAR:	QAPAGE	DOSADD	
AIRCAL	AIRCAL		SETNUC	FLAGS:
ANMCAL	AQUCAL	DAYPC:	WPATHS	AIRLIN
AQUCAL	DRKCAL	AIRLIN		DOSADD
CANDH	INITNV	CDECAL	DOSALL:	NUCTST
CRPCAL	REDCAS	DOSSUM	DOSCAL	QAPAGE
EDRCRP	REDCHA	EXTDF	DOSCTL	REPORT
EDRRRES	XQCAL	HEADIT	DOSSUM	SETNUC
EXTCAL		HEADNG	RITBYP	
INHCAL	BIODAT:	INTDF	RITBYR	FODATA:
INTPOL	BIOLIN	MAKDA2	RITEDE	APATHS
REDCAS	BLOCK2	OPNFIL	TOTCAL	BLOCK2
REDFIL	CARBON	QAPAGE		DITTY
XQCAL	CASE2	REPORT	DOSES:	FOOLIN
XQIN	DITTY	RITEND	CDECAL	WPATHS
	QAPAGE	RITINT	RITEND	
AIRCON:	TRITUM		RITINC	FODPAR:
CASE2	WPATHS	DECAY:		ACUTE1
EOVRQ		ACUTE1	DOSFAC:	ACUTEA
PMEQ	CONC:	ACUTEA	AIRLIN	ACUTEC
	ACUTE1	ACUTEC	DOSADD	AIRCAL
AIRPAR:	ACUTEA	BLOCK2		ANMCAL
ACUTE1	ACUTEC	CHAIN	EDCN:	BLOCKD
ACUTEA	AIRCAL	DGCHAIN	APATHS	CANDH
ACUTEC	ANMCAL	DIFEQ2	CONTRL	CRPCAL
AIRCAL	AQUCAL		DOSADD	DKHARV
BLOCKD	CANDH	GEN	WPATHS	EDRANM
EXTCAL	CRPCAL	ORDIN		EDRCRP
INTPOL	DKHARV	REDCHA	ENVPAR:	EDRNON
REDCAS	DRKCAL	RITINT	REDCAS	EDRRRES
REDCHA	EDRANM	SETPAR		INITNV
REDFIL	EDRCRP		EXPALL:	REDCAS
XQCAL	EDRNON	DFPAR:	EXPOS	REDCHA
XQIN	EDRRRES	BLOCKD	INITNV	XQCAL
	ENV	DOSCAL	RITEXP	XQIN
ANMPAR:	EXPOS	DOSCTL	RITMED	
ACUTEA	EXTCAL	REDFIL	TRNSPT	GRDDAT:
AIRCAL	INHCAL	REDSET		DOSADD
ANMCAL	INITNV		EXTPAR:	GRDLIN
BLOCKD	PACKAG	DISPSN:	BLOCKD	
CANDH	PRIOR	BLOCK2	EXTCAL	
DKHARV	REDCHA	CASE2	INHCAL	
EDRANM	REDIST	DITTY	REDCAS	
EDRNON	RITMED	EOVRQ	FILES:	
INITNV	SWCAL	QAPAGE	BLOCK2	
REDCAS	TRNSPT		BLOCKD	
REDCHA	XQCAL	DKAY:	FILERR	

TABLE 2.3. (contd)

INTDFS:	SIJLIB	EDRRES	ORGID:	CASE2
CDECAL		ENV	AIRLIN	DITTY
INTDF	NAMLST:	EXPOSR	QAPAGE	DOSADD
LS2	BLOCK2	EXTCAL	REPORT	QAPAGE
METLIB	CASE2	GEN	WBEDE2	WPATHS
RITEND	DITTY	INHCAL	WBEDE4	
RITINT	QAPAGE	INITNV		PLOT:
SETOrg		INTDF	ORGMAS:	BLOCK2
SETPAR	NUCNAM:	INTPOL	AIRLIN	FILLUP
	ACTIN	IOD	BLKORG	GRAPH
INVIN:	AIRLIN	LS2	DIRBYP	SETUP
DOSCAL	APATHS	METLIB	DITBYR	
DOSCTL	BIOLIN	ORDIN	DOSADD	POPU:
IDNUC	CONTRL	PACKAG	DOSCAL	CASE2
INTDF	DIRBYP	PRIOR	DOSCTL	PMEQ
ORDIN	DITBYR	REDCAS	DOSSUM	QAPAGE
	FILLUP	REDCHA	METLIB	
ISO:	FOOLIN	REDFIL	REDFIL	RAD:
BETA	GRAPH	REDIST	REDSET	ACUTE1
EXTDF	GRDLIN	REDSET	REPORT	ACUTEA
ISOSUB	NUCTST	REPORT	RITBYP	ACUTEC
NRGLIB	QAPAGE	RITBYP	RITBYR	AIRCAL
SHORT	REPORT	RITBYR	RITEDE	ALK
	SETNUC	RITEDE	RITEND	ANMCAL
LABELS:	WPATHS	RITEND	RITINT	AQUCAL
ACUTE1		RITEXP	SETOrg	CANDH
BLOCKD	OPT:	RITINC	SIJLIB	CDECAL
DOSE	ACUTE1	RITINT	TOTCAL	CRPCAL
REDFIL	ACUTEA	RITMED	WBEDE	DIFEQ2
RITBYP	ACUTEC	SETOrg	WBEDE2	DKHARV
RITBYR	AIRCAL	SETPAR	WBEDE4	DRKCAL
RITEXP	ALK	SIJLIB		EDRANM
XQCAL	ANMCAL	SUBHED	ORGPARG:	EDRCRP
	AQUCAL	SWCAL	ALK	EDRNON
MTBPAR:	BIOCAL	TOTCAL	BLKORG	EDRRES
ALK	BLKORG	TRNSPT	CDECAL	ENV
BLKORG	BLOCKD	WBEDE	DIFEQ2	EXPOSR
CDECAL	CANDH	WBEDE2	GEN	EXTCAL
DEP	CDECAL	WBEDE4	IOO	GEN
DIFEQ2	CRPCAL	XQCAL	METLIB	INHCAL
GEN	DIFEQ2	XQIN	RITEND	INITNV
INTDF	DKHARV		RITINC	INTDF
IOD	DOSCAL	OPTION:	RITINT	IOD
LS2	DOSCTL	ACTIN	SETOrg	LS2
METLIB	DOSE	BLOCK2	SETPAR	METLIB
ORDIN	DDSSUM	CASE2	SIJLIB	ORDIN
RITEND	DRKCAL	CONSET		PACKAG
RITINT	EDRANM	DITTY	PATHIN:	PRIOR
SETOrg	EDRCRP	QAPAGE	APATHS	REDCHA
SETPAR	EDRNON	REPORT	BLOCK2	

TABLE 2.3. (contd)

REDIST	RMD2:	SOURCE:	RITMED	VARYBL:
RITEND	ORDIN	BLOCK2	SUBHED	ACTIN
RITEXP	RLIBIN	DITTY	SWCAL	APATHS
RITINC	SIJLIB	NUCTST	TOTCAL	BLOCK2
RITINT		SETNUC	TRNSPT	CASE2
RITMED	SEE:		WBEDE	DITTY
SETORG	SEERED	SWPAR:		QAPAGE
SETPAR	SIJLIB	ACUTE1	TIMES2:	REPORT
SIJLIB		ACUTEA	BLOCK2	WPATHS
SWCAL	SIJS:	ACUTEC	CASE2	
TRNSPT	CDECAL	BLOCKD	CONSET	
XQCAL	RITINT	EXTCAL	DIRBYP	
	SIJLIB	REDCAS	DITBYR	
		RITMED	DITTY	
RADIN:	SOLPAR:	SWCAL	GRAPH	
DOSCAL	ACUTE1	TRNSPT	HEADIT	
DOSCTL	ACUTEA		REPORT	
DOSE	ACUTEC	TIMES:		
DOSSUM	ANMCAL	ACUTE1	TITL:	
REDFIL	BIOCAL	ACUTEA	ACTIN	
REDSET	BLOCKD	ACUTEC	AIRLIN	
RITBYR	CANDH	AQUCAL	BLOCK2	
RITEDE	CRPCAL	DOSCAL	CASE2	
TOTCAL	DKHARV	DOSCTL	CDECAL	
	DOSCAL	DOSE	DITTY	
RESULT:	DOSCTL	DOSSUM	DOSE	
BLOCK2	EDRANM	EDRNON	DOSSUM	
CONTRL	EDRCRP	ENV	EXTDF	
DIRBYP	EDRNON	EXPOS	HEADIT	
DITBYR	EDRRES	EXTCAL	HEADNG	
DOSADD	ENV	INHCAL	INTDF	
REPORT	EXTCAL	INITNV	OPNFIL	
WBEDE2	INHCAL	INTDF	QAPAGE	
WBEDE4	INITNV	PACKAG	REDFIL	
	PACKAG	REDCAS	REPORT	
RMD:	PRIOR	REDFIL		
AIRLIN	REDCAS	REDSET		
EXTOF	REDCHA	RITBYP		
IDNUC	REDFIL	RITBYR		
NRGLIB	REDIST	RITEDE		
ORDIN	RITMED	RITEND		
RLIBIN	TRNSPT	RITEXP		
SETNUC		RITINT		
SHORT				
SIJLIB				

3.0 GLOBAL PARAMETER DICTIONARY AND COMMON BLOCK DEFINITION

Table 3.1 is the global parameter dictionary for the GENII Software Package. Parameters are described for all the codes in the GENII Integrated Design/Maintenance Environment with the exception of EXTDF. The EXTDF parameter dictionary is included with the EXTDF code listing in Section 5.1 of this volume. Parameter usage is summarized in Table 3.2. This table identifies the codes that use each parameter, the FORTRAN COMMON BLOCK where the parameter resides, prominent exposure pathway flags associated with the parameter, FORTRAN type, a flag indicating if the parameter is set by the user, read from a library, or calculated, the parameter indices associated with the FORTRAN DIMENSION, the code modules where the parameter is set and the code modules where the parameter is used.

TABLE 3.1. Global Parameter Dictionary

Parameter Name	Common Block	Description
AB	FODATA	Soil removal percolation constant, yr^{-1} .
ACTA	VARBYL	Activity released to air for each time increment for up to 100 radionuclides. Units are total curies released in each period to air.
ACTW	VARBYL	Activity released to water for each time increment for up to 100 radionuclides. Units are total curies released in each period to water.
ACUTE	OPT	Flag set if this is an acute exposure case, (dimensionless).
ADJ	MTBPAR	Deposition fractions into nine lung compartments for translocation classes D, W, and Y, respectively, (dimensionless).
ADJEAT	FODPAR	Ratio of total production of terrestrial foods to population consumption rate for each terrestrial food, (dimensionless) Maximum value is 1.0. Accounts for total production less than the yearly production necessary to feed the specified population.
ADJET2	ANMPAR	Ratio of total production of animal products to population consumption rate for each animal product, (dimensionless). Maximum value is 1.0. Accounts for total production less than the yearly production necessary to feed the specified population.
ADJETQ	AQUPAR	Ratio of total production of aquatic foods to population consumption rate for each aquatic food, (dimensionless).
ADRTTL	TITLES	Title of airborne release data library in DITTY.
AEDE	OPT	Set if the dose commitment (annual effective dose equivalent) is to be calculated.
AEDEQ	DOSALL	Annual effective dose equivalent, (Sv or rem).
AIR	OPT	Set if air transport is to be considered for this case. Equivalenced with TROPT(1).
AIRCN	OPT	Flag set if air concentration has been input. Used to determine source of air concentration to use for air calculations (off site or on site) and to determine validity of user's scenario.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
AIRCON	CONC	Concentration in air of each radionuclide, (Units of Activity/m ³), for each radionuclide in the current chain.
AIRCON	EDCN	Atmospheric concentrations of radionuclides from dispersion/diffusion (no resuspension), (person-ci-yr/m ³), in DITTY.
AIREXT	OPT	Set if the external exposure from air (infinite plume model) is to be considered for this case.
AL	DECAY	Radiological decay constant for each radionuclide in the current chain, yr ⁻¹ .
ALDAY	DECAY	Radiological decay constant for each radionuclide in the current chain, (d ⁻¹).
ALOG2	OPT	Natural log of 2.0. Default value: 0.6931
ALT	RADIN	Decay constant of each radionuclide to be considered for this case, (yr ⁻¹).
ANF	OPT	Flag set to consider each of the four animal food pathways, (dimensionless).
ANFOOD	OPT	Set if the animal product ingestion pathway is to be considered for this case, (dimensionless).
ANMCON	CONC	Radionuclide concentration for each animal food product, (Units of Activity/kg) for each radionuclide in the current chain.
ANMFED	ANMPAR	Flag set if concentration of animal fresh forage is known, default value is false (dimensionless).
ANMLAB	LABELS	Eight character description/label for each animal product compartment: Beef, Poultry, Cow Milk, and Eggs. Equivalenced with EXPLAB.
ANNULD	DOSALL	Yearly annual dose, (Sv or rem).
AQF	OPT	Flag set to consider each of the four aquatic food ingestion pathways, (dimensionless).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
AQFLAB	LABELS	Eight character description/label for each aquatic food compartment: Fish, Molluscs, Invertebrate, and Water Plants. Equivalenced with EXPLAB.
AQFOOD	OPT	Flag set if the aquatic food ingestion pathway is to be considered for this case, (dimensionless).
AQRLAB	LABELS	Eight character description/label for each aquatic recreation activity: Swimming, Boating, and Shoreline. Equivalenced with EXPLAB.
AQUATC	EDCN	Concentration of radionuclides in the edible portion to aquatic plants and animals, person-ci-yr/kg (or per liter H ₂ O). (DITTY).
AQUCON	CONC	Aquatic foods concentration, (Units of Activity/kg), for each aquatic food and radionuclide in the current chain.
AQUPOP	AQUPAR	Population ingesting aquatic food products, (person).
AQU TT	TIMES	Transit time for water release term (surface water) to reach site of aquatic foods production, (hr).
AR	DKAY	Radiological decay constant for each radionuclide, yr ⁻¹ .
ARF2CN	CONC	Animal-fodder-weighted decayed air concentration for each radionuclide chain member in the current chain for each animal fodder path, (Units of Activity s/m ³ yr).
ARFCN	CONC	Terrestrial-food-weighted decayed air concentration for each radionuclide chain member for each terrestrial food path, (Units of Activity s/m ³ yr).
ARPCON	CONC	Population-weighted air concentration decayed for time in transit. (Units of Activity s/m ³ yr).
ARPCN	AIR	Average population-weighted air dose factor (Units of Activity person rem/yr Ci).
ARRAY	PLOT	Character storage array for graph.
ASSA	INTDFS	Absolute step size allowed in call to the LSODES2 Differential Equation Solver.
ATNO	RMD2	Atomic number of each radionuclide in the master radionuclide library.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
ATNUM	RAD	Atomic number of each radionuclide in the current chain.
ATOL	INTDFS	Absolute error tolerance allowed in call to LSODES2 Differential Equation Solver.
AVALSL	EXTPAR	Top soil is available for resuspension to a depth of AVALSL, (cm). Default value: 1.0 cm.
AW	RAD	Mass number, including optional metastable designation (m), for each radionuclide in the current chain.
AW	NAMES	Six character atomic weight symbol for each radionuclide in the master radionuclide library. Isomeric states are indicated by the letter M after the atomic weight.
AW2M	RMD2	Mass number including optional metastable classification for each implicit daughter in the master radionuclide library.
AWI	INVIN	Mass number (plus optional metastable specifications) for each radionuclide in the input list.
AWM	RMD	Mass number (plus optional metastable specifications) for each radionuclide in the master radionuclide data library.
AWM	NUCNAM	Six character element name for each radionuclide in the master list.
AWT	RADIN	Mass number, including optional metastable classification, for each radionuclide to be considered for this case.
AYEAR	OPT	Days in a year conversion factor. Default value: 365.0.
BAS	RADIN	Flag set if there is any input inventory in the five basic concentration categories (dimensionless).
BASIC	OPT	Flag set if user has supplied any radionuclide basic concentrations on input, (dimensionless).
BEFAIR	TIMES	Number of years that radionuclides were deposited on the site via air deposition prior to the beginning of the intake period, (yr).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
BEFIRR	TIMES	Number of years that radionuclides were deposited by irrigation with contaminated water on the site prior to the beginning of the intake period, (yr).
BEFORE	TIMES	Number of years prior to the beginning of the intake period that the inventory was disposed (yr). Package degradation starts at this time.
BIOACF	AQUPAR	Bioaccumulation factors for each radionuclide in current chain, (Units of Activity/kg per Units of Activity/L).
BIOACF	BIODAT	Bioaccumulation factors in DITTY for: 1 - Fish 2 - Crustacea 3 - Molluscs 4 - Water Plants.
BIOACT	ENVPAR	Bioaccumulation factors for each radionuclide considered in this case, (Units of Activity/kg per Units of Activity/L).
BIOMA2	ANMPAR	Standing biomass (wet) of each animal feed or forage type. Used for air interception calculations (kg/m^2).
BIOMAS	FODPAR	Standing biomass (wet) of each terrestrial food type. Used for air interception calculations (kg/m^2).
BIOT	OPT	Set if biotic transport is to be considered for this case, (dimensionless).
BIOTTL	TITLES	Title of bioaccumulation library, (only elements 1 - 20 are title, 21 - 40 are units) in DITTY.
BONE	RAD	Bone dosimetry classification: V - volume seeker, S - surface seeker, N - none, for each radionuclide in the current chain.
BONED	RMD	Bone dosimetry classification (N-none, V-volume seeker, S-surface seeker) for each radionuclide in the master radionuclide data library.
BONET	RADIN	Bone dosimetry classification for each radionuclide considered in this case.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
BRANCH	RMD2	Branching ratio of each implicit daughter in the master radionuclide library.
BTDSET	SOLPAR	Index of biotic transport scenario to consider during the inventory decay/buildup period prior to uptake. Allowable values: 1 - arid non agricultural, 2 - humid non agricultural, 3 - agricultural.
BTNTK	SOLPAR	Flag set if biotic transport is to be considered during the intake period.
BTPRE	SOLPAR	Flag set if biotic transport is to be considered during the inventory decay /buildup period.
BUILDH	AIRPAR	Building height, (m), used in building wake model.
BUILDX	AIRPAR	Building cross-sectional area (m^2), used for building wake model.
BURWAS	OPT	Flag set if buried waste availability is considered in this case.
BVI	FODPAR	The concentration ratio for plant uptake of each plant type and radionuclide in the current chain, (Units of Activity/kg [wet weight] per Units of Activity/kg [dry soil]).
BVIT	ENVPAR	Concentration ratio for plant uptake of each plant type and radionuclide in this case, (Units of Activity/kg [wet weight] per Units of Activity/kg [dry soil]).
C14	RAD	Flag set if current radionuclide is carbon-14.
CARBON	MTBPAR	Flag set if the current element is carbon.
CASCON	RADIN	Concentration in five basic concentration and four derived concentration compartments for each radionuclide considered in this case, (Units of Activity per standard media for each compartment).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
CASQ	RADIN	Concentration in each of three source term compartments for each radionuclide considered in this case. Compartments and units are: 1 - air (Units of Activity/yr), 2 - buried waste (Units of Activity/m ³), 3 - surface water (Units of Activity/yr).
CASTTL	TITLES	Case title in DITTY.
CDE	DOSALL	Committed dose equivalent for each of the eleven components of the effective dose equivalent, (Sv or rem).
CDEING	DOSES	Ingestion committed dose equivalent for each organ, for each yearly increment, summed over the current radionuclide chain. Same as parameter DFG in module REDSET of DOSE.
CDEING	DOSALL	Dose to each organ from ingestion (rem or Sv).
CDEINH	DOSES	Inhalation committed dose equivalent for each organ considered, for each yearly increment, summed over radionuclide chain members in the current chain. Same as parameter DFH read in module REDSET of DOSE.
CDEINH	DOSALL	Dose to each organ from inhalation (rem or Sv).
CFLO	PATHIN	River flow rate in DITTY, (ft ³ /s).
CHIAC	DAY	IAC output.
CHIPAT	DAY	IPATH output.
CLASS	RAD	Translocation classification for each radionuclide in the current chain. Allowable values: D,W,Y.
CLASST	RADIN	Translocation classification of each radionuclide considered in this case.
CLOCK	DAYPC	Ten character time-of-day of execution.
CONCIN	INVIN	Input concentration of radionuclide in nine compartments as ordered in the input file for each radionuclide in the input list.
CONS	FODPAR	Consumption rate of each terrestrial food, (kg/yr).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
CONS2	ANMPAR	Human consumption rate of animal products, (kg/yr).
CONSUM	ANMPAR	Animal consumption of feed and forage (kg/day). Default values: 68.0 (feed-beef), 0.12 (feed-poultry), 68.0 (feed-milk cow), 0.12 (feed-eggs), 55.0 (forage-beef), 55.0 (forage-milk cow).
CONSUM	PATHIN	Consumption rates, kg/yr, for terrestrial paths in DITTY.
CRATIO	FODATA	Concentration ratios in DITTY for: 1 - Plants, 2 - Eggs, 3 - Milk, 4 - Beef, 5 - Unused, 6 - Poultry.
CTOAIR	CONC	Initial soil deposition from air for acute exposures (Units of Activity/m ²).
CUMD	DOSALL	Cumulative dose (internal plus external), (Sv or rem).
CUMDOS	OPT	Set if the cumulative dose is to be calculated.
CUMID	DOSALL	Cumulative internal dose, (Sv or rem).
CUMIOR	DOSALL	Cumulative dose to each organ in the master organ list for each year of the dose commitment period (Rem or Sv).
CUMIYR	DOSALL	Yearly cumulative internal dose, (Sv/yr or rem/yr).
DAIT	DFPAR	Air submersion external dose factors for total body, (person Sv/yr per Bq/m ³).
DAIT	DAY	Eight character name for day of year, MMDDYY: MM - month, DD - day, YY - year.
DASHES	OPT	Line of dashes used in reports.
DAYYR	OPT	Day to year conversion, value: 365.25, (d/yr).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
DBIT	DFPAR	External exposure conversion factor at the water surface for each radionuclide considered in this case. (person Sv/yr per Bq/m ² L to the total body).
DCEND	TIMES	Dose calculations end after this years (yr).
DCFEXT	AIRPAR	External dose conversion factor from surface dose to effective dose equivalent.
DDIT	DFPAR	External dose factor for exposure to contaminated soil or waste with: 1 - 0.15 m, 2 - 0.5 m, 3 - 1.0 m overburden of soil (person Sv/yr per Bq/m ³).
DEBUG	OPT	Flag set for special output for debugging and testing.
DEEP	OPT	Flag set if deep soil calculations are to be performed.
DEPFR1	OPT	Fraction of deposition from air intercepted by the plant (dimensionless).
DEPFR2	OPT	Interception fraction of irrigation water onto leaves, (dimensionless). Default value: 0.25.
DEPOSIT	MTBPAR	Uptake rate of each of the first nine lung subcompartments, (Bq/d).
DERANM	OPT	Flag set if derived concentration has been input for animal products.
DERAQU	OPT	Flag set if derived concentration has been input for aquatic foods.
DERCRP	OPT	Flag set if derived concentration has been input for terrestrial plants.
DERDRK	OPT	Flag set if derived concentration has been input for drinking water.
DERIVE	OPT	Flag set if user has supplied any radionuclide derived concentrations on input, (dimensionless).
DEX1R	DOSALL	External dose by radionuclide received in the first year, used for AEDE calculation.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
DEX1V	DOSALL	External dose by exposure pathway received in the first year, used for AEDE calculation.
DFG	DFPAR	Ingestion committed dose equivalent yearly increment for each organ in the master organ list for each year of the dose commitment period.
DFG	DOSFAC	Ingestion dose factors for DITTY from chronic exposure, (Sv per 70 yr/Bq/yr for 70 yr).
DFH	DFPAR	Inhalation committed dose equivalent yearly increment for each organ in the master organ list for each year of the dose commitment period.
DFH	DOSFAC	Inhalation dose factors for DITTY from chronic exposure, (Sv per 70 yr/Bq/yr for 70 yr).
DIAM	MTBPAR	Particle size (micron), activity median atmospheric diameter of an aerosol distribution.
DIETFR	ANMPAR	Fraction of animal feed consisting of contaminated stored grain (1-4) as well as beef (5) and milk cow (6) fresh forage, (dimensionless). Total for each animal product may equal less than 1.0 to account for uncontaminated fodder.
DIST	DISPSN	Distance from the release point to the center of population ring, X: M. Must be in increasing order
DK	DECAY	Indicator of radionuclide chain members that are first and second precursors of this radionuclide in the current chain, respectively as specified in the master radionuclide library. (Dimensionless).
DK	DKAY	Fraction of first and second precursor that decay to this radionuclide, for DITTY.
DKF	RMD	Fraction of first and second precursor that decay to the current radionuclide in the master radionuclide library.
DKT	RADIN	Fraction of the first and second precursor that decay to each radionuclide considered in this case.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
DOAIR	OPT	Flag set if air deposition buildup is considered during current year of simulation. Always set on during intake period, used to control air deposition during the inventory decay/buildup period prior to the beginning of the intake period.
DOBIOT	OPT	Flag set if biotic transport is considered during current year of simulation. Always set on during intake period, used to control biotic transport during the inventory decay/buildup period prior to the beginning of the intake period.
DOIRR	OPT	Flag set if irrigation deposition buildup is considered during current year of simulation. Always set on during intake period, used to control irrigation deposition during the inventory decay/buildup period prior to the beginning of the intake period.
DOSCDR	DOSALL	Committed dose equivalent by radionuclide, (Sv or rem).
DOSCDV	DOSALL	Committed dose equivalent by environmental pathway, (Sv or rem).
DOS01	DOSALL	Internal dose for each organ in the master list summed over ingestion and inhalation contributions, radionuclides in the input list, years of the dose commitment period and all environmental exposure pathways. (If IUNIT>5, Rem, otherwise Sv).
DOS02	DOSALL	Cumulative total dose to organs, (Sv or rem).
DOS03	DOSALL	Maximum annual dose to organs, (Sv or rem).
DOSR	DOSALL	Internal dose for each organ in the master list and each radionuclide in the input list, summed over ingestion and inhalation as well as all years of the dose commitment period and all environmental exposure pathways. (If IUNIT>5, Rem, otherwise Sv).
DOSRE	DOSALL	External dose by radionuclide, (Sv or rem).
DOSRP	DOSALL	Dose to each organ by radionuclide for 1)inhalation, 2)ingestion (rem or Sv).
DOSTYP	OPT	Parameter written by ENVIN and read by ENV and DOSE, but no longer used.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
DOSV	DOSALL	Internal dose for each organ in the master list and each environmental pathway summed over ingestion and inhalation and radionuclides as well as all years of the dose commitment period (If IUNIT>5, Rem, otherwise Sv).
DOSVE	DOSALL	External dose by environmental pathway, (Sv or rem).
DOWAST	OPT	Flag set if waste package degradation is considered during current year of simulation. Always set on during intake period, used to control waste calculations during the inventory decay/buildup period prior to the beginning of the intake period.
DPVL	FODPAR	Deposition velocity of each radionuclide in the current chain, (m/s).
DPVLT	ENVPAR	Deposition velocity of each radionuclide in this case, (m/s).
DPVRES	OPT	Deposition velocity used for resuspension calculations, (m/s). Default value: 0.001.
DRFOQ	AIRPAR	Population-weighted finite plume external dose rate factor (person rem dis) / (Ci MeV).
DRFSAV	AIRPAR	Maximum individual external dose rate factors for finite plume for each of six energy groups, (rem dis/[Units of Activity] Mev).
DRINK	OPT	Flag set if the drinking water pathway is to be considered for this case, (dimensionless).
DRYFA2	ANMPAR	Dry weight to wet weight ratio for each animal feed or forage pathway, (dimensionless).
DRYFAC	FODPAR	Dry weight to wet weight ratio for each terrestrial food type, (dimensionless).
DS2CON	CONC	Radionuclide concentration in the deep soil compartment for each radionuclide for animal fodder, (Units of Activity/kg ³).
DSCON	CONC	Deep soil concentration of available contamination, (Units of Activity/m ³), for each radionuclide in the current chain for each terrestrial food path.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
DSIT	DFPAR	External dose factor for exposure to contaminated surface soil of each radionuclide considered in this case (person Sv/yr per Bq/effective m^2 to the total body). Read from file in units of Sv/yr per Bq/ m^3 for a 15 cm slab and units adjusted.
DSRES	CONC	Deep soil concentration at the residential/resuspension location for each radionuclide in the current chain, (Units of Activity/ m^3).
DSRES	CONC	Deep soil concentration in the residual/resuspension soil compartment for each radionuclide in the current chain.
DTOTAL	OUTORG	Total dose to each organ as a function of time in DITTY.
DUMMY	OPT	Array of zeros passed to subroutine CHAIN.
DVEL	FODATA	Deposition velocities, (m/s), in DITTY.
DWATER	ANMPAR	Animal drinking water consumption water, (L/d).
DWCF	BIODAT	Drinking water cleanup factors (the fraction passing through a water treatment plant)
DWCLEN	AQUPAR	Drinking water cleanup factor for each radionuclide in the current chain, (dimensionless).
DWCLET	ENVPAR	Drinking water cleanup factor for each radionuclide in the input list, (dimensionless).
DWCON	CONC	Drinking water concentration (Units of Activity/L).
DWFACA	ANMPAR	Fraction of animal drinking water that is contaminated, (dimensionless).
DWPOP	AQUPAR	Population drinking contaminated water, (person).
DWSRC	AQUPAR	Flag set to indicate source of drinking water: 0 - none, 1 - ground water, 2 - surface water, 3 - derived concentration.
DWTRET	AQUPAR	Logical set if drinking water is processed by water treatment plant.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
DWUSAG	AQUPAR	Drinking water consumption rate (L/yr).
EDA	GRDDAT	External dose factor for submersion in contaminated air, (rem/s per ci/m ³).
EDBCNW	EDCN	Concentration of radionuclide in the edible portion of the terrestrial plants and animals, (person ci yr/kg), from irrigation deposition.
EDBCON	EDCN	Concentration of radionuclides in the edible portion of terrestrial animals and plants from atmospheric deposition, (person ci yr/kg).
EDE	DOSALL	Effective dose equivalent, (Sv or rem).
EDEING	DOSALL	Effective dose equivalent from ingestion (rem or Sv).
EDEINH	DOSALL	Effective dose equivalent from inhalation (rem or Sv).
EDERG	DOSALL	Effective dose equivalent from ingestion by radionuclide (rem or Sv).
EDERH	DOSALL	Effective dose equivalent from inhalation by radionuclide (rem or Sv).
EDIS	AIRPAR	Energy per disintegration in each energy group for each radionuclide in the current chain, (MeV/dis).
EDS	GRDDAT	External dose factor for exposure to contaminated soil, (person Sv/yr per Bq/m ²), units adjusted on input.
EDW	GRDDAT	External dose factor for exposure to contaminated water, (person Sv/yr per Bq/L).
EFFSTK	AIRPAR	Flag set if the input stack height is to be treated as an effective stack height. This condition is true when stack height is greater than zero and stack flow, diameter and temperature are zero, and STACK is also true, (dimensionless).
EFPOP	AFPPAR	Effective food-weighted population for each terrestrial food used if FOQOPT=3 (FPRD/CONS summed over distance and direction) or effective area-weighted population if FOQOPT=2 ([fractional pop. * total pop]/total pop. summed over distance and direction).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
EFPOPA	AFPPAR	Effective food-weighted population for each animal food product used if FOQOPT=3 (FPRD/CONS summed over distance and direction) or effective area-weighted population if FOQOPT=2 ([fractional population * total population] / total population summed over distance and direction).
ELNAME	MTBPAR	Element name of each radionuclide in the current chain as read from the master radionuclide library.
ELT	RAD	Element symbol of each radionuclide in the current chain.
ELT	NAMES	Two character element name for each radionuclide in the master radionuclide data library, (DITTY).
ELT2M	RMD2	Element symbol for each implicit daughter in the master radionuclide library.
ELTI	INVIN	Element symbol of each radionuclide in the input list.
ELTM	RMD	Element symbol of each radionuclide in the master radionuclide library.
ELTM	NUCNAM	2 character element name for each radionuclide in the master list, (DITTY).
ELTT	RADIN	Element symbol for each radionuclide to be considered in this case.
EOQ	AIRCON	Normalized time-integrated air concentration for each spatial interval, (s/m ³) for 10 distances and 16 sectors in DITTY.
ETEMP	AIRPAR	Effluent temperature used for atmospheric calculations, (degrees C).
EXCAMT	SOLPAR	Rate at which soil is excavated from the waste by animal burrowing activity, (m ³ /m ² yr).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
EXCAV	SOLPAR	Fraction of soil moved by animals from each of 6 soil layers: 1 - < 0.15 m, 2 - > 0.15 m and ≤ 0.5 m, 3 - > 0.5 m and ≤ 1.0 m, 4 - > 1.0 m and ≤ 1.5 m, 5 - > 1.5 m and ≤ 2.0 m, 6 - > 2.0 m, for 1-nonagricultural arid, and 2-nonagricultural humid, and, 3-agricultural sites, (dimensionless).
EXPLAB	LABELS	The 8-character label for each exposure path as defined in BLOCKD.
EXPORT	OPT	Flag set if dose is to be calculated for food crops grown on contaminated site and exported to another location.
EXPOS	CONC	Array to store exposure rates for each exposure pathway for each radionuclide.
EXPOST	EXPALL	Environmental exposure rates for each year of the intake period, for each member of the current radionuclide chain, for each exposure pathway.
EXTD	DOSALL	External dose, (Sv or rem).
EXTDOS	DOSALL	External annual dose, (Sv or rem).
EXTIM	PATHIN	Hours/year exposure time to contaminated soil.
F	DISPSN	Joint frequency of occurrence of atmospheric conditions for up to 8 windspeeds, 7 stabilities, and 16 sectors, (dimensionless), in DITTY.
F1	MTBPAR	Fraction of material absorbed into blood from gut for each radionuclide in the current chain (dimensionless).
FETAGE	MTBPAR	Age of the fetus, (d), to use in the fetal iodine model.
FETDOS	MTBPAR	Logical flag set if fetal dose from iodine is to be calculated.
FEXTC	MTBPAR	Fraction excreted from the transfer compartment (blood and body fluids) for each radionuclide in the current chain. $FEXTC + UEXTC = 1.0$.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
FG2SI	MTBPAR	Switch for fraction from gut to small intestine. Set to 1.0 if F1=1.0 otherwise 0.0 (dimensionless).
FG2TC	MTBPAR	Switch for fraction from gut to the transfer compartment. Set to 1.0 if F1=1.0 otherwise 0.0, (dimensionless).
FILN	FILES	Default file names associated with logical unit numbers 1 through 50. For default values see BLOCKD.
FINITE	OPT	Set if dose from a finite plume is to be considered for this case.
FMI	ANMPAR	Transfer coefficient that relates daily intake rate by an animal to the concentration in an edible animal product, (Units of Activity/L or kg per Units of Activity/d), for four stored feed and two fresh forage compartments.
FMIT	ENVPAR	Transfer coefficient that relates daily intake rate by an animal to the concentration in an edible animal product, (Units of Activity/L or kg per Units of Activity/d), for each radionuclide in this case.
FOQ	FODPAR	Food-weighted chi/Q value, (food s/m^3).
FOQOPT	OPT	Option for specification of population for food production. Allowable values are: 0 - Use food-weighted chi/Q value, 1 - Use population-weighted chi/Q , 2 - Use uniform production, 3 - Use chi/Q and production grids.
FPRD	AFPPAR	Food production in each grid point of each terrestrial food type, (kg/yr).
FPRDA	AFPPAR	Animal product production in each grid point for each animal food product, (kg/yr).
FRACUT	ANMPAR	Fraction of animal diet that consists of fresh forage following an acute release for four seasons winter, spring, summer, and autumn (dimensionless).
FRCLD	EXTPAR	Average fraction of time spent in cloud (hr/person hr).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
FRSIZ	EXTPAR	Source area for external dose modification factor. Used in near-field scenarios only. Effects calculation if source area is less than 1250 m ² . (m ²).
FTRTTL	TITLES	Title of transfer coefficient library, (only elements 1 - 20 are title, 21 - 60 are units). (DITTY).
GAMMAT	ENVPAR	Energy per disintegration in each energy group for each radionuclide considered in this case, (MeV/dis).
GDRTTL	TITLES	Title of external exposure D.F. library for ground and swimming exposure. (DITTY).
GROUND	OPT	Set if external exposure from soil is to be considered for this case.
GRWP	FODPAR	Growing period for each terrestrial food type (d).
GRWP	PATHIN	Growing period for food types (d) in DITTY.
GRWPA	ANMPAR	Growing period for animal feed (four types) and forage (two types), (d).
GWCON	CONC	Concentration in ground water of each radionuclide in the current chain, (Units of Activity/L).
H2	MTBPAR	Time step to use for DGCHAIN calls, (d). H2 is set to the smallest half time of any chain member but not greater than 1 day.
H3	RAD	Flag set if current radionuclide is tritium.
HARVA	ANMPAR	Radionuclide concentration removed from soil due to animal consumption/harvest of fodder for each animal product and radionuclide for surface (1) and deep (2) soil, (Units of Activity/kg).
HARVST	OPT	Flag set if the user wishes to consider radionuclide removal due to harvest removal, (dimensionless).
HARVT	FODPAR	Radionuclide concentration removed from the soil due to terrestrial food harvest for each food pathway and radionuclide for surface (1) and deep(2) soil, (Units of Activity/kg).
HIDOSE	DOSES	70-yr dose increment in DITTY.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
HL	RAD	Half-life of each radionuclide chain member (d).
HLDUP	FODPAR	Holdup time between harvest and consumption of each terrestrial food type, (d).
HLDUP2	AQUPAR	Holdup time between harvest and consumption of each aquatic food type, (d).
HLDUPA	ANMPAR	Holdup time between harvest or slaughter and consumption of each animal product, (d).
HLT	RADIN	Radiological half-life of each radionuclide to be considered in this case, (yr).
HOLDDW	AQUPAR	Holdup time between contamination of drinking water and consumption, (d).
HRBOAT	EXTPAR	Length of exposure from boating in contaminated water (hr).
HRGRD	EXTPAR	Length of exposure to contaminated ground, (hr).
HRINH	EXTPAR	Number of hours of inhalation exposure to contamination per year, (hr/yr).
HRPLUM	EXTPAR	Length of exposure to contaminated plume, (hr).
HRSHOR	EXTPAR	Length of external exposure from shoreline activities next to contaminated water, (hr).
HRSWIM	EXTPAR	Length of exposure from swimming in contaminated water, (hr).
HRYR	OPT	Number of hours in a year (hr/yr), constant. Default value: 8766.0
HS	DISPSN	Height of the stack, (m), in DITTY.
HSTART	TIMES	Beginning time step to use for evaluating the differential equations defining organ retention as presented in subroutine DIFEQ2, (d).
IAC	OPTION	Set positive to consider acute release period, (DITTY).
IAIR	OPTION	Set positive if airborne release activity data is to be read, (DITTY).

TABLE 3.1. (contd)

<u>Parameter Name</u>	<u>Common Block</u>	<u>Description</u>
IAN	(local)	Loop index for animal food products, $\leq$ to NAN.
ICDE	DOSALL	Index in master organ list corresponding to the organ dose in array CDE, (dimensionless).
ICH	RADIN	Number of radionuclide chains to be considered in this case $1 \leq ICH \leq 100$.
ICHN	DKAY	No. of decay chains in master list, $1 \leq ICHN \leq 100$, in DITTY.
ICL	RAD	Index of the solubility classification for each radionuclide in the current chain. Allowable values are: 1-D (days), 2-W (weeks), and 3-Y (years).
ICLASS	RADIN	Index of the translocation classification for each radionuclide: 1 - Class D, 2 - Class W, 3 - Class Y.
ICLN	DOSALL	Cross index relating each organ in the output list with the master organ list.
IDF	OPT	Control integer indicating whether: 1 - inhalation, 2 - ingestion, 3 - external, 4 - no, dose rate factors are to be used to calculate the dose from each environmental exposure pathway.
IDFTTL	TITLES	Title of inhalation/ingestion dose factor library, (DITTY).
IDIR	AIRPAR	Index of each direction, starting with 1 for wind blowing from south to north.
IEOQ	NAMLST	Controls reading/calculation of atmospheric dispersion in DITTY.
IFR	RMD	Indices of chain members that are first and second precursor of current radionuclide in master radionuclide data library.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
IFR	DECAY	IFR(1,I) gives the chain member that is the first precursor to radionuclide I, IFR(2,I) is the location of second precursor, $IFR(1,I) < IFR(2,I) < IMEM(I)$. (DITTY).
IFRM	DECAY	Fraction of first and second precursor that decay to the current radionuclide as specified in the master radionuclide library, (dimensionless).
IFRM	DKAY	IFRM(1,I) gives the chain member that is the first precursor to radionuclide I. IFRM(2,I) gives second precursor. $IFRM(1,I) < IFRM(2,I)$. (DITTY).
IFRT	RADIN	Index of the chain members that are first and second precursors of each radionuclide, respectively, considered in this case.
IGRDOS	OPTION	Flag set to 1 for graph of dose to each organ in DITTY.
IGRNUC	OPTION	Flag set to 1 to graph each release of radionuclide in DITTY.
IGRPL	OPTION	Flag set to 1 to graph population dispersion factor for waterborne pathways in DITTY.
IGRPM	OPTION	Flag set to 1 to graph population dispersion factor for airborne pathways in DITTY.
IGRPOP	OPTION	Flag set to 1 to graph population distribution data in DITTY.
IGRTNU	OPTION	Flag set to 1 to graph total release of all radionuclides in DITTY.
IMOD	RAD	Model index for each radionuclide in the current chain. Allowable values: 0-General, 1-Alkaline Earth, 2-Iodine. Daughters follow parent.
IMODM	RMD	Model index for each radionuclide in the master radionuclide library. Allowable values: 0-General, 1-Alkaline Earth, 2-Iodine.
IMPORT	OPT	Logical flag set if food is imported into region to feed the population.
IN	(local)	Loop index of radionuclides in the current chain, (dimensionless).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
INDW	SOLPAR	Buried waste depth index. Used for biotic transport calculations. See parameter EXCAV for values. Allowable range: $1 \leq \text{INDW} \leq 6$. (Dimensionless).
INFLG	FLAGS	Control integer to indicate which master list radionuclides have no dose factors supplied, (DITTY).
INGWAT	EXTPAR	Water inadvertently ingested per hour while swimming, (L).
INHAL	OPT	Flag set if the inhalation exposure pathway is to be considered for this case, (dimensionless).
INHDF	OPT	Flag set if inhalation dose factors are being calculated this pass. (Note: there are two control loops in INTDF, one for calculating ingestion DRF's and one for calculating inhalation DRF's.)
INUC	DKAY	No. of radionuclides in master list, $1 \leq \text{INUC} \leq 100$, in DITTY.
IO	(local)	Loop index for organs considered for this case.
IODI	MTBPAR	Index of the age-specific fetal iodine dose factor array to use for this part of the calculation.
IOFNUC	RADIN	Number of radionuclides in each chain to be considered for this case.
IOR	DFPAR	Flag set for each organ considered for the current radionuclide.
IORG	ORGPAR	Index in master organ list of each organ considered in the current case. Associated with organ list.
IOSALT	BIODAT	Value of ISALT for previous case: comparison with ISALT determines if different bioaccumulation factors need to be read in, (DITTY).
IPA	NAMLST	Controls definition of population dispersion factor for air releases, (DITTY).
IPATH	OPTION	Input flag selects pathways to be considered, (DITTY).
IPL	NAMLST	Controls definition of population for acute waterborne releases, (DITTY).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
IPNDX	RMD2	Parent index of each implicit daughter in the master radionuclide library.
IPOP	OPTION	Selects method of determining population dispersion factor, (DITTY).
IPOPL	NAMLST	Controls definition of population for waterborne releases, (DITTY).
IRC	(local)	Index of the current recreational activity.
IRELES	AIRPAR	Release type index where: 0 - ground level release, open area, 1 - stack release (effective or plume rise), 2 - release from vent or short stack on building roof (building wake), 3 - release from building below roof (ground level, building wake).
IRES	OPT	Flag set to indicate resuspension option: 0 - no resuspension, 1 - use Mass Loading model to calculate resuspension, 2 - use Anspaugh model to calculate resuspension.
IRMD	RAD	Index of each radionuclide chain member in the master radionuclide library.
IRRSA	ANMPAR	Index defining source of irrigation water for each animal feed or forage type where: 0 - no irrigation, 1 - ground water source, 2 - surface water source, (dimensionless).
IRRSR	SOLPAR	Index defining the source of residential irrigation water: 0 - residential irrigation not considered, 1 - ground water, 2 - surface water.
IRRST	FODPAR	Index defining source of irrigation water for each terrestrial food type where: 0 - no irrigation, 1 - ground water source, 2 - surface water source, (dimensionless).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
IRTIMA	ANMPAR	Number of months per year of irrigation of each animal feed and forage type, (mo/yr).
IRTIMR	SOLPAR	Number of months per year of irrigation of residential land area, (mo/yr).
IRTIMT	FODPAR	Number of months per year of irrigation of each terrestrial food type, (mo/yr).
ISALT	OPT	Flag to indicate fresh-(0) or salt-(1) water bioaccumulation factors.
ISTAT	INTDFS	Array of status parameters returned by the LSODES2 Differential Equation Solver stored for later printing in the report.
ITF	(local)	Index of terrestrial food type, $\leq$ NFT.
ITIME	TIMES	Loop index for year of simulation, either of uptake or of the dose commitment period.
ITIMT	TIMES	Over-all time index, that starts counting from the earliest prior period.
IUNIT	OPT	Release term input units: 1-pCi, 2-pCi, 3-mCi, 4-Ci, and 5-Bq, $1 \leq IUNIT \leq 5$.
IWAT	OPTION	Flag set positive if waterborne release activity data is to be read in DITTY.
IYX	ORGP	Cross index relating the integrated retention compartment of array YWORK with each organ in the organ list.
JFIN	AIRPAR	Flag set if joint frequency data is to be used otherwise it is assumed that chi/Q grid is to be used.
KGG	OPT	Kilogram to gram conversion factor, value: 1.0E-3, (kg/g).
KGMG	OPT	Kilogram to milligram unit conversion factor, 1.0E-6 kg/mg.
LABELX	PLOT	Character x-axis label in DITTY.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
LABELY	PLOT	Character storage array for selected Y-axis label, (DITTY).
LEACHR	SOLPAR	Leaching rate constant (percolation) of radionuclides, out of the surface soil layer (top 15 cm) for each member of the current radionuclide chain (yr^{-1}).
LEACHT	ENVPAR	Leaching rate constant (percolation) of radionuclides out of the surface soil layer (top 15 cm) for each radionuclide in the input list (yr^{-1}).
LEAFRS	FODPAR	Resuspension factor unto plant leaf surfaces, (m^{-1}).
LEGEND	PLOT	Character array for radionuclide names for IGRTNUC option in DITTY.
LM2IN	OPT	Liter/ m^2 to inch conversion factor, ($\text{L}/\text{m}^2 \text{ in}$). Used to convert from irrigation rate of in/yr to $\text{L}/\text{m}^2 \text{ yr}$.
LOIC	TIMES	Loss of institutional control occurred LOIC years prior to the beginning of the intake period, (yr).
LUA	OPTION	Select input logical file unit for airborne release activity in DITTY.
LUN	OPT	Logical unit number of the current output file.
LUW	OPTION	Select input logical file unit for waterborne release activity in DITTY.
M3CM3	OPT	Cubic meter to cubic centimeter conversion constant (m^3/cm^3). Value: $1.0\text{E}-6$.
M3L	OPT	Cubic meter to liter unit conversion constant, (m^3/L). Value: $1.0\text{E}-3$.
MANULR	SOLPAR	Deep soil volume/surface area mixing ratio used to account for manual redistribution of a given volume of buried contaminated waste such as from the digging of a basement or well over a defined surface area, (m).
MASMAS	ORGMAS	Mass of each organ in the master organ list, (gm).
MASORG	ORGMAS	Name of each organ in the master organ list.
MAXO	DOSALL	Index of controlling organ.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
MAXP	DOSALL	Index of controlling pathway: 1)inhalation, 2)ingestion, 3)external.
MAXR	DOSALL	Index of controlling radionuclide.
MAXTIM	DOSES	Dose integral period (70-YR period) during which the maximum dose rate occurs in DITTY.
MAXYR	DOSALL	Year of dose commitment period receiving the largest annual dose, (yr).
METHOD	OPT	Method to be used to evaluate differential equations defining organ retentions as presented in subroutine DIFEQ2. Note: only method 3 is now supported.
MEVSV	OPT	Conversion factor for changing MeV/g per transformation to Sv per Bq-d.
MIDIR	AIRPAR	Index of direction of the maximum individual, where 1 indicates wind blowing from north to south.
MIDIST	AIRPAR	Distance from air release to exposure point of maximum or average individual, (m).
MINDIS	AIRPAR	Minimum distance that can be considered (m).
MIXFLG	SWPAR	Selection flag for mixing ratio calculation: 0 - use input value, 1 - river model, 2 - lake model.
MIXR	SWPAR	Mixing ratio at each water pathway usage location (dimensionless).
MOPYR	PATHIN	The number of months per year irrigation occurs in DITTY.
MORG	ORGMAS	Number of organs in the master organ list.
MOYR	OPT	Number of months in a year conversion, (mo/yr). Value: 12.0.
NAN	OPT	Number of animal food products allowed in program. Value: 4.
NAQ	OPT	Number of aquatic food types allowed in program. Value: 4.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
NBEFORE	TIMES	Number of years in the optional radionuclide inventory decay/buildup period, (yr). Set to the greatest of BEFORE, BEFAIR, or BEFIRR.
NBONE	ORGP	Number of "BONE" subcompartments considered for the current radionuclide chain. Allowable values: $0 \leq \text{NBONE} \leq 4$.
NCH	RMD	Number of decay chains in the master radionuclide library.
NCH	DECAY	No. of decay chains in the master library RMDLIB, $1 \leq \text{NCH} \leq 200$. (DITTY).
NCHAIN	OPT	Number of radionuclide chains to consider for this case. Same as parameter ICH in Common Block RADIN used by ENVIN.
NCHN	RMD	Chain number that each radionuclide in the master radionuclide library is a member of.
NCHN	DECAY	Chain number for each radionuclide.
NCHST	RMD	Location in the master radionuclide library of the first member of a radionuclide chain.
NCHST	DECAY	Location in the master radionuclide list of the first member of each chain, $1 \leq \text{NCHST}(I) \leq 300$
NDAU	RMD2	Number of implicit daughters for each radionuclide in the master radionuclide library.
NDIR	AIRPAR	Number of sectors used for atmospheric calculations.
NDIST	AIRPAR	Number of distances specified in the distance array for atmospheric calculations.
NDIST	DISPSN	Number of distances considered for defining population and E/Q, $1 \leq \text{DIST} \leq 10$, in DITTY.
NEAR	OPT	Flag set on if this is a near field (i.e., narrowly-focused, single site) scenario. Default is FALSE: far-field scenario assumed (i.e., wide-scale release, multiple site). (Dimensionless).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
NEQ	INTDFS	Number of differential equations to evaluate for the current radionuclide chain.
NFLAG	RMD	Control integer to indicate if each radionuclide in the master radionuclide library was included in the input list.
NFLAG2	INVIN	Index of the position in the master radionuclide library of each radionuclide in the input list.
NFLAGC	RMD	Control integer to indicate if each of the chains in the master radionuclide library was referenced in the input list.
NIDRMD	RMD2	Number of implicit daughters included in the radionuclide master library.
NIN	INVIN	Number of radionuclide in the input list $0 < NIN \leq 100$.
NMAX	OPT	Maximum number of radionuclides that can be considered in one case. Default values: 100.
NMET	DISPSN	Number of atmospheric stability categories for definition of joint frequency data, in DITTY.
NOCOMP	ORGPARG	Total number of organ subcompartments considered for the current radionuclide chain. Allowable values: $0 \geq NOCOMP \geq 9$.
NOFN	DKAY	Number of radionuclides in each chain, $1 \leq NOFN(i) \leq 9$, in DITTY.
NOFNUC	RMD	Number of radionuclides in each chain in master radionuclide data library.
NONAG	OPT	Flag set if this calculation is for a non agricultural scenario during the radionuclide inventory decay/buildup period prior to the beginning of the intake period. Cleared at beginning of the intake period.
NONAGD	CONC	Non-agricultural deep soil compartment concentration for each radionuclide in the current chain, (Units of Activity/m ³). Used during the radionuclide inventory option decay/buildup period prior to the beginning of the intake period for biotic transport calculations.

TABLE 3.1. (contd)

<u>Parameter Name</u>	<u>Common Block</u>	<u>Description</u>
NONAGS	CONC	Non-agricultural surface soil compartment for each radionuclide in the current chain, (Units of Activity/m ²). Used during the radionuclide inventory optional decay/buildup period prior to the beginning of the intake period for biotic transport calculations.
NONUC	RAD	Number of radionuclides in current chain for this case $1 \leq \text{NONUC} \leq 9$, (dimensionless).
NORG	ORGP	Number of additional organs for which integrated retentions are calculated for this radionuclide chain. Associated with organ models.
NORGL	ORGP	Master organ index of each organ considered for the current radionuclide chain. Used as cross-reference between the integrated retention organ compartments (YORG and YWORK) and the master organ list.
NORGR	ORGP	Number of organ sub-compartments to be considered for each organ modelled.
NORGL	ORGP	Number of organs in the organ list for the current radionuclide chain.
NORGS	DOSALL	Number of target organs in the output list.
NOTHER	ORGP	Number of "OTHER" subcompartments considered for the current radionuclide chain. Allowable values: $0 \geq \text{NOTHER} \geq 3$.
NPATH	OPT	Number of environmental exposure pathways that can be considered.
NRE	OPT	Number of aquatic recreation pathways available. Current value: 3.
NSC	INTDFS	Number of steps to convergence allowed in call to the LSODES2 Differential Equation Solver.
NSEAS	AIRPAR	Number of seasons considered for atmospheric calculations. Default value: 1.
NSPD	AIRPAR	Number of wind speeds considered for atmospheric calculations.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
NSTAB	AIRPAR	Number of stability classes considered for atmospheric calculations.
NTA	NAMLST	Number of times for which data is supplied in arrays PM1, POPT, and T, (DITTY).
NTF	OPT	Number of terrestrial food types, (dimensionless). Current value: 4.
NTIME	TIMES	Number of time period, length of dose commitment period.
NTKEND	TIMES	Intake of contamination ends after NTKEND (yr).
NTL	NAMLST	Number of times for which population data is given in arrays PL1 and TL in DITTY.
NTOD	AIRPAR	Number of time-of-days considered in atmospheric calculations.
NUBAR	DISPSN	Number of windspeed groups used for definition of joint frequency data, $1 \leq \text{NUBAR} \leq 8$.
NUCS	RMD	Number of radionuclides in the master radionuclide library.
NUCS	NUCNAM	Number of radionuclides in the master list, (DITTY).
NUCTOT	RADIN	Total number of radionuclides to be considered in this case, including daughters.
NVU	OPT	Unit conversion factors for input inventory, corresponding to IUNIT (index of input units). Default values: $1.0\text{E-}12$ (pCi), $1.0\text{E-}6$ (μCi), $1.0\text{E-}3$ (mCi), 1.0 (Ci), $2.7\text{E-}11$ (Bq).
OMAX	DOSALL	Dose to controlling organ.
ONEYR	OPT	One year, constant (yr). Value: 1.0
ORGANS	ORGPARG	Names of each organ considered in the current case.
ORGFEX	MTBPAR	Fraction excreted via urine from each organ compartment for each radionuclide in the current chain. $\text{ORGFEX} + \text{ORGUEX} = 1.0$.

TABLE 3.1. (contd)

<u>Parameter Name</u>	<u>Common Block</u>	<u>Description</u>
ORGING	ORGP	Multiplier apportioning "other" among all organs making up "other" by mass for ingestion (dimensionless).
ORGINH	ORGP	Multiplier apportioning "other" among all organs making up "other" by mass for inhalation (dimensionless).
ORGLT	ORGP	Multiplier applied to the integrated quantity in the committed dose equivalent calculation usually set to 1.0. Used to select bone surface or volume and to ratio bone volume between cortical and cancellous tissue.
ORGUEX	MTBP	Fraction excreted via feces from each organ compartment for each radionuclide in the current chain. ORGUEX + ORGFEX = 1.0.
OUTEDE	OPT	Flag set if the user is only interested in the annual effective dose equivalent calculation, as opposed to cumulative dose calculation. Dose calculations are performed more efficiently when this flag is set.
OUTPTH	OPT	Flag set if report of organ dose by partway is desired.
OUTRAD	OPT	Flag set if report of organ dose by radionuclide is desired.
OVRBRD	SOLP	Depth of soil overburden of buried waste, (m).
P	OPT	Pi. Value: 3.1415926.
PACKHL	SOLP	Half-life of the waste form/package, (yr).
PAKADD	CONC	Waste package degradation contribution, (Units of Activity/m ³).
PATH	OPT	Exposure pathway flags, equivalenced with named pathway logicals.
PL	VARBYL	Total population for each time period, used in waterborne calculations.
PL1	NAMLST	Total population (waterborne release) for each time in array TL in DITTY.
PLTCON	CONC	Radionuclide concentration in each terrestrial food type for each radionuclide in the current chain, (Units of Activity/kg).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
PLTLAB	LABELS	Eight character description/label for each terrestrial plant food compartment: Leafy Veg, Root Veg, Grains, Fruits. Equivalenced with EXPLAB.
PM	VARBYL	Population dispersion factor, person-s/m ³ for airborne releases for each time period in DITTY.
PM1	NAMLST	Airborne population dispersion factor in DITTY.
PMA	NAMLST	Population dispersion factor for acute waterborne releases in DITTY.
PMAX	DOSALL	Dose of controlling pathway: inhalation, ingestion, or external (rem or Sv).
PODTTL	TITLES	Title of population distribution library in DITTY.
POP	AFPPAR	Population for each distance and direction.
POP	POPU	Population within each spatial interval for 10 distances and 16 direction sectors in DITTY.
POPDOS	OPT	Flag set if population dose is to be calculated for this case.
POPDOS	DOSES	The population weighted integrated dose to five organs for 100 radionuclides in DITTY.
POPIN	OPT	Total exposed population input by user. Used when population grid not used, (persons).
POPOPT	OPT	Population definition option: 1 - use population grid in file POP.IN, 2 - use population total entered this line (dimensionless).
POPT	OPT	Total population considered for inhalation and external calculations at the residential location (person).
POPT	NAMLST	Total population (airborne release) for each time in array T in DITTY.
PPL	NAMLST	Total population for acute waterborne releases in DITTY.
PRCNTI	OPT	Probability level to use for acute air exposures where 1-1%, 2-5%, 3-10%, 4-25%, 5-50% (dimensionless).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
PWT	AIRPAR	Population-weighted chi/Q values for each distance in the specified sector for acute population exposures (person s/m ³).
PWTAIR	CONC	Individual or average population-weighted ₃ air exposure for acute releases (Units of Activity s/m ³).
PWTX	AIRPAR	Population-weighted external dose rate factors for finite plume (person rem dis/(Ci MeV)).
PWTXAR	AIRPAR	Individual external dose rate factors for finite plume (person rem dis/(Ci MeV)).
Q	DFPAR	Environmental exposure rate for each radionuclide for each exposure path for each year of intake, (Units of Activity/yr).
QAIR	CONC	Air release term, (Units of Activity/yr).
QIN	INVIN	Input release term for air (Units ₃ of Activity/yr), buried waste (Units of Activity/m ³), and surface water (Units of Activity/yr) for each radionuclide in the input list.
QSW	CONC	Surface water release term, (Units of Activity/yr).
QWAS	CONC	Buried waste source term, (Units of Activity/m ³).
RA226	MTBPAR	Flag set if the current radionuclide is radium 226.
RADEDE	DOSALL	Effective Dose equivalent for each radionuclide considered in this case (rem or Sv).
REC	OPT	Flag set if each of the aquatic recreation pathways are to be considered for this case.
RECON	PATHIN	Reconcentration ratios for water concentration calculations in DITTY.
RECRE	OPT	Flag set if the aquatic recreation exposure pathway is to be considered for this case.
RECTT	TIMES	Transit time for surface water release term to reach site of aquatic recreational activities, (hr).
RELEND	TIMES	Release ends after year RELEND (yr).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
RELTRM	OPT	Flag set if user has supplied any radionuclide release terms on input, (dimensionless).
RESFAC	EXTPAR	Resuspension factor.
RESIRR	SOLPAR	Flag set if irrigation of the residential site is to be considered.
RESSOL	CONC	Residential/resuspension surface soil compartment used for external and inhalation calculations, (Units of Activity/m ²).
RF1	OPT	Fraction of plant roots in the surface soil layer, that is; in the top 15 cm (dimensionless).
RF2	OPT	Fraction of plant roots in deep soil that are exposed to potential contamination from buried contained waste (dimensionless).
RINH	EXTPAR	Human inhalation rate (cm ³ /s).
RINHA	EXTPAR	Breathing rate for acute releases (cm ³ /s).
RIRR	FODPAR	Irrigation water applicable rate, (in/yr), for each terrestrial food type.
RIRR	PATHIN	Irrigation rate, (L/m ² /mo) in DITTY.
RIRRA	ANMPAR	Irrigation water applicable rate for animal fodder (in/yr) for four stored feed and two fresh forage compartments.
RIRRR	SOLPAR	Irrigation water application rate for residential land area, (in/yr).
RM	PATHIN	Mixing ratio for water concentration calculation in DITTY.
RMAX	DOSALL	AEDE of controlling radionuclide (rem or Sv).
RMDTTL	TITLES	Title of RMDLIB in DITTY.
RTBLOOD	MTBPAR	Biological rate constant for the transfer compartment, (blood and body fluids) for each radionuclide in the current chain (d-1).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
RTBONE	MTBPAR	Biological rate constant of each "BONE" subcompartment considered for the current radionuclide chain, (d-1).
RTGUT	MTBPAR	Biological rate constant for each of four gut model compartments (d-1).
RTLUNG	MTBPAR	Biological rate constant for each of 12 lung/lymph compartments (d-1).
RTOL	INTDFS	Relative error tolerance allowed in call to the LSODES2 Differential Equation Solver.
RTORG	MTBPAR	Biological rate constant for each organ/tissue subcompartment (d-1).
RTOTHR	MTBPAR	Biological rate constant of each "OTHER" organ subcompartment considered for the current radionuclide chain, (d-1).
RTPACK	SOLPAR	Available waste concentration, (Units of Activity/m ³).
RTSIBL	MTBPAR	Biological rate of transfer between small intestine (SI gut subcompartment) and the transfer compartment (blood and body fluids), (d-1).
SAVINC	DOSALL	Yearly internal dose increment for the first three years of the dose commitment period. Printed in summary report. (Sv or rem).
SAVORG	DOSALL	Dose increment to each organ for the first three years of intake and dose commitment (Rem or Sv). Used for dose summary report.
SCONW	EDCN	Farm soil concentrations of radionuclides, (person ci yr/kg) in DITTY.
SEALAB	LABELS	Descriptive labels for each of the four seasons considered during an acute release: winter, spring, summer, and autumn.
SECD A	DPT	Seconds in a day conversion factor, (s/d). Default value: 8.64E4.
SECYR	OPT	Number of seconds in a year (s/yr) constant. Default value: 3.15E7

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
SEDCON	CONC	Concentration, (Units of Activity/m ³), in sediment of each radionuclide in the current chain.
SEDCON	EDCN	River sediment concentrations of radionuclides, (person ci yr/m ²), in DITTY.
SFLOW	AIRPAR	Stack flow used in atmospheric calculations, (m ³ /s).
SHITE	AIRPAR	Stack height used for atmospheric calculations, (m).
SHORWI	EXTPAR	Shore width factor for each shoreline type. Shoreline type (SHRTYP) is set by the user.
SHRTYP	EXTPAR	Shoreline type used to determine shore-width factor, Allowable values: 1 - river shore, 2 - lake shore, 3 - ocean site, 4 - tidal basin.
SI2I	ORGMAS	Semi-infinite to infinite dose correction factor (dimensionless). Applied to external exposure dose rate for immersion.
SIJ	SIJS	Sij factors total dose (Sv/da) rate on target organ i per Bq in source organ j, for each radionuclide in the current chain.
SINDX	ORGMAS	Source organ index of each organ in the master organ list.
SL2CON	CONC	Radionuclide concentration in the surface soil compartment by radionuclide chain member and animal product, (Units of Activity of Activity/m ²).
SLCON	EDCN	Concentration in farm soil of radionuclides from atmospheric deposition, (person ci yr/kg), in DITTY.
SLDN	OPT	Surface soil density, (kg [dry soil] per square meter). Default value: 224.0
SLING	OPT	Set if the inadvertent soil ingestion pathway is to be considered for this case, (dimensionless).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
SOLCON	CONC	Surface soil concentration, (Units of Activity/m ²), of each radionuclide in the current chain, for each terrestrial food type.
SOLING	SOLPAR	Quantity of soil inadvertently ingested, (mg/day).
SOLUNT	OPT	Soil source units are in terms of activity per: 1 - m ² , 2 - m ³ , 3 - kg, 1 ≤ SOLUNT ≤ 3.
SPECOR	ORGP	Logical flag set for each organ in the master organ list that is "specified" or considered for this radionuclide chain.
SRAD	AIRPAR	Stack radius used for atmospheric calculations, (m).
SSLDN	OPT	Soil density: (1.5E3 kg/m ³).
STACK	AIRPAR	Flag set on if air release is from a stack, (dimensionless).
STORTM	ANMPAR	Storage time of animal feed, between harvest and animal consumption, (d), for four stored feed and two fresh forage compartments.
SURCM	SOLPAR	Depth of surface soil layer, (cm).
SVU	OPT	Soil source term media conversion factor, corresponding to index SOLUNT. Default values: 1.0, 0.15, 224.0.
SWACUT	CONC	Time-integrated surface water concentration for acute exposures (Units of Activity yr/L).
SWAT	OPT	Set if surface water transport is to be considered for this case.
SWCON	CONC	Concentration in surface water of each radionuclide in the current chain, (Units of Activity/L).
SWDPH	SWPAR	Average water depth in surface water body (m).
SWDZ	SWPAR	Depth of effluent discharge point to surface water, used only for lake model (m).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
SWFLOW	SWPAR	Average river flow rate: for river model (MIXFLG=1), flow velocity (m/s), (MIXFLG=3), volumetric flow rate (m ³ /s).
SWIDTH	SWPAR	Average river width, used only for river model when MIXFLG = 1, (m).
SWING	OPT	Flag set if inadvertent ingestion of water during swimming is to be considered.
SWIRR	CONC	Surface water concentration decayed for transit to irrigation site (Units of Activity/L).
SWLSX	SWPAR	Longshore distance from effluent release point to usage location for each water pathway (m).
SWOSY	SWPAR	Offshore distance to the water intake for each water pathway (m).
SWQB	SWPAR	Rate of effluent discharge of the receiving surface water body, (m ³ /s).
SWTT	TIMES	Transit time for surface water release term to reach population, (hr).
T	NAMLST	Times at which airborne population data is supplied, years A.D. in DITTY.
TARGET	ORGP	Flag set if each organ/tissue in the organ list is a target.
TCBONE	MTBPAR	Fraction of contamination going from the transfer compartment (blood and body fluids) to each of the "BONE" compartments considered for the current radionuclide chain.
TCLASS	RMD	Translocation classification, (sometimes referred to as solubility classification), for each radionuclide in the master radionuclide library. Allowable values: D - Class D, W - Class W, Y - Class Y.
TCMULT	ORGP	Transfer compartment multiplier used to get correct integrated retentions in differential equations for given model compartments. Apportions transfer compartment among all compartments.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
TCORG	MTBPAR	Fraction of material going from transfer compartment (blood and body fluids) to each organ sub-compartment for each radionuclide in the current chain (dimensionless).
TCOTHR	MTBPAR	Fraction of contamination going from the transfer compartment (blood and body fluids) to each of the "OTHER" organ subcompartments considered for the current radionuclide chain.
TCWS	SWPAR	Transfer constant from water to sediment, ($L/m^2/yr$). Default value: 36500.0
TEI	MTBPAR	Logical flag set if the tellurium-iodine model is to be used for this radionuclide chain.
TFD	OPT	Flag set to consider each of four terrestrial food pathways, (dimensionless).
TFOOD	OPT	Set if the terrestrial food crop ingestion pathway is to be considered for this case, (dimensionless).
TICKX	PLOT	Array of x-axis tick marks in DITTY.
TICKY	PLOT	Array of y-axis tick marks in DITTY.
TINDX	ORGMAS	Target organ index of each organ in the master organ list.
TITLS	TITL	Eighty-character title of each file corresponding to the filename stored in the file 'FILENAME.DAT' and associated with the logical unit number FILN.
TL	NAMLST	Times at which waterborne population data is supplied, years A.D.
TODAY	DAYPC	Ten character date of execution.
TOTEXC	SOLPAR	Total quantity of soil excavated by burrowing animals for: 1 - arid non agricultural, 2 - humid non agricultural, 3 - agricultural conditions, ($m^3/m^2 yr$).
TOTMAS	ORGPARG	Total mass of the human body, (gm).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
TPOPS	AIRPAR	Total population in the specified sector for acute exposures (persons).
TPRODA	ANMPAR	Total production of each animal product. If input by user, the minimum of total production or consumption rate times population is used in calculations. If value of 0.0 input, TPRODA is set to consumption rate times the population. (kg/yr).
TPRODQ	AQUPAR	Total production of each aquatic food type. If input by user, the minimum of total production or consumption rate times population is used in calculations. If value of 0.0 input, TPRODQ is set to consumption rate times population. (kg/yr).
TPRODT	FODPAR	Total production of each terrestrial food type. If input by user, the minimum of total production or consumption rate times population is used in calculations. If value of 0.0 input, TPRODT is set to consumption rate times population. (kg/yr).
TR	RMD	Radiological half-life of each radionuclide in radionuclide master library, (d).
TRANS	FODPAR	Translocation factor from plant surfaces to edible part of the plant for each terrestrial plant type, (dimensionless).
TRANSA	ANMPAR	Translocation factor from plant surfaces to edible parts of the plant, for four stored feed and two fresh forage compartments, (dimensionless).
TRITUM	MTBPAR	Flag set if current radionuclide is tritium.
TTAIR	AIRPAR	Travel time to each distance in specified sector for acute release, population exposure (s).
TTAIR1	AIRPAR	Travel time to the specified distance for acute atmospheric releases (s).
UBAR	AFPPAR	Average windspeed for each direction, (m/s).
UBAR	DISPSN	Average windspeed for each energy group, (m/s), in DITTY.

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
UEXTC	MTBPAR	Fraction excreted from the transfer compartment (blood and body fluids) via urine for each radionuclide in the current chain. UEXTC+FEXTC=1.0.
UNIT1	OPT	Label specification for inventory input units.
UNIT2	OPT	Label specification of each transport media corresponding to indices of TROPT.
UNIT3	OPT	Label specification for soil source input units option.
UPTGUT	MTBPAR	Uptake rate to the gut model, input is to the gut (stomach) subcompartment, (Bq/d).
USAG	AQUPAR	Consumption rate of each aquatic food product, (kg/yr).
USAGE	PATHIN	Consumption or exposure rates for aquatic paths
WASDEP	SOLPAR	Thickness of buried waste, (m). Waste is assumed to be uniformly distributed.
WATCON	EDCN	Water concentrations of radionuclides, (Ci/L person yr).
WDE	DOSALL	Weighted dose equivalent for each of the eleven components of the whole body effective dose equivalent, (Sv or rem).
WRDTTL	TITLES	Title of waterborne release data library in DITTY.
WT	OPT	Weight associated with each of the 11 components of the whole body EDE, (dimensionless). Default values: 0.25, 0.15, 0.12, 0.12, 0.03, 0.03, 5 times 0.06
WTIM	OPT	Weathering half life, (d). Default value: 14.0
X	AIRPAR	Standard distances used in population, food production, and chi/Q grids, (m).
XDIV	MTBPAR	Biological half-life in pulmonary region of the lung for translocation classes D, W, and Y, respectively, (d). Default values: 0.5, 50.0, 500.0
XMLF	EXTPAR	Mass loading factor, (g/m ³), used for resuspension calculations with Mass Loading model.
XOQ	AFPPAR	Chi/Q values for each distance and direction, (s/m ³).

TABLE 3.1. (contd)

Parameter Name	Common Block	Description
XOQI	AFPPAR	Normalized air concentration for a single location, (s/m^3).
XOQOPT	OPT	Option for specification of chi/Q . Allowable values are: 0 - Use population-weighted chi/Q value, 1 - Use population and chi/Q grid, 2 - Use joint frequency data.
YBLOOD	INTDFS	Amount of each radionuclide chain member in the transfer compartment (body fluids and blood). Equivalenced with YWORK array.
YELD	FODPAR	Yield of each terrestrial food type, (kg/m^2), per year.
YELD	PATHIN	Crop yield, (kg/m^2), for the crops or forage associated with the seven 'CONSUM' pathways in DITTY.
YELDA	ANMPAR	Yield of animal fodder, (kg/m^2), for four stored feed and two fresh forage compartments.
YELDBT	SOLPAR	Total vegetative production, for arid, humid and agricultural conditions, respectively, during the optional inventory decay/buildup period, ($\text{kg}[\text{wet}]/\text{m}^2 \text{ yr}$).
YGUT	INTDFS	Amount of each radionuclide chain member in each of four gut model subcompartments. Equivalenced with YWORK array.
YLUNG	INTDFS	Amount of each radionuclide in each of 12 lung compartments at any given time step.
YORG	INTDFS	Amount of each radionuclide chain member in each organ subcompartment. Equivalenced with YWORK array.
YOTHR	INTDFS	Amount of each radionuclide chain member in each of the "OTHER" organ subcompartments. Equivalenced with YWORK array.
YRDA	OPT	Years in a day conversion factor (yr/d). Default value: $2.74\text{E-}3$.
YRHR	OPT	Year to hour conversion factor, value: $1.14\text{E-}4$, (yr/hr).
YRSEC	OPT	Year to second conversion factor, value: $3.17\text{E-}8$, (yr/s).

TABLE 3.1. (contd)

<u>Parameter Name</u>	<u>Common Block</u>	<u>Description</u>
YWORK	INTDFS	Work array passed to the LSODES2 Differential Equation Solver.
ZERO	OPT	Constant: 0.0, (dimensionless).
ZNP	MTBPAR	Deposition fraction for the nasal-pharynx lung region, (dimensionless).
ZP	MTBPAR	Deposition fraction for the pulmonary lung region (dimensionless).
ZTB	MTBPAR	Deposition fraction for the tracheo-bronchial lung region, (dimensionless).

TABLE 3.2. Parameter Usage

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
AFPPAR	AVEU	ENV	AIR	REAL	USER CALC	NDIR	XQIN	XQCAL	AIRCAL
AFPPAR	DRFOQ	ENV	AIR	REAL	CALC	NDIR NDIST 6	CRONMO XQIN	XQCAL	AIRCAL
AFPPAR	EFPOP	ENV	AIR	REAL	CALC	NTF	XQCAL	ANMCAL	CRPCAL XQCAL
AFPPAR	EFPOPA	ENV	AIR	REAL	CALC	NAN	XQCAL	ANMCAL	XQCAL AIRCAL
AFPPAR	FPRD	ENV	AIR	REAL	USER CALC	NDIST NDIR NTF	POPCAL XQCAL	XQPOP	XQCAL AIRCAL
AFPPAR	FPRDA	ENV	AIR	REAL	USER CALC	NDIST NDIR NAN	POPCAL XQCAL	XQPOP	XQCAL AIRCAL
AFPPAR	POP	ENV	AIR	REAL	USER	NDIST NDIR	XQIN	XQIN	XQCAL AIRCAL
AFPPAR	XOQ	ENV	AIR	REAL	USER CALC	NDIST NDIR	CRONMO XQIN	CRONMO	INTPOL XQCAL AIRCAL
AFPPAR	XOQI	ENVIN ENV	AIR	REAL	USER	1	READIN REDCAS INTPOL XQCAL	AIRCAL	INTPDL XQCAL
AIRPAR	BUILDH	ENVIN ENV	AIR	REAL	USER	1	READIN REDCAS	ACCMOD	
AIRPAR	BUILDZ	ENVIN ENV	AIR	REAL	USER	1	READIN REDCAS	ACCMOD	
AIRPAR	DRFSAV	ENVIN ENV	AIR	REAL	CALC	6	ACCMOD		

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>	
AIRPAR	EDIS	ENV	AIR	REAL	LIBR	6 NONUC	REDCHA	AIRCAL	
AIRPAR	EFFSTK	ENVIN	AIR	LOGICAL	PROG	1	CHECK	CRONMO	
AIRPAR	ETEMP	ENVIN	AIR	REAL	USER	1	READIN CHECK CRONMO REDCAS	RITENV CHECK CRONMO	
AIRPAR	FC	ENV	AIR	REAL	PROG	6	BLOCKD	AIRCAL ACUTE1	
AIRPAR	IRELES	ENVIN ENV	AIR	INTEGER	USER	1	READIN REDCAS	ACCMOD	
AIRPAR	JFIN	ENVIN ENV	AIR	LOGICAL	USER	1	READIN REDCAS	CHECK XQCAL	
AIRPAR	MIDIR	ENV	AIR	INTEGER	USER	1	READIN REDCAS XQCAL	RITENV CHECK INTPOL XQCAL	
AIRPAR	MIDIST	ENV	AIR	REAL	USER	1	READIN XQCAL REDCAS	RITENV CHECK INTPOL XQCAL	
AIRPAR	MINDIS	ENV	AIR	REAL	PROG	1	BLOCKD	CHECK	
AIRPAR	NDIR	ENVIN ENV	AIR	INTEGER	PROG	1	BLOCKD	XQIN CRONMO INTPOL	XQCAL AIRCAL
AIRPAR	NDIST	ENVIN ENV	AIR	INTEGER	PROG	1	BLOCKD REDFLT	CRONMO XQIN INTPOL	XQCAL AIRCAL
AIRPAR	NSEAS	ENVIN	AIR	INTEGER	PRDG	1	CRONMO ACCMOD	CRONMO ACCMOD	
AIRPAR	NSPD	ENVIN	AIR	INTEGER	PROG	1	CRONMO ACCMOD	CRONMO ACCMOD	
AIRPAR	NSTAB	ENVIN	AIR	INTEGER	PROG	1	CRONMO ACCMOD	CRONMO ACCMOD	

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>
AIRPAR	NTOD	ENVIN	AIR	INTEGER	PROG	1	CRONMO ACCMOD	CRONMO ACCMOD
AIRPAR	PMX	ENVIN ENV	AIR	REAL	CALC	6	ACCMOD	ACCMOD
AIRPAR	PWT	ENVIN ENV	AIR	REAL	CALC	NDIST	ACCMOD	ACUTE1
AIRPAR	PWTX	ENVIN ENV	AIR	REAL	CALC	NDIST 6	ACCMOD	ACUTE1
AIRPAR	SFLOW	ENV	AIR	REAL	USER	1	READIN CHECK REDCAS	RITENV CHECK ACCMOD CRONMOD
AIRPAR	SHITE	ENVIN	AIR	REAL	USER	1	READIN CHECK REDCAS	RITENV CHECK CRONMO ACCMOD
AIRPAR	SRAD	ENVIN	AIR	REAL	USER	1	CHECK REDCAS	RITENV CHECK ACCMOD CRONMO
AIRPAR	STACK	ENVIN ENV	AIR	LOGICAL	USER	1	READIN REDCAS	RITENV CHECK
AIRPAR	TPOPS	ENVIN ENV		REAL	CALC	1	ACCMOD	ACUTE1 ACUTE1
AIRPAR	TTAIR	ENVIN ENV	AIR	REAL	CALC	NDIST	ACCMOD	ACUTE1
AIRPAR	TTAIRI	ENVIN ENV		REAL	CALC	1	ACCMOD	ACUTE1
AIRPAR	X	ENVIN ENV	AIR	REAL	PROG	NDIST	BLOCKD	CRONMO INTPOL XQCAL AIRCAL ACCMOD
ANMPAR	ADJET2	ENV	ANFOOD	REAL	CALC	NAN	XQCAL	ANMCAL XQCAL
ANMPAR	ANMFED	ENV	ANFOOD	LOGICAL	PROG	I	REDCHA	ANMCAL

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>	
ANMPAR	BIOMA2	ENVIN ENV	ANFOOD	REAL	USER PROG	NAN+2	REDFLT	ANMCAL ACUTEA	
ANMPAR	CONS2	ENV	ANFOOD	REAL	USER	NAN	READIN REDCAS	ANMCAL RITQA RITENV	XQCAL AIRCAL
ANMPAR	CONSUM	ENV	ANFOOD	REAL	PROG	6	REDFLT BLOCKD REDCAS	ANMCAL REDFLT RITENV	
ANMPAR	DIETFR	ENV	ANFOOD	REAL	USER	NAN+2	READIN REOCAS	ANMCAL RITQA RITENV	
ANMPAR	DRYFA2	ENV	ANFOOD	REAL	USER PROG	NAN+2	REDFLT	ANMCAL ACUTEA	
ANMPAR	DWATER	ENV	ANFOOD	REAL	PROG	NAN	REDFLT REDCAS	ANMCAL REDFLT RITENV	
ANMPAR	DWFACA	ENV	ANFOOD	REAL	USER	NAN	READIN REDCAS	ANMCAL RITQA RITENV	
ANMPAR	FMI	ENV	ANFOOD	REAL	LIB	NAN+2 NONUC	REDCHA	ANMCAL	
ANMPAR	FRACUT	ENVIN ENV	ANFOOD	REAL	LIBR	4	REDFLT READIN	ACUTE1	
ANMPAR	GRWPA	ENV	ANFOOD	REAL	USER	NAN+2	READIN REDCAS	ANMCAL RITQA	RITENV CRPCAL
ANMPAR	HARVA	ENV	ANFOOD	REAL	CALC	NAN NONUC 2	ANMCAL	ANMCAL DKHARV	
ANMPAR	HLDUPA	ENV	ANFOOD	REAL	USER	NAN	READIN REDCAS	ANMCAL RITQA RITENV	
ANMPAR	IRRSA	ENVIN ENV	ANFOOD	INTEGER	USER	NAN+2	READIN REDCAS	ANMCAL READIN CHECK	RITQA RITENV EDRANM

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
ANMPAR	IRTIMA	ENVIN ENV	ANFOOD	REAL	USER	NAN+2	READIN REDCAS	ANMCAL RITQA	RITENV EDRANM
ANMPAR	RIRRA	ENV	ANFOOD	REAL	USER	NAN+2	READIN REDCAS	ANMCAL RITQA	RITENV EDRANM
ANMPAR	STORTM	ENV	ANFOOD	REAL	USER	NAN+2	READIN REDCAS	ANMCAL RITQA RITENV	
ANMPAR	TPRODA	ENVIN ENV	ANFOOD	REAL	USER CALC	NAN+2	READIN CHECK XQCAL REDCAS	ANMCAL RITQA RITENV XQCAL	
ANMPAR	TRANSA	ENV	ANFOOD	REAL	USER	NAN+2	BLOCKD REDFLT REDCAS	ANMCAL REDFLT RITENV	
ANMPAR	YELDA	ENV	ANFOOD	REAL	USER	NAN+2	READIN REDCAS	ANMCAL RITQA RITENV	
AQUPAR	ADJETQ	ENV	AQFOOD	REAL	CALC	NAQ	XQCAL	AQUCAL XQCAL	
AQUPAR	AQUPOP	ENVIN ENV	AQFOOD	REAL	USER	1	READIN REDCAS XQCAL	AQUCAL RITQA RITENV XQCAL	
AQUPAR	BIOACF	ENV	AQFOOD	REAL	LIB	NAQ NONUC	REDCHA	AQUCAL	
AQUPAR	DWCLEN	ENV	DRINK	REAL	LIB	NONUC	REDCHA	DRKCAL	
AQUPAR	DWPOP	ENV ENVIN	DRINK	REAL	USER	1	READIN REDCAS XQCAL	RITQA RITENV	
AQUPAR	DWSRC	ENVIN ENV	DRINK	INTEGER	USER	1	READIN REDCAS	DRKCAL RITQA	RITENV CHECK
AQUPAR	DWTRET	ENVIN ENV	DRINK	LOGICAL	USER	1	READIN REDCAS	DRKCAL RITQA RITENV	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
AQUPAR	DWUSAG	ENVIN ENV	DRINK	REAL	USER	1	READIN REDCAS	DRKCAL RITQA RITENV	
AQUPAR	HLDUP2	ENVIN ENV	AQFOOD	REAL	USER	NAQ	READIN REDCAS	AQUCAL RITQA	RITENV CRPCAL
AQUPAR	HOLDDW	ENVIN ENV	DRINK	REAL	USER	1	READIN REDCAS	DRKCAL RITENV	
AQUPAR	TPRODQ	ENVIN ENV	AQFOOD	REAL	USER CALC	NAQ	READIN CHECK REDCAS	RITQA RITENV XQCAL	
AQUPAR	USAG	ENV	AQFOOD	REAL	USER	NAQ	READIN REDCAS	AQUCAL RITQA	RITENV RITQA
CONC	AIRCON	ENV	AIR	REAL	USER CALC	NONUC	REDCHA TRNSPT INITNV	CRPCAL ANMCAL EDRANM INHCAL	EXTCAL TRNSPT EDRRES EDRCRP
CONC	ANMCON	ENV	ANFOOD	REAL	USER CALC	NAN NONUC	ANMCAL INITNV REDCHA	ANMCAL	
CONC	AQUCON	ENV	AQFOOD	REAL	USER CALC	NAQ NONUC	REDCHA AQUCAL INITNV	AQUCAL ANMCAL	
CONC	ARF2CN	ENV	ANFOOD	REAL	CALC	NONUC NAN	TRNSPT INITNV AIRCAL	SOLCAL EDRANM ANMCAL XQCAL AIRCAL	
CONC	ARFCON	ENV	AIR	REAL	CALC	NONUC NTF	AIRCAL TRNSPT INITNV	CRPCAL XQCAL EDRCRP	
CONC	ARPCON	ENV	AIR	REAL	CALC	NONUC	AIRCAL TRNSPT INITNV	SOLCAL INHCAL EXTCAL TRNSPT AIRCAL EORRES	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
CONC	ARPCN	ENV	AIR	REAL	CALC	NONUC 6	AIRCAL	EXTCAL	
CONC	CTOAIR	ENV	AIR	REAL	CALC	NONVC	TRNACU	ACUTEA ACUTEC	
CONC	DS2CON	ENV	DEEP	REAL	CALC	NONUC NAN+2	REDCHA INITNV PRIOR HARVES	SOLCAL ANMCAL EDRANM XQCAL PRIOR HARVES	
CONC	DSCON	ENV	DEEP	REAL	USER CALC	NONUC NTF	REDCHA SOLCAL INITNV PRIOR HARVES EDRCRP	CRPCAL PRIOR HARVES EORCRP	
CONC	DSRES	ENV	DEEP	REAL	CALC	NONUC	PRIOR TRNSPT INITNV EDRRES	EDRRES PRIOR	
CONC	DWCON	ENV	DRINK	REAL	USER CALC	NONUC	INITNV REDCHA	DRKCAL	
CONC	EXPOS	ENV		REAL	CALC	NONUC NPATH	ANMCAL CRPCAL AQUCAL INHCAL DRKCAL EXTCAL INITNV	EXPOS	
CONC	GWCON	ENV	GWAT	REAL	USER CALC	NONUC	REOCHA TRNSPT INITNV	CRPCAL ANMCAL EDRANM DRKCAL	TRNSPT EDRRES EORCRP
CONC	NONAGD	ENV	NONAG	REAL	CALC	NONUC	EDRNON INITNV	PRIOR EDRNON	
CONC	NONAGS	ENV	NONAG	REAL	CALC	NONUC	EDRNON INITNV	PRIOR EDRNON REDCHA	

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>	
CONC	PAKADD	ENV	BURWAS	REAL	CALC	NONUC	PACKAG	EDRANM EDRNON PACKAG	EDRRES EDRCRP
CONC	PLTCON	ENV	TFOOD	REAL	USER CALC	NTF NONUC	CRPCAL INITNV REDCHA	CRPCAL SOLCAL	
CONC	PWTAIR	ENV	AIR	REAL	CALC	NONUC	ACUTE1	ACUTEC ACUTEA	
CONC	QAIR	ENV	AIR	REAL	USER	NONUC	INITNV REDCHA	AIRCAL ACUTE1	
CONC	QSW	ENV	SWAT	REAL	USER	NONUC	REDCHA INITNV	TRNSPT	
CONC	QWAS	ENV	BURWAS	REAL	USER	NONUC	REDCHA INITNV PACKAG	SOLCAL PACKAG	
CONC	RESSOL	ENV	GROUND	REAL	CALC	NONUC	INITNV REDCHA PRIOR EDRRES	EXTCAL INHCAL CRPCAL TRNSPT PRIOR EDRRES	
CONC	SEDCON	ENV	SWAT	REAL	USER CALC	NONUC	RECCAL EXTCAL INITNV	RECCAL EXTCAL	
CONC	SL2CON	ENV	ANFOOD	REAL	CALC	NONUC NAN+2	EDRANM INITNV REDCHA PRIOR HARVES	ANMCAL SOLCAL EDRANM PRIOR DKSOIL	
CONC	SOLCON	ENV	TFOOD	REAL	USER CALC	NONUC NTF	INITNV REDCHA PRIOR EDRCRP	CRPCAL SOLCAL PRIOR HARVES DKSOIL EDRCRP	
CONC	SWACUT	ENV	SWAT	REAL	CALC	NONUC	ACUTE1	ACUTEA	AQUCAL

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>	
								DRKCAL	ACUTEC
CONC	SWCON	ENV	SWAT	REAL	USER CALC	NONUC	REDCHA TRANSPT INITNV	CRPCAL ANMCAL CHECK	CHECK DRKCAL TRANSPT
CONC	SWIRR	ENV	SWAT	REAL	USER	NONUC	TRANSPT	CRPCAL ANMCAL EDRANM	TRANSPT EDRRES EDRCRP
DAYPC	CLOCK			CHAR*10		1	MAKDA2	RITEND HEADNG	OPNFIL RITINT
DAYPC	TODAY			CHAR*10		1	MAKDA2	HEADNG OPNFIL RITINT	
DECAY	AL	ENV INTDF		REAL*8	CALC	NONUC	REDCHA ORDIN	CHAIN	
DECAY	ALDAY	INTDF		REAL	CALC	NONUC		DGCHAI DIFEQ2 RITINT	
DECAY	DK	ENV		INTEGER	LIB	2 NONUC	REDCHA ORDIN	CHAIN DGCHAI RITINT	
DECAY	IFRM	ENV		REAL	LIB	2 NONUC	ORDIN REDCHA	CHAIN DGCHAI	ORDIN RITINT
DECAY	NUC	ENV		INTEGER	PROG	1	ORDIN REDCHA	CHAIN DGCHAI	
DFPAR	DAIT	DOSE		REAL	LIB	NUCTOT	REDFIL	DOSCAL	
DFPAR	DBIT	DOSE		REAL	LIB	NUCTOT	REDFIL	DOSCAL	
DFPAR	DDIT	DOSE		REAL	LIB	NUCTOT 3	REDFIL	DOSCAL	
DFPAR	DFG	DOSE		REAL	CALC	MDRG DCEND	REDSET	DOSCAL REDSET	
DFPAR	DFH	DOSE		REAL	CALC	MORG DCEND	REDSET	DOSCAL REDSET	

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>
DFPAR	DSIT	ENVIN		REAL	LIB	NUCTOT	REDFIL	DOSCAL
DFPAR	IOR	DOSE		LOGICAL	PROG	NORG	SETORG	DOSCAL
DFPAR	Q	OOSE		REAL	CALC	NTKENO	DOSCAL	DOSCAL
DOSALL	AEDEQ	DOSE		REAL	CALC	1	WBEDE	DOSSUM
DOSALL	ANNULD	DOSE		REAL	CALC	DCEND	TOTCAL	DOSSUM
DOSALL	CDE	DOSE		REAL	CALC	11	WBEDE	DOSSUM WBEDE
DOSALL	CDEING	DOSE		REAL	CALC	MORG	DOSCAL	TOTCAL
DOSALL	CDEINH	DOSE		REAL	CALC	MORG	DOSCAL	TOTCAL
DOSALL	CUMD	DOSE		REAL	CALC	1	TOTCAL	DOSSUM
DOSALL	CUMID	DOSE		REAL	CALC	1	TOTCAL	DOSSUM TOTCAL
DOSALL	CUMIOR	DOSE		REAL	CALC	MORG DCEND	TOTCAL	DOSSUM
DOSALL	CUMIYR	DOSE		REAL	CALC	DCEND	DOSCAL	DOSSUM DOSCAL TOTCAL
DOSALL	DASHES	DOSE		CHAR*8	PROG	10	BLOCKD	RITBYP RITBYR
DOSALL	DEX1R	DOSE		REAL	CALC	NUCTOT	DOSCAL	DOSCAL RITBYR
DOSALL	DEX1V	DOSE		REAL	CALC	NPATH	DOSCAL	DOSCAL RITBYP
DOSALL	DOSCDR	DOSE		REAL	CALC	MORG NUCTOT	DOSCAL	RITBYR DOSCAL
DDSALL	DOSCDV	DOSE		REAL	CALC	MORG NUCTOT	DOSCAL	RITBYP DOSCAL
DOSALL	DOS01	DOSE		REAL	CALC	MORG	DOSCAL	WBEDE DOSCAL DOSSUM
								TOTCAL RITBYP RITBYR

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>	
DOSALL	DOS02	DOSE		REAL	CALC	MORG	DOSCAL	DOSCAL TOTCAL	RITBYP RITBYR
DOSALL	DOS03	DOSE		REAL	CALC	MORG		DOSSUM	
DOSALL	DOSR	DOSE		REAL	CALC	MORG NUCTOT	DOSCAL	RITBYR DOSCAL	
DOSALL	DOSRE	DOSE		REAL	CALC	NUCTOT	DOSCAL	RITBYR DOSCAL	
DOSALL	DOSRP	DOSE		REAL	CALC	MORG NUCTOT 2	DASCAL	TOTCAL	
DOSALL	DOSV	DOSE		REAL	CALC	MORG NPATH	DOSCAL	RITBYP DOSCAL	
DOSALL	DOSVE	DOSE		REAL	CALC	5	DOSCAL	RITBYP DOSCAL	
DOSALL	EDE	DOSE		REAL	CALC	1	WBEDE	DOSSUM WBEDE	
DOSALL	EDEING	DOSE		REAL	CALC	1	TOTCAL	DOSSUM	
DOSALL	EDEINH	DOSE		REAL	CALC	1	TOTCAL	DOSSUM	
DOSALL	EDERG	DOSE		REAL	CALC	NUCTOT	TOTCAL	RITEDE	
DOSALL	EDERH	DOSE		REAL	CALC	NUCTOT	TOTCAL	RITEDE	
DOSALL	EXTD	DOSE		REAL	CALC	1	TOTCAL	DOSSUM TOTCAL	RITBYP RITBYR
DOSALL	EXTDOS	DOSE		REAL	CALC	DCEND	DOSCAL	DOSSUM DOSCAL TOTCAL	RITBYP RITBYR WBEDE
DOSALL	ICDE	DOSE		INTEGER	CALC	11	WBEDE	DOSSUM WBEDE	
DOSALL	ICLN	DOSE		INTEGER	CALC	MORG	TOTCAL	RITBYR RITBYP DOSSUM	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In
DOSALL	MAXO	DOSE		INTEGER	CALC	1	DOSSUM	DOSSUM
DOSALL	MAXP	DOSE		INTEGER	CALC	1	TOTCAL	DOSSUM
DOSALL	MAXR	DOSE		INTEGER	CALC	1	TOTCAL	DOSSUM
DOSALL	MAXYR	DOSE		INTEGER	CALC	1		DOSSUM
DOSALL	NORGS	DOSE		INTEGER	CALC	1	TOTCAL	RITBYP RITBYR DOSSUM TOTCAL
DOSALL	OMAX	DOSE		REAL	CALC	1	DOSSUM	DOSSUM
DOSALL	PMAX	DOSE		REAL	CALC	1	TOTCAL	DOSSUM
DOSALL	RADEDE	DOSE		REAL	CALC	NUCTOT	TOTCAL	RITEDE
DOSALL	RMAX	DOSE		REAL	CALC	1	TOTCAL	DOSSUM
DOSALL	SAVINC	DOSE		REAL	CALC	3 3	DOSCAL	DOSSUM DOSCAL
DDSALL	SAVDRG	DOSE		REAL	CALC	MORG 3 3	DOSCAL	TOTCAL
DOSALL	WDE	DOSE		REAL	CALC	11	WBEDE	DOSSUM
DOSES	CDEING	INTDF		REAL	CALC	NORGL NTIME	CDECAL	RITINC RITEND
DOSES	CDEINH	INTDF		REAL	CALC	NORGL NTIME	CDECAL	RITINC RITEND
ENVPAR	BIOACT	ENVIN	AQFOOD	REAL	LIB	NAQ NUCTOT	ENVLIB	RITENV
ENVPAR	BVIT	ENVIN	TFOOD ANFOOD	REAL	LIB	NTF NUCTOT	ENVLIB	RITENV
ENVPAR	DPVLT	ENVIN	TFOOD ANFOOD	REAL	LIB	NTF NUCTOT	ENVLIB	RITENV
ENVPAR	DWCLET	ENVIN	DRINK	REAL	LIB	NUCTOT	ENVLIB	RITENV
ENVPAR	FMIT	ENVIN	ANFOOD	REAL	LIB	NAN+2 NUCTOT	ENVLIB	RITENV

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>
ENVPAR	GAMMAT	ENVIN ENV	FINITE	REAL	LIB	6 NUCTOT	ENVLIB	RITENV
ENVPAR	LEACHT	ENVIN		REAL	LIB	NIN	ENVLIB	RITENV
EXPALL	EXPOST	ENV		REAL	CALC	NTKEND NONUC NPATN	EXPOS INITNV	RITEXP
EXTPAR	AVALSL	ENV	IRES	REAL	USER	1	READIN REDCAS	RITQA RITENV INHCAI
EXTPAR	FRCLOD	ENV	ACUTE	REAL	USER	1	READIN REDCAS	ACUTE1
EXTPAR	FRSIZ	ENVIN ENV	NEAR	LOGICAL	USER	1	READIN REDCAS	EXTCAL
EXTPAR	HRBOAT	ENVIN ENV	RECRE	REAL	USER	1	READIN REDCAS	RITQA RITENV EXTCAL
EXTPAR	HRGRD	ENVIN ENV	GROUND	REAL	USER	1	READIN REDCAS	RITQA RITENV EXTCAL
EXTPAR	HRINH	ENVIN ENV	INHAL	REAL	USER	1	READIN REDCAS	INHCAI RITQA RITENV CHECK
EXTPAR	HRPLUM	ENVIN ENV	AIREXT	REAL	USER	1	READIN REDCAS	RITQA RITENV EXTCAL
EXTPAR	HRSHDR	ENVIN ENV	RECRE	REAL	USER	1	READIN REDCAS	RITQA RITENV EXTCAL
EXTPAR	HRSWIM	ENVIN ENV	RECRE	REAL	USER	1	READIN REDCAS	RITQA RITENV EXTCAL
EXTPAR	INGWAT	ENVIN ENV	SWING	REAL	USER PROG	I	REDFLT REDCAS BLOCKD	EXTCAL REDFLT RITENV

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
EXTPAR	RESFAC			REAL		1	INHCAL	INHCAL	
EXTPAR	RINH	ENVIN ENV	INHAL	REAL	USER	1	READIN REDCAS	INHCAL RITQA	RITENV CHECK
EXTAR	RINHA	ENV	ACUTE	REAL	USER PROG		REDFLT	ACUTEI	
EXTPAR	SHORWI	ENV	RECRE	REAL	PROG	4	BLOCKD REDFLT REDCAS	REDFLT RITENV EXTCAL	
EXTPAR	SHRTYP	ENVIN ENV	RECRE	INTEGER	USER	1	READIN REDCAS	RITENV RITQA EXTCAL	
EXTPAR	XMLF	ENV	IRES	REAL	USER	1	READIN REDCAS	RITQA RITENV INHCAL	
FILES	FILN	ENVIN		CHAR*20	LIB	30	BLOCKD	FILERR OPNFIL	REDFLT RITQA
FODPAR	ADJEAT	ENV	TFOOD	REAL	CALC	NTF	XQCAL	CRPCAL XQCAL	
FODPAR	BIOMAS	ENVIN ENV	TFOOD	REAL	USER PROG	NTF	REDFLT	CRPCAL ACUTEC	
FODPAR	BVI	ENV	TFOOD	REAL	LIB	NTF NONUC	REDCHA	CRPCAL ANMCAL EDRANM	EDRNON EDRRES EDRCRP
FODPAR	CONS	ENVIN ENV	TFOOD	REAL	USER	NTF	READIN REDCAS	CRPCAL RITQA	RITENV XQCAL
FODPAR	DPVL	ENV		REAL	LIB	NONUC	REDCHA	CRPCAL ANMCAL EDRANM	EDRRES EDRCRP
FODPAR	DRYFAC	ENV		REAL	USER PROG	NTF	REDFLT	CRPCAL ACUTEC	
FODPAR	FOQ	ENV		REAL	CALC USER	1	READIN REDCAS	RITQA RITENV	
FODPAR	GRWP	ENVIN	TFDOD	REAL	USER	NTF	READIN	CRPCAL	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
		ENV					REDCAS	RITQA	RITENV
FODPAR	HARVT	ENV	TFOOD	REAL	CALC	NTF NONUC 2	CRPCAL	DKHARV	
FODPAR	HLDUP	ENVIN ENV	TFOOD	REAL	USER	NTF	READIN REDCAS	CRPCAL RITQA RITENV	
FODPAR	IRRST	ENVIN ENV	TFOOD	INTEGER	USER	NTF	READIN REDCAS	CRPCAL READIN RITQA	RITENV CHECK EDRCRP
FODPAR	IRTIMT	ENVIN ENV	TFOOD	REAL	USER	NTF	READIN REDCAS	CRPCAL RITQA	RITENV EDRCRP
FODPAR	LEAFRS	ENV		REAL	PROG USER	1	REDFLT BLOCKD REDCAS	CRPCAL ANMCAL REDFLT RITENV	
FODPAR	RIRR	ENV	IRR	REAL	USER	NTF	READIN REDCAS	CRPCAL RITQA	RITENV EDRCRP
FODPAR	TPROD	ENVIN ENV	TFOOD	REAL	USER CALC	NTF	READIN CHECK XQCAL REDCAS	RITQA RITENV XQCAL AIRCAL	
FODPAR	TRANS	ENV	TFOOD	REAL	USER	NTF	BLOCKD REDFLT REDCAS	CRPCAL REDFLT RITENV	
FODPAR	YELD	ENV	TFOOD	REAL	USER	NTF	READIN REDCAS	CRPCAL RITQA RITENV	EDRANM EDRCRP
INTDFS	ASSA	INTDF		REAL*8	USER	1	INTDF	LS2 RITINT	
INTDFS	ATOL	INTDF		REAL*8	USER	1	INTDF	LS2 RITINT	
INTDFS	ISTAT	INTDF		INTEGER	PROG	6 2	LS2	RITEND	

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Expo- sure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimen- sions</u>	<u>Set In</u>	<u>Used In</u>
INTDFS	NEQ	INTDF		INTEGER	CALC	1	METLIB	LS2
INTDFS	NSC	INTDF		INTEGER	USER	1	INTDF	LS2 RITINT
INTDFS	RTOL	INTDF		REAL*8	USER	1	INTDF	LS2 RITINT
INTDFS	YBLOOD	INTDF		REAL*8	CALC	NONUC	METLIB	GEN ALK IOD
INTDFS	YGUT	INTDF		REAL*8	CALC	NONUC 4	SETPAR	DIFEQ2
INTDFS	YLUNG	INTDF		REAL*8	CALC	NONUC 12	SETPAR	DIFEQ2
INTDFS	YORG	INTDF		REAL*8	CALC	NONUC NOCOMP	METLIB	GEN ALK IOD
INTDFS	YOTHR	INTDF		REAL*8	CALC	NONUC NOTHER	METLIB	GEN ALK IOD
INTDFS	YWORK	INTDF		REAL*8	CALC		CDECAL LS2 SETPAR	CDECAL LS2 RITEND
INVIN	AWI	ENVIN		CHAR*6	USER	NIN	READIN INTDF	INTDF IDNUC READIN RITQA
INVIN	CONCIN	ENVIN		REAL	USER	9 NIN	READIN	ORDER RITQA
INVIN	ELTI	ENVIN		CHAR*2	USER	NIN	READIN INTDF	INTDF IDNUC READIN RITQA
INVIN	NFLAG2	INTDF		INTEGER	CALC	NIN	IDNUC	ORDIN
INVIN	NIN	ENVIN		INTEGER	USER	1	READIN INTDF	INTDF IDNUC READIN RITQA
INVIN	QIN	ENVIN		REAL	USER	3 NIN	READIN	RITENV ORDER RITQA

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>
LABELS	ANMLAB	ENVIN ENV	ANFOOD	CHAR	USER	NAN	BLOCKD	RITQA RITENV
LABELS	AQFLAB	ENVIN ENV	AQFOOD	CHAR	USER	NAQ	BLOCKD	RITQA RITEXP
LABELS	AQRLAB	ENVIN ENV	RECRE	CHAR	USER	NAQRC	BLOCKD	RITQA RITEXP
LABELS	EXPLAB	ENV DOSE		CHAR*B0	PROG	22	BLOCKD	RITBYP CHECK RITEXP
LABELS	PLTLAB	ENVIN ENV	TFOOD	CHAR	USER	4	BLOCKD	RITQA RITENV
LABELS	SEALAB	ENVIN ENV DOSE		CHAR*6	PROG	4	BLOCKD	DOSSUM SUBHED
MTBPAR	ADJ	INTDF		REAL	PROG	9 3	BLOCKD	SETPAR
MTBPAR	CARBON	INTDF		LOGICAL	PROGR AM	1	ORDIN	DIFEQ2 SETPAR
MTBPAR	DEPOSIT	INTDF		REAL	CALC	9	SETPAR	DIFEQ2 SETPAR
MTBPAR	DIAM	INTDF		REAL	USER	1	INTDF	
MTBPAR	ELNAME	INTDF		CHAR*14	LIB	NONUC	ORDIN	METLIB RITINT
MTBPAR	F1	ENVIN DOSE		REAL	LIB	NONUC	METLIB	RITEND RITINT SETPAR
MTBPAR	FETAGE	INTDF		REAL	USER	1	INTDF	IOD
MTBPAR	FETDOS	INTDF		LOGICAL	USER	1	INTDF	IOD INTDF
MTBPAR	FEXTC	ENVIN DOSE		REAL	LIB	NONUC	METLIB	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
MTBPAR	FG2SI	INTDF		REAL	CALC	1	SETPAR	DIFEQ2	
MTBPAR	FG2TC	INTDF		REAL	CALC	1	SETPAR	DIFEQ2	
MTBPAR	H2	INTDF		REAL*8	CALC PROG	1	ORDIN	ORDIN	
MT8PAR	IODI	INTDF		REAL	PROG	1	ORDIN	IOD ORDIN	
MTBPAR	ORGFEX	INTDF		REAL	LIB	NORGCM NONUC			
MTBPAR	ORGUEX	INTDF		REAL	LIB	NORGCM NONUC			
MTBPAR	RA226	INTDF		LOGICAL	CALC	1	ORDIN	DIFEQ2	
MTBPAR	RTBLOOD	INTDF		REAL	LIB	NONUC	METLIB	ALK GEN	IOD RITINT
MTBPAR	RTBONE	INTDF		REAL	LIB	NBONE	METLIB	ALK GEN RITINT	
MTBPAR	RTGUT	INTDF		REAL	CALC	4	SETPAR	DIFEQ2 SETPAR	
MTBPAR	RTLUNG	INTDF		REAL	PROG	12	SETPAR	DIFEQ2 SETPAR	
MTBPAR	RTORG	INTDF		REAL	LIB	NOCOMP	METLIB	METLIB ALK GEN	IOD RITINT
MTBPAR	RTOTHR	INTDF		REAL	LIB	NOTHER	METLIB	ALK GEN	IOD RITINT
MTBPAR	RTSIBL	INTDF		REAL	CALC	1	SETPAR	DIFEQ2 SETPAR	
MTBPAR	TCBONE	INTDF		REAL	LIB	NBONE	METLIB	ALK GEN RITINT	
MTBPAR	TCORG	INTDF		REAL	LIB	NORGCM	METLIB	METLIB	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
						NONUC		ALK GEN RITINT	
MTBPAR	TCOTHR	INTDF		REAL	LIB	NOTHER	METLIB BLOCKD	ALK GEN RITINT	
MTBPAR	TEI	INTDF		LOGICAL	PROG	1	ORDIN	DIFEQ2 IOD ORDIN	RITEND RITINT SETORG
MTBPAR	TRITUM	INTDF		LOGICAL	PROG	1	ORDIN	DIFEQ2 SETPAR	
MTBPAR	UEXTC	INTDF		REAL	LIB	NONUC			
MTBPAR	UPTGUT	INTDF		REAL	CALC	1	SETPAR	DIFEQ2	SETPAR
MTBPAR	XDIV	INTDF		REAL	PROG	3	BLOCKD	SETPAR	
MTBPAR	ZNP	INTDF		REAL	PROG	1	DEP	SETPAR	
MTBPAR	ZP	INTDF		REAL	PROG	1	DEP	SETPAR	
MTBPAR	ZTB	INTDF		REAL	PROG	1	DEP	SETPAR	
OPT	ACUTE	ENVIN ENV		LOGICAL	USER	1	READIN INTDF REDFIL REDCAS	INTDF RITINT SETPAR	ENVIN RITQA RITENV
OPT	AEDE	ENVIN DOSE		LOGICAL	USER	1	REDFIL CHECK REDCAS	RITENV	
OPT	AIR	ENVIN ENV		LOGICAL	USER		READIN REDFIL REDCAS	ENVIN RITQA RITENV CHECK EDRANM TRANSPT	XQCAL AIRCAL REDCAS EDRRES EDRCRP
OPT	AIRCN	ENVIN ENV		LOGICAL	CALC	1	CHECK REDCAS	RITENV EDRANM ANMCAL INHCAL	EXTCAL TRANSPT EDRRES EDRCRP

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
OPT	ALOG2	ENV INTDF		REAL	PROG	1	BLOCKD	SOLCAL SETPAR METLIB	ANMCAL CRPCAL PACKAG
OPT	ANF	ENVIN ENV	ANFOOD	LOGICAL	USER	NAN	READIN REDCAS CHECK	ANMCAL RITQA RITENV CHECK EDRANM	XQCAL REDCAS REDCHA PRIOR DKHARV
OPT	ANFOOD	ENVIN ENV		LOGICAL	USER	1	READIN REDCAS REDFIL	EXPOS READIN RITQA RITENV CHECK	TRNSPT XQCAL REDCAS REDCHA
OPT	AQF	ENVIN ENV	AQFDOD	LOGICAL	USER	NAN	READIN REDCAS CHECK	AQUCAL RITQA RITENV CHECK	XQCAL REDCAS REDCHA
OPT	AQFOOD	ENVIN ENV		LOGICAL	USER	1	READIN REDCAS REDFIL	EXPOS READIN RITQA RITENV	CHECK XQCAL REDCAS
OPT	AYEAR	ENV INTDF		REAL	PROG	1	BLOCKD	INTDF	
OPT	BASIC	ENV ENVIN		LOGICAL	CALC	1	CHECK BLOCKD REDCAS	RITQA RITENV REDCHA CHECK	
OPT	BIOT	ENVIN ENV		LOGICAL	USER	1	READIN REDCAS REDFIL	READIN RITQA RITENV CHECK EDRANM EDRNON	ENV REDCAS PRIOR EDRRES EDRCRP
OPT	BURWAS	ENV		LOGICAL	USER	1	READIN REDCAS REDFIL	TRNSPT READIN RITQA RITENV	CHECK REDCAS DKSOIL

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
OPT	CUMDOS	ENVIN DOSE		LOGICAL	USER		REDFIL CHECK REDCAS	RITENV	
OPT	DAYYR	ENV		REAL	PROG	1	BLOCKD	CRPCAL INHCAL	
OPT	DEBUG	ENVIN ENV DOSE OUT		LOGICAL	USER	1	READIN INTDF REDFIL ENV REDCAS	INTDF METLIB LS2 ANMCAL RITINT SETPAR SIJLIB WBEDE READIN RITENV EDRANM CRPCAL AQUCAL	INHCAL EXTCAL EDRNON INTPOL XQCAL AIRCAL ENV PRIOR DKSOIL PACKAG EDRRES EDRCRP
OPT	DEEP	ENVIN ENV		LOGICAL	PROG	1	CHECK REDCAS	EDRNON EDRRES EDRCRP EDRANM	CRPCAL ANMCAL DKSOIL
OPT	DEPFR1	ENV		REAL	PROG	1	REDFLT BLOCKD REDCAS	CRPCAL ANMCAL REDFLT RITENV	
OPT	DEPFR2	ENV		REAL	PROG USER	1	BLOCKD REDFLT REDCAS	CRPCAL ANMCAL REDFLT RITENV	
OPT	DERANM	ENV		LOGICAL	PROG	1	REDCHA	ANMCAL	
OPT	DERAQU	ENV		LOGICAL	PROG	1	REDCHA	AQUCAL	
OPT	DERCRP	ENV		LOGICAL	PROG	1	REDCHA	CRPCAL	
OPT	DERDRK	ENV		LOGICAL	PROG	1	REDCHA	DRKCAL	
OPT	DERIVE	ENV ENVIN		LOGICAL	CALC	1	CHECK BLOCKD REDCAS	RITQA RITENV REDCHA	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
OPT	DOAIR	ENV		LOGICAL	CALC	1	PRIOR TRNSPT	SOLCAL EDRANM	EDRRES EDRCRP
OPT	DOBIOT	ENV		LOGICAL	CALC	1	PRIOR TRNSPT	SOLCAL EDRANM EDRNON	EDRRES EDRCRP
OPT	DOIRR	ENV		LOGICAL	CALC	1	PRIOR TRNSPT	SOLCAL EDRRES EDRCRP	
OPT	DOSTYP	ENVIN DOSE		INTEGER	USER	1	REDFIL CHECK REDCAS	ANMCAL RITQA RITENV	CHECK CRPCAL XQCAL
OPT	DOWAST	ENV		LOGICAL	CALC	1	PRIOR TRNSPT	SOLCAL TRNSPT	PRIOR DKSOIL
OPT	DPVRES	ENV		REAL	PROG	1	REDFLT BLOCKD REDCAS	CRPCAL ANMCAL REDFLT RITENV	
OPT	DRINK	ENVIN ENV		LOGICAL	USER	1	READIN	EXPOS READIN RITQA	CHECK REDCAS
OPT	DUMMY	ENV		REAL	PROG	NONUC	BLOCKD		
OPT	EXPORT	ENVIN ENV		LOGICAL	USER		READIN REDCAS	RITENV XQCAL	
OPT	FINITE	ENVIN ENV		LOGICAL	USER	1	READIN	DOSCAL RITQA EXTCAL	
OPT	FOQOPT	ENV		INTEGER	USER	1	READIN REDCAS	READIN RITQA RITENV	CHECL XQCAL AIRCAL
OPT	GROUND	ENVIN ENV		LOGICAL	USER	1	READIN	EXPOS RITQA RITENV	CHECK EXTCAL REDCAS
OPT	HARVST	ENVIN ENV		LOGICAL	USER PROG	1	REDFLT	DKHARV CRPCAL	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
								ANMCAL	
OPT	HRYR	ENV		REAL	PROG	1	BLOCKD		
OPT	IDF	DOSE		INTEGER	CALC	NPATH	BLOCKD	DOSCAL RITBYP	
OPT	IMPORT	ENVIN ENV		LOGICAL	PROG	1	READIN	XQCAL	
OPT	INHAL	ENVIN ENV		LOGICAL	USER	1	READIN	EXPOS READIN RITQA RITENV	CHECK TRNSPT REDCAS
OPT	INHDF	INTDF		LOGICAL	PROG	1	INTDF	CDECAL DIFEQ2 LS2	RITEND SETPAT
OPT	IRES	ENVIN ENV		INTEGER	USER	1	READIN REDCAS	READIN RITQA	RITENV OMHCAL
OPT	ISALT	ENVIN		INTEGER		1	READIN REDCAS	ENVLIB RITENV CHECK	
OPT	IUNIT	ENVIN		INTEGER	USER	1	READIN REDFIL REDCAS	DOSCAL RITQA RITENV	RITEXP TRNSPT
OPT	KGG	ENV		REAL	PROG	1	BLOCKD	INHCAL	
OPT	KGMG	ENV		REAL	PROG	1	BLOCKD	CRPCAL	
OPT	LM2IN	ENV		REAL	PROG	1	BLOCKD	CRPCAL ANMCAL EDRCRP	EDRANM EDRRES
OPT	LUN	ENVIN ENV DOSE OUT			PROG	1	ENV INTDF CDECAL METLIB METLIB RITEND REDFLT XQIN RITINC RITINT SIJLIB	INTDF CDECAL METLIB RITEND REDFLT XQIN RITINC RITINT SIJLIB	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In
							DOSE REDFIL REDSET DOSSUM READIN RITQA ENVLIB RITENV CHECK CRONMO RITEXP TRNSPT XQCAL REDCAS REDCHA	DOSE REDFIL REDSET DOSSUM RITBYP RITBYR READIN RITQA ENVLIB RITENV CHECK CRONMO RITEXP TRNSPT XQCAL REDCAS REDCHA
OPT	M3CM3	ENV		REAL	PROG	1	BLOCKD	INHCAL
OPT	M3L	ENV		OPT	PROG	1	BLOCKD	TRNSPT
OPT	METHOD	INTDF		INTEGER	USER	1	INTDF	INTDF RITEND RITINT
OPT	MEVSV			REAL	PROG		BLOCKD	SIJLIB
OPT	MOYR	ENV		REAL	PROG	1	BLOCKD	CRPCAL ANMCAL EDRANM EDRRES EDRCRP
OPT	NAN	ENV	ANFOOD	REAL	PROG	1	BLOCKD	ANMCAL READIN RITQA RITENV CHECK EDRANM TRNSPT XQCAL AIRCAL REDCAS REDCHA PRIOR DKHARV
OPT	NAQ	ENV	AQFOOD	INTEGER	PROG	1	BLOCKD	AQUCAL READIN RITQA ENVLIB RITENV CHECK XQCAL REDCAS
OPT	NCHAIN	ENV		INTEGER	CALC	1	REDCAS REDFIL	ENV REDFIL

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Expo- sure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimen- sions</u>	<u>Set In</u>	<u>Used In</u>	
								REDCAS	
OPT	NEAR	ENVIN ENV		LOGICAL	USER	1	READIN REDCAS REDFIL	RITQA RITENV CHECK REDCAS PRIOR	
OPT	NMAX	ENVIN		INTEGER	PROG	1	BLOCKD	ORDER	
OPT	NONAG	ENV ENVIN	NEAR	LOGICAL	CALC	1	CHECK REDCAS PRIOR	PRIOR RITENV CHECK REDCHA DKHARV	
OPT	NPATH	DOSE ENV		REAL	PROG	1	BLOCKD	RITEXP REDFIL DOSCAL	RITBYP EXPOSR INITNV
OPT	NRE	ENVIN		INTEGER	PROG	1	BLOCKD	CHECK	
OPT	NTF	ENV	TFOOD	INTEGER	PROG	1	BLOCKD	CRPCAL READIN RITQA ENVLIB RITENV CHECK TRANSPT	XQCAL AIRCAL REDCAS REDCHA PRIOR DKHARV EDRCRP
OPT	NVU	DOSE		REAL	PROG	5	REDFLT BLOCKD REOCAS	REDFLT DOSCAL RITENV	
OPT	ONEDOS	ENVIN DOSE		LOGICAL	USER	1	REDFIL CHECK REDCAS	RITENV	
OPT	ONEYR	ENV		REAL	PROG	1	BLOCKD	SOLCAL	
OPT	OUTEDE	DOSE		LOGICAL	USER	1	REDFIL REDCAS	DOSCAL DOSSUM	RITBYP RITBYR
OPT	OUTPTH	ENVIN OUT		LOGICAL	USER	1	READIN REDFIL REDCAS	DOSE RITENV	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
OPT	OUTRAD	ENVIN OUT		LOGICAL	USER	1	READIN REDFIL REDCAS	DOSE RITENV	
OPT	P	ENV		REAL	PROG	1	BLOCKD	MIXRTO XQCAL	
OPT	PATH	ENV DOSE		LOGICAL	USER	NPATH	REDCAS REDFIL	REDFIL DOSCAL RITBYP	RITENV RITEXP
OPT	POPDOS	ENVIN ENV		LOGICAL	USER		READIN REDCAS REDFIL	TOTCAL RITQA RITENV CHECK	XQCAL AIRCAL ENV
OPT	POPIN	ENVIN ENV		INTEGER	USER	1	READIN REDCAS	XQPOP	
OPT	POPOPT	ENVIN ENV		INTEGER	USER	1	READIN REDCAS	XQPOP XQCAL	
OPT	POPT	ENV		REAL	USER CALC	1	XQIN XQCAL REDCAS	EXTCAL INHCAL XQIN	CRPCAL XQCAL AIRCAL
OPT	PRCNTI	ENVIN		INTEGER	USER PROG	1	REDFLT	ACCMOD	
OPT	REC	ENVIN ENV	RECRE	LOGICAL	USER	5	CHECK	EXTCAL	
OPT	RECRE	ENVIN ENV		LOGICAL	USER	1	READIN REDCAS REDFIL	EXPOS RITQA RITENV	CHECK EXTCAL REDCAS
OPT	RELTRM	ENV ENVIN		LOGICAL	CALC	1	CHECK BLOCKD REDCAS	RITQA RITENV REDCHA CHECK	
OPT	RF1	ENV		REAL	USER		READIN REDCAS CHECK	CRPCAL ANMCAL RITQA RITENV CHECK	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
OPT	RF2	ENV		REAL	USER		READIN CHECK REDCAS	CRPCAL ANMCAL RITQA RITENV CHECK	EDRANM EDRNON EDRRRES EDRCRP
OPT	SECDA	INTDF		REAL	PROG	1	BLOCKD	ORDIN CDECAL RITEND	
OPT	SECYR	ENV		REAL	PROG	1	BLOCKD	SOLCAL INHCAL ANMCAL EDRANM	CRPCAL EDRRRES EDRCRP
OPT	SLDN	ENV		REAL	PROG	1	REDFLT BLOCKD REDCAS	SOLCAL CRPCAL ANMCAL REDFLT RITENV INHCAL	
OPT	SLING	ENVIN ENV		LOGICAL	USER	1		RITQA CRPCAL EXPOS	
OPT	SOLUNT	ENVIN		INTEGER	USER	1	READIN REDFIL REDCAS	ORDER RITQA	
OPT	SSLDN	ENV		REAL	BLOCK D	1	REDFLT BLOCKD REDCAS	SLNCAL ANMCAL REDFLT RITENV EDRANM EDRRRES EDRCRP	CRPCAL EDRNON EDRRRES EDRCRP
OPT	SVU	ENVIN		REAL	PROG	3	REDFLT BLOCKD REDCAS	ORDER REDFLT RITENV	
OPT	SWAT	ENVIN ENV		LOGICAL	USER	1	READIN REDCAS REDFIL	TRNSPT READIN RITQA RITENV	CHECK ENV REDCAS

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>	
OPT	SWING	ENVIN ENV		LOGICAL	USER	1		CHECK	
OPT	TFD	ENVIN ENV	TFOOD	LOGICAL	USER	4	READIN REDCAS CHECK	CRPCAL RITQA RITENV CHECK XQCAL AIRCAL	REDCAS REDCHA PRIOR DKHARV EDRCRP
OPT	TFOOD	ENVIN ENV		LOGICAL	USER	1	READIN REDCAS REDFIL	EXPOS RITQA RITENV CHECK	TRNSPT XQCAL AIRCAL REDCAS
OPT	UNIT1	ENV		CHAR*3	PROG	5	BLOCKD	RITQA RITEXP TRNSPT	
OPT	UNIT2	ENV		CHAR*2	PROG	6	BLOCKD	RITEXP	
OPT	UNIT3	ENV		CHAR*2	PROG	3	BLOCKD	RITQA	
OPT	UNITCF	ENV		REAL	PROG	1	BLOCKD		
OPT	WT	DOSE		REAL	PROG	11	BLOCKD REDCAS	DOSSUM RITENV	
OPT	WTIM	ENV		REAL	PROG	1	REDFLT BLOCKD REDCAS	CRPCAL ANMCAL REDFLT	WBEDE RITENV
OPT	XOQOPT	ENV	AIR	INTEGER	USER	1	READIN REDCAS	ENVIN RITQA RITENV	CHECK XQCAL
OPT	YRDA	ENVIN ENV		REAL	PROG	1	BLOCKD	ORDER AQUCAL ANMCAL	CRPCAL DRKCAL
DPT	YRHR	ENV		REAL	PROG	1	BLOCKD	AQUCAL INHCAL	EXTCAL TRNSPT
OPT	YRSEC	ENV		REAL	PROG	1	BLOCKD	INHCAL TRNSPT AIRCAL	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
OPT	ZERO	INTDF		REAL	PROG	1	BLOCKD	EULER DIFEQ2 LS2	
ORGMAS	MASMAS	INTDF		REAL	PROG	MORG	BLOCKD	SETORG	
ORGMAS	MASORG	ENVIN		CHAR*8	PROG	MORG	BLOCKD	METLIB RITEND SETORG DOSSUM	RITBYP RITBYR WBEDE
ORGMAS	MORG	SIJMAK		INTEGER	PROG	1	BLOCKD	SIJLIB REOSCT DOSCAL	TOTCAL WBEDE
ORGMAS	SI2I	DOSE		REAL	PROG	1	BLKORG REDFIL	DOSCAL	
ORGMAS	SINDX	SIJMAK		INTEGER	PROG	MORG	BLOCKD		
ORGMAS	TINDX	SIJMAK		INTEGER	PROG	MORG	BLOCKD		
ORGPARG	IORG	INTDF SIJMAK		INTEGER	CALC	NORG	BLOCKD SIJLIB SETORG REDSET	METLIB RITEND RITINT SETORG SIJLIB	
ORGPARG	IYX	INTDF		INTEGER	CALC	NORGL	SETORG	CDECAL	
ORGPARG	NBONE	INTDF		INTEGER	CALC	1	METLIB	METLIB GEN RITINT	
ORGPARG	NOCOMP	INTDF		INTEGER	CALC	1	METLIB	METLIB GEN RITINT	
ORGPARG	NORG	ENVIN DOSE		INTEGER	CALC	1	METLIB	METLIB CDECAL GEN	RITEND RITINT SETORG
ORGPARG	NORGCM	INTDF		INTEGER	CALC	NORG	METLIB SETORG	METLIB GEN RITINT	
ORGPARG	NORGCR	ENVIN		INTEGER	CALC	1	METLIB	SETORG	

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>
		DOSE						RITEND RITINT
ORGP	NORGL	INTDF		INTEGER	CALC	1	SETORG	CDECAL METLIB RITEND RITINC RITINT SETORG SIJLIB
ORGP	NOTHER	INTDF		INTEGER	CALC	1	METLIB	METLIB GEN RITINT
ORGP	ORGANS	ENVIN		CHAR*8	CALC	NORG	SETORG	RITEND RITINT
ORGP	ORGING	INTDF		REAL	CALC	MORG	SETORG	CDECAL
ORGP	ORGINH	INTDF		REAL	CALC	MORG	SETORG	CDECAL
ORGP	ORGMLT	INTDF		REAL	CALC	NORGL	SETORG	CDECAL RITINT
ORGP	SPECOR	INTDF		LOGICAL	CALC	NDRGL	SETORG	CDECAL RITINT SETORG
ORGP	TARGET	INTDF		LOGICAL	CALC	NORGL	SETORG	CDECAL RITINT
ORGP	TCMULT			REAL	CALC	MORG	SETORG	GEN DIFEQ2 IOD ALK
ORGP	TOTMAS	INTDF		REAL	PROG	1	BLOCKD	SETORG
RAD	ATNUM	INTDF		INTEGER	PROG	NONVC	IDNUC	METLIB
RAD	AW	ENV		CHAR*6	CALC	NONUC	REDCHA ORDIN	ORDIN RITEND RITINT SIJLIB RITEXP
RAD	BONE	ENV		CHAR*1	LIB	NONUC	REDCHA ORDIN	RITINT SETORG
RAD	C14	ENV		LOGICAL	PROGR AM	1	REDCHA	EXPOS

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Exposure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimensions</u>	<u>Set In</u>	<u>Used In</u>	
RAD	CLASS	ENVIN		CHAR*1	LIB	NONUC	REDCHA ORDIN	METLIB ORDIN RITEND	RITINT SETPAR
RAD	ELT	ENV		CHAR*2	CALC	NONUC	REDCHA ORDIN	ORDIN RITEND SIJLIB	
RAD	H3	ENV		LOGICAL	PROGR 1 AM		REDCHA	EXPOSR	
RAD	HL	ENV		REAL	LIB	NONUC	REDCHA		
RAD	ICL	INTDF		INTEGER	PROG	NONUC	ORDIN		
RAD	IMOD	INTDF		INTEGER	LIB	NONUC	ORDIN	METLIB DIFEQ2 RITEND	RITINT SETORG
RAD	IRMD			INTEGER	PROG	NONVC	ORDIN	SIJLIB	
RAD	NONUC	ENVIN ENV		INTEGER	CALC	NONUC	ORDIN ENV	CDECAL ALK DIFEQ2 PRIOR IOD LS2 ORDIN RITEND ANMCAL XQIN RITINT SIJLIB CHECK EDRANM CRPCAL	AQUICAL RITEXP INHCAL DRKCAL EXTCAL TRNSPT EXPOSR EDRNON AIRCAL ENV REDCHA DKHARV PACKAG EDRRES EDRCRP
RADIN	ALT	ENVIN		REAL	CALC	NUCTOT	ORDER ORDIN	ORDIN RITENV	
RADIN	AWT	ENVIN		CHAR*6	PROG	NUCTOT	ORDER REDFIL	REDFIL REDSET	RITBYR RITENV
RADIN	BAS	ENVIN		LAGICAL	PROGR 5 AM		CHECK	RITQA	

TABLE 3.2. (contd)

<u>Common Block</u>	<u>Parameter Name</u>	<u>Used By</u>	<u>Expo- sure</u>	<u>Fortran Type</u>	<u>Set By</u>	<u>Dimen- sions</u>	<u>Set In</u>	<u>Used In</u>	
RADIN	BONET	ENVIN		CHAR*1	PROG	NUCTOT	ORDER	RITENV	
RADIN	CASCON	ENVIN		REAL	CALC	5+4 NUCTOT	ORDER	ORDER RITENV CHECK	
RADIN	CASQ	ENVIN		REAL	CALC	3 NUCTOT	ORDER	RITENV CHECK	
RADIN	CLASST	ENVIN		CHAR*1	PROG	NUCTOT	ORDER	ORDER RITENV	
RADIN	DKT	ENVIN		REAL	PROG	2 NUCTOT	ORDER	RITENV	
RADIN	ELTT	ENVIN		CHAR*2	PROG	NUCTOT	ORDER REDFIL	REDSET RITBYR	ENVLIB RITENV
RADIN	HLT	ENVIN		REAL	CALC	NUCTOT	ORDER	ORDER RITENV	
RADIN	ICH	ENVIN		INTEGER	CALC	1	ORDER	RITENV	
RADIN	ICLASS	ENVIN		INTEGER	CALC	NUCTOT	ORDER REDCHA	SETPAR RITENV	
RADIN	IFRT	ENVIN		INTEGER	PROG	2 NUCTOT	ORDER	ORDER RITENV	
RADIN	IOFNUC	ENVIN		INTEGER	CALC	NUCTOT	ORDER REDFIL	RITENV	
RADIN	NUCTOT	ENVIN		INTEGER	CALC	1	ORDER REDFIL	DOSE REDFIL DOSCAL RITBYR	ORDER ENVLIB RITENV CHECK
RMD	AWM	ENVIN		CHAR*6	LIB	250	RLIBIN	IDNUC ORDER	ORDIN RLIBIN
RMD	BONED	ENVIN		CHAR*1	LIB	250	RLIBIN	ORDER ORDIN	
RMD	DKF	ENVIN		REAL	CALC	2 250	RLIBIN	ORDER ORDIN	
RMD	ELTM	ENVIN		CHAR*2	LIB	250	RLIBIN	IDNUC	RLIBIN

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Expo- sure	Fortran Type	Set By	Dimen- sions	Set In	Used In	
								ORDER ORDIN	RITINT RITEXP
RMD	IFR	ENVIN		INTEGER	LIB	2 250	RLIBIN	ORDER ORDIN	
RMD	IMODM	INTDF		INTEGER	LIB CALC	NUCS	RLIBIN	ORDIN	
RMD	NCH	ENVIN		INTEGER	CALC	1	RLIBIN	ORDER RLIBIN	
RMD	NCHN	ENVIN		INTEGER	CALC	250	RLIBIN	IDNUC ORDIN	
RMD	NCHST	ENVIN		INTEGER	CALC	200	RLIBIN	ORDER ORDIN	
RMD	NFLAG	ENVIN		INTEGER	CALC	250	IDNUC	ORDER	
RMD	NFLAGC	ENVIN		INTEGER	CALC	200	IDNUC	ORDER	
RMD	NOFNUC	ENVIN		INTEGER	CALC	200	RLIBIN	ORDER ORDIN RLIBIN	
RMD	NUCS	ENVIN		INTEGER	CALC	1	RLIBIN	RLIBIN IDNUC	
RMD	TCLASS	ENVIN		CHAR*1	LIB	250	RLIBIN	ORDER ORDIN	
RMD	TR	ENVIN		REAL	LIB	250	RLIBIN	ORDER ORDIN	
RMD2	ATNO			INTEGER	LIB	NUCS	RLIBIN	METLIB	
RMD2	BRANCH			REAL	LIB	30	RLIBIN		
RMD2	ELT2M			CHAR*2	LIB	30	RLIBIN		
RMD2	IPNDX			INTIGER	LIB	30	RLIBIN		
RMD2	NDAU			INTEGER	LIB	NUCS	RLIBIN		
RMD2	NIDRMD			INTEGER	LIB	30	RLIBIN		

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
RMD2	AW2M			CHAR*6	LIB	30	RLIBIN		
SIJS	SIJ	ENVIN DOSE		REAL	LIB	NORG NORG NONUC	SIJLIB	CDECAL RITINT SIJLIB	
SOLPAR	BTDSET	ENVIN ENV	BIOT	INTEGER	USER	1	READIN REDCAS	RITQA RITENV CHECK	BIOCAL EDRNON
SOLPAR	BTNTK	ENVIN ENV	BIOT	LOGICAL	USER	1	READIN REDCAS	SOLCAL RITQA RITENV	
SOLPAR	BTPRE	ENVIN ENV	BIOT	LOGICAL	USER	1	READIN REDCAS	RITQA RITENV PRIOR	
SOLPAR	EXCAMT	ENV	BIOT	REAL	CALC	1	BIOCAL	EDRANM EDRNON	EDRRES EDRCRP
SOLPAR	EXCAV	ENV	BIOT	REAL	PROG	6 3	BLOCKD REDFLT REDCAS	REDFLT RITENV BIOCAL	
SOLPAR	INDW	ENV	BIOT	INTEGER	CALC	1	BIOCAL	SOLCAL BIOCAL	
SOLPAR	IRRSR	ENV	GROUND	INTEGER	USER	1	READIN REDCAS	SOLCAL RITQA RITENV	CHECK EDRRES
SOLPAR	IRTIMR	ENV	GROUND	REAL	USER	1	READIN REDCAS	SOLCAL RITQA	RITENV EDRRES
SOLPAR	LEACHR	ENV		REAL	LIB	NONUC	REDCHA	SOLCAL	
SOLPAR	MANULR	ENVIN ENV	BURWAS	REAL	USER	1	READIN REDCAS	RITQA RITENV PRIOR	
SOLPAR	OVRBRD	ENVIN ENV		REAL	USER	1	READIN REDCAS	BIOCAL RITQA RITENV	
SOLPAR	PACKHL	ENVIN ENV		REAL	USER	1	READIN REDCAS	SOLCAL RITQA	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
								RITENV	
SOLPAR	RESIRR	ENVIN ENV		LOGICAL	USER	1	READIN REDCAS	EDRRRES READIN RITENV	CHECK PRIOR
SOLPAR	RIRRR	ENV	GROUND	REAL	USER	1	READIN REDCAS	SOLCAL RITQA	RITENV EDRRRES
SOLPAR	RTPACK	ENV	BURWAS	REAL	CALC	NONUC	PACKAG TRNSPT	PACKAG	
SOLPAR	SOLING	ENV		REAL	USER PROG	1	BLOCKD REDFLT REDCAS	REDFLT RITENV CRPCAL	
SOLPAR	SURCM	ENV		REAL	USER PROG	1	BLOCKD REDFLT	INHCAL REDFLT	
SOLPAR	TOTEXC	ENV		REAL	PROG	3	BLOCKD REDFLT REDCAS	SOLCAL REDFLT RITENV BIOCAL	
SOLPAR	WASDEP	ENV	NEAR	REAL	USER	1	READIN REDCAS	RITQA RITENV CHECK EDRANM CRPCAL	ANMCAL EDRNON EDRRRES EDRCRP
SOLPAR	YELDBT	ENV	BIOT	REAL	PROG	3	BLOCKD REDFLT REDCAS	REDFLT RITENV EDRNON EDRRRES	
SWPAR	MIXFLG	ENVIN	SWAT	INTEGER	USER		READIN REDCAS	SWCAL ENV READIN RITQA	RITENV CHECK REDCAS
SWPAR	MIXR	ENVIN	SWAT	REAL	USER	1	SWCAL READIN REDCAS	RITQA RITENV CHECK TRNSPT	
SWPAR	SWDPTH	ENVIN	SWAT	REAL	USER	1	READIN REDCAS	CHECK RITQA	SWCAL RITENV

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
SWPAR	SWDZ	ENVIN	SWAT	REAL	USER	1	READIN REDCAS	RITENV RITQA	SWCAL
SWPAR	SWFLOW	ENVIN	SWAT	REAL	USER	1	READIN REDCAS	SWCAL RITQA RITENV	CHECK TRNSPT
SWPAR	SWIDTH	ENVIN	SWAT	REAL	USER	1	READIN REDCAS	SWCAL RITQA	RITENV CHECK
SWPAR	SWLSX	ENVIN	SWAT	REAL	USER	1	READIN REDCAS	SWCAL RITQA RITENV	
SWPAR	SWOSY	ENVIN	SWAT	REAL	USER	1	READIN REDCAS	SWCAL RITQA RITENV	
SWPAR	SWQB	ENVIN	SWAT	REAL	USER	1	READIN REDCAS	MIXTRO RITQA RITENV	
SWPAR	TCWS	ENV		REAL	PROG	1	REDFLT REDCAS	REDFLT RITENV EXTCAL	
TIMES	AQUTT	ENVIN ENV	AQFDOD	REAL	USER	NAQ	READIN REDCAS CHECK	AQUCAL RITQA RITENV CHECK	
TIMES	BEFAIR	ENV ENVIN		INTEGER	USER	1	READIN REDCAS REDFIL	PRIOR RITQA RITENV CHECK	
TIMES	BEFIRR	ENV ENVIN		INTEGER	USER	1	READIN REDCAS REDFIL	PRIOR RITQA RITENV CHECK	
TIMES	BEFORE	ENVIN ENV		REAL	CALC	1	READIN REDCAS	PRIOR RITQA RITENV CHECK	

TABLE 3.2. (contd)

Common Block	Parameter Name	Used By	Exposure	Fortran Type	Set By	Dimensions	Set In	Used In	
TIMES	DCEND	ENVIN DOSE		REAL	USER	1	READIN INTDF REDFIL REDCAS	INTDF RITEND RITINT REDFIL DOSCAL DOSSUM	TOTCAL RITBYP RITBYR RITQA RITENV
TIMES	HSTART	INTDF		REAL*8	USER	1	INTDF	INTDF	RITINT
TIMES	ITIME	ENV DOSE		INTEGER	CALC	1	ENV	INTDF INHCAL TRNSPT	EXPOS ENV PRIOR
TIMES	ITIMT	ENV		INTEGER	CALC	1	PRIOR ENV	PACKAG INHCAL	ENV PRIDR
TIMES	LOIC	ENV ENVIN	NEAR	INTEGER	USER	1	READIN REDCAS	PRIOR RITQA	RITENV CHECK
TIMES	NBEFORE	ENV		INTEGER	CALC	1	PRIOR	PRIOR	
TIMES	NTIME	DOSE		INTEGER	USER	1	INTDF REDFIL ENV	INTDF RITEND RITEXP	INITNV ENV
TIMES	NTKEND	ENVIN ENV		REAL	USER	1	READIN REDFIL REDCAS	DOSCAL DOSSUM RITBYP RITBYR	RITQA RITENV ENV
TIMES	RECTT	ENVIN ENV	RECRE	REAL	USER	1	READIN REDCAS CHECK	RITENV CHECK EXTCAL	
TIMES	RELEND	ENVIN ENV		REAL	USER	1	READIN REDCAS REDFIL	DOSSUM RITBYP RITBYR RITQA	RITENV EXTCAL TRNSPT
TIMES	SWTT	ENVIN ENV	SWAT	REAL	USER	1	READIN REDCAS	RITENV CHECK TRNSPT	
TITL	TITLS	ENVIN ENV DOSE		CHAR*80	USER PROG	30	OPNFIL REDFLT REDFIL READIN	RITQA HEADNG OPNFIL	

4.0 WORKSHEETS AND HAND CALCULATIONS

A worksheet package is provided to assist the user performing hand calculations for code verification. Table 4.1 is the table of contents for the worksheet package included in Exhibit 4.1.

TABLE 4.1. GENII Environmental Dosimetry Software Package
Hand Calculation Worksheets Table of Contents

Media Concentrations for Chronic Exposure:

Surface water

Decay for transit time to irrigation withdrawal site	4.3
Decay for transit time to aquatic foods collection site	4.26
Decay for transit time to aquatic recreation site	4.3
Decay for transit time to drinking water withdrawal site	4.25
Sediment concentration	4.3

Air

Infinite plume	4.4
Finite plume	4.5
Average food-weighted air concentration	4.7

Soil

Waste package availability	4.8
Deep soil concentration	4.9
Manual redistribution	4.10
Biotic transport	4.10
Surface soil concentration	4.11

Plant and animal product concentrations	4.15
---	------

Chronic Exposures:

Inhalation

Resuspension	4.20
Inhalation air concentration and exposure	4.21

TABLE 4.1. (Contd)

External	
Infinite plume and finite plume	4.22
Surface soil, deep soil and buried waste	4.23
Aquatic recreation	4.24
Ingestion	
Drinking water	4.25
Aquatic foods	4.25
Terrestrial foods and animal products	4.27
Inadvertent ingestion of soil	4.28
Ingestion of swimming water	4.28
Time-Integrated Concentrations for Acute Exposure:	
Surface water	
Decay for transit time to irrigation withdrawal site	4.29
Decay for transit time to aquatic foods collection site	4.29
Decay for transit time to aquatic recreation site	4.29
Air	
Infinite plume	4.30
Finite plume	4.31
Soil	4.32
Plant and animal product concentrations	4.34
Acute Exposures:	
Inhalation	4.41
External	4.39
Ingestion	4.39
Dose:	
Internal dose increments	4.42
External dose increments	4.43
Dose totals	4.44

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

SURFACE WATER CONCENTRATION

Surface Water Release Term • Mixing Ratio • Surface Water / Flow Rate • Unit Conversion • Conversion Factor • Surface Water = Concentration

$$\begin{aligned}
 & \left[\frac{i}{\text{QSW}} \right] \frac{\text{UoA}}{\text{yr}} \cdot \left[\frac{i/c}{\text{MIXR}} \right] / \left[\frac{i}{\text{SWFLOW}} \right] \frac{\text{m}^3}{\text{sec}} \cdot 1.0 \times 10^{-3} \frac{\text{m}^3}{\text{L}} \cdot 3.17 \times 10^{-8} \frac{\text{yr}}{\text{sec}} = \left[\frac{c}{\text{SWCON}} \right] \frac{\text{UoA}}{\text{L}} \\
 & \text{MEDIA.OUT}
 \end{aligned}$$

DECAY SURFACE WATER FOR TRANSIT TIME TO IRRIGATION WITHDRAWAL / RECREATIONAL SITES

Surface Water Concentration • λ decay • Transit Time • Unit Conversion • Decayed Surface Water = Concentration

$$\begin{aligned}
 & \left[\frac{i/c}{\text{SWCON}} \right] \frac{\text{UoA}}{\text{L}} \cdot e^{-\left[\left[\frac{c}{\text{AL}} \right] \text{yr}^{-1} \cdot \left[\frac{i}{\text{SWTT RECTT}} \right] \text{hr} \cdot 1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}} \right]} = \left[\frac{c}{\text{WATCON / SWIRR}} \right] \frac{\text{UoA}}{\text{L}} \\
 & \text{MEDIA.OUT}
 \end{aligned}$$

SEDIMENT CONCENTRATION

Decayed Surface Water Concentration • Water to Sediment Transfer Factor • $\frac{1.0 - e^{-\left(\lambda_{\text{decay}} \cdot 1 \text{ yr} \right)}}{\lambda_{\text{decay}}}$ • Sediment = Concentration

$$\begin{aligned}
 & \left[\frac{c}{\text{WATCON}} \right] \frac{\text{UoA}}{\text{L}} \cdot \left[\frac{d}{25295.0} \right] \frac{\text{L}}{\text{m}^2 \text{ yr}} \cdot \frac{1.0 - e^{-\left[\left[\frac{c}{\text{AL}} \right] \text{yr}^{-1} \cdot 1 \text{ yr} \right]}}{\left[\frac{c}{\text{AL}} \right] \text{yr}^{-1}} = \left[\frac{c}{\text{SEDCON}} \right] \frac{\text{UoA}}{\text{m}^2} \\
 & \text{debug}
 \end{aligned}$$

Parameter Source Legend:
 i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

MEDIA CONCENTRATION: SURFACE WATER AND SEDIMENT
 Subroutines: TRNSPT, EXTCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

AIR CONCENTRATION - INFINITE PLUME (When Air Concentration Input; No Air Transport)

Air Concentration $\cdot$ Unit Conversion = Population-Weighted Air Concentration

$$\frac{i/c}{\text{AIRCON}} \cdot \frac{\text{UoA}}{\text{SECYR}} \cdot 3.15 \times 10^7 \frac{\text{sec}}{\text{yr}} = \frac{c}{\text{ARPCON}} \cdot \frac{\text{UoA sec}}{\text{yr}}$$

debug

AIR RELEASE DECAY FOR TRANSIT TIME FOR EACH DISTANCE (i) AND DIRECTION (j) - INFINITE PLUME array

Air Release Term $\cdot e^{-\left[\lambda_{\text{decay}} \cdot \text{Distance} / \text{Average Wind Speed} \cdot \text{Unit Conversion} \right]}$ = Decayed = Air Release Term

$$\frac{i}{\text{QAIR}} \cdot \frac{\text{UoA}}{\text{yr}} \cdot e^{-\left[\frac{c}{\text{AL}} \cdot \text{yr}^{-1} \cdot \frac{\text{DIST}_i}{\text{AVEU}_j} \cdot \frac{\text{sec}}{\text{sec}} \cdot 3.17 \times 10^{-8} \frac{\text{yr}}{\text{sec}} \right]} = \frac{c}{\text{DKAIR}_{ij}} \cdot \frac{\text{UoA}}{\text{yr}}$$

debug

AIR CONCENTRATION - INFINITE PLUME (Individual, Chi/Q value input)

Air Release Term (No Decay) $\cdot$ Population-Weighted Chi/Q = Total / Population = Average = Population-weighted Air Concentration

$$\frac{i}{\text{QAIR}} \cdot \frac{\text{UoA}}{\text{yr}} \cdot \frac{i}{\text{XQOI}} \cdot \frac{\text{person sec}}{\text{yr}} / \frac{i/c}{\text{POPT}} \cdot \text{person} = \frac{c}{\text{ARPCON}} \cdot \frac{\text{UoA sec}}{\text{yr}}$$

debug

Parameter Source Legend:

i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

MEDIA CONCENTRATION: AIR
 Subroutine: XQCAL, AIRCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

AVERAGE POPULATION-WEIGHTED AIR CONCENTRATION - INFINITE PLUME

Summed Over Distance & Direction $\left[\begin{array}{l} \text{Decayed Air Release Term} \\ \text{Chi/Q by Distance and Direction} \\ \text{Population by Distance and Direction} \end{array} \right] / \begin{array}{l} \text{Total Population For Air Paths} \end{array} = \begin{array}{l} \text{Average Population-Weighted Concentration} \end{array}$

$$\sum_{i=1}^{NDIST} \sum_{j=1}^{NOIR} \left[\begin{array}{c} c \\ \text{DKAIR}_{ij} \end{array} \right] \frac{\text{UoA}}{\text{yr}} \cdot \begin{array}{c} i/c \\ \text{XQ}_{ij} \end{array} \frac{\text{sec}}{3} \cdot \begin{array}{c} i \\ \text{POP}_{ij} \end{array} \text{person} \Bigg/ \begin{array}{c} c \\ \text{POPT} \end{array} \text{person} = \begin{array}{c} c \\ \text{ARPCON} \end{array} \frac{\text{UoA sec}}{3 \text{ yr}}$$

MEDIA.OUT

AVERAGE POPULATION-WEIGHTED AIR DOSE FACTOR - FINITE PLUME

Summed Over Energy Groups, Distance and Direction $\left[\begin{array}{l} \text{Decayed Air Release Term} \\ \text{Dose Rate Factor For Finite Plume} \\ \text{Population by Distance and Direction} \\ \text{Energy per Disintegration} \\ \text{Surface Correction} \end{array} \right] = \begin{array}{l} \text{Intermediate Value} \end{array}$

$$\sum_{k=1}^6 \sum_{i=1}^{NDIST} \sum_{j=1}^{NOIR} \left[\begin{array}{c} c \\ \text{DKAIR}_{ij} \end{array} \right] \frac{\text{UoA}}{\text{yr}} \cdot \begin{array}{c} i/c \\ \text{DRFQ}_{ijk} \end{array} \frac{\text{person rem dis}}{\text{Ci MeV}} \cdot \begin{array}{c} i \\ \text{POP}_{ij} \end{array} \text{person} \cdot \begin{array}{c} l \\ \text{EDIS}_k \end{array} \frac{\text{MeV}}{\text{dis}} \cdot \begin{array}{c} d \\ \text{FC}_k \end{array} \Bigg] = \begin{array}{c} \text{ } \end{array}$$

Intermediate Value / Total Population For Air Paths = Average Population-Weighted Air Dose Factor

$$\begin{array}{c} c \\ \text{ } \end{array} / \begin{array}{c} c \\ \text{POPT} \end{array} \text{person} = \begin{array}{c} c \\ \text{ARPCN} \end{array} \frac{\text{UoA person rem}}{\text{yr Ci}}$$

debug

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

MEDIA CONCENTRATION: AIR
Subroutine: XQCAL, AIRCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

AIR RELEASE DECAY TO MAXIMUM INDIVIDUAL LOCATION - FINITE PLUME

Air Release Term $\cdot e^{-\left[\lambda_{\text{decay}} \cdot \text{Specified Distance} + \frac{\text{Average Wind Speed in Specified Sector}}{\text{Unit Conversion}} \right]}$ = Decayed = Air Release Term

$$\frac{i}{\text{QAIR}} \cdot \frac{\text{UoA}}{\text{yr}} \cdot e^{-\left[\frac{c}{\text{AL}} \cdot \text{yr}^{-1} \cdot \frac{i}{\text{MIDIST}} + \frac{i/c}{\text{AVEU (midir)}} \cdot \frac{\text{sec}}{3.17 \times 10^{-8} \text{ yr}} \right]} = \frac{c}{\text{DKAIR}} \cdot \frac{\text{UoA}}{\text{yr}}$$

debug

AVERAGE OR MAXIMUM INDIVIDUAL AIR DOSE FACTOR - FINITE PLUME

Summed Over Energy Groups $\left[\text{Decayed Air Release Term} \cdot \text{Dose Rate Factor For Finite Plume} \cdot \text{Energy per Disintegration} \cdot \text{Surface Correction} \right] = \text{Average/Maximum Individual Air Dose Factor}$

$$\sum_{k=1}^8 \left[\frac{c}{\text{DKAIR}} \cdot \frac{\text{UoA}}{\text{yr}} \cdot \frac{i/c}{\text{DRSAV}_k} \cdot \frac{\text{person rem dis}}{\text{Ci MeV}} \cdot \frac{l}{\text{EDIS}_k} \cdot \frac{\text{MeV}}{\text{dis}} \cdot \frac{d}{\text{FC}_k} \right] = \frac{\text{ARPXCN}}{\text{yr Ci}} \cdot \text{UoA person rem}$$

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

MEDIA CONCENTRATION: AIR
Subroutine: XQCAL, AIRCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

AVERAGE FOOD-WEIGHTED AIR CONCENTRATION (If FQOPT = 0)

Air Release Term (No Decay) • Food-Weighted Chi/Q = Average Food-weighted Air Concentration

$$\frac{i}{QAIR} \frac{UoA}{yr} \cdot \frac{i}{FOQ} \frac{sec}{3} = \frac{c}{ARFCO} \frac{UoA}{3 yr} \frac{sec}{3}$$

ARFCO
ARF2CO

debug

AVERAGE FOOD-WEIGHTED AIR CONCENTRATION (If FQOPT = 1)

Average Population-weighted Air Concentration = Average Food-weighted Air Concentration

$$\frac{c}{ARPCO} \frac{UoA}{3 yr} = \frac{c}{ARFCO} \frac{UoA}{3 yr} \frac{sec}{3}$$

ARFCO
ARF2CO

debug

FOOD-WEIGHTED AIR CONCENTRATION (FQOPT = 2 or 3)

Summed Over Each Distance and Direction [Decayed Air Release Term • Chi/Q by Distance and Direction • Food Production by Distance and Direction] / Total Production = Average Food-weighted Air Concentration

$$\sum_{i=1}^{NDIST} \sum_{j=1}^{NDIR} \left[\frac{c}{DKAIR_{ij}} \frac{UoA}{yr} \cdot \frac{i/c}{XQ_{ij}} \frac{sec}{3} \cdot \frac{i/c}{FPRD_{ij}} \frac{kg}{yr} \right] / \frac{i}{TPROD} \frac{kg}{yr} = \frac{c}{ARFCO} \frac{UoA}{3 yr} \frac{sec}{3}$$

TPROD
TPRODA

ARFCO
ARF2CO

MEDIA.OUT

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

MEDIA CONCENTRATION: AIR
Subroutine: XQCAL, AIRCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

WASTE PACKAGE RELEASE TERM

$$\begin{aligned}
 & - \left(\ln 2.0 / \text{Package Half-life} \right) \cdot \left(\text{Years of Simulation} - 1 \text{ yr} \right) \left(\ln 2.0 / \text{Package Half-life} \right) \cdot \left(\text{Years of Simulation} \right) = \text{Waste Package Release Term} \\
 & - \left(0.693 / \text{PACKHL} \right) \text{yr}^{-1} \cdot \text{ITIME} \text{yr} - 1.0 \text{ yr} - \left(0.693 / \text{PACKHL} \right) \text{yr}^{-1} \cdot \text{ITIME} \text{yr} = \text{c} \text{yr}^{-1} \\
 & \text{ALOG2} \quad \text{PACKHL} \quad \text{ITIME} \quad \text{ALOG2} \quad \text{PACKHL} \quad \text{ITIME} \quad \text{PACKAV}
 \end{aligned}$$

DECAY CONTAINED WASTE (After First Year)

$$\begin{aligned}
 & \text{Contained Waste Concentration} \cdot e^{-\left(\lambda_{\text{decay}} \cdot 1 \text{ yr} \right)} = \text{Decayed Contained Waste Concentration} \\
 & \left[\frac{i}{\text{QWAS}} \cdot \frac{\text{UoA}}{3} \right] \cdot e^{-\left[\frac{c}{\text{AL}} \text{yr}^{-1} \cdot 1 \text{ yr} \right]} = \frac{c}{\text{QWAS}} \cdot \frac{\text{UoA}}{3} \\
 & \text{debug}
 \end{aligned}$$

WASTE PACKAGE AVAILABILITY OF DECAYED CONTAINED WASTE

$$\begin{aligned}
 & \text{Decayed Contained Waste Concentration} \cdot \text{Waste Package Release Term} = \text{Waste Package Degradation Rate} \\
 & \left[\frac{i}{\text{QWAS}} \cdot \frac{\text{UoA}}{3} \right] \cdot \text{c} \text{yr}^{-1} = \frac{c}{\text{RTWAST}} \cdot \frac{\text{UoA}}{3} \text{yr} \\
 & \text{debug}
 \end{aligned}$$

Parameter Source Legend:

i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

WASTE FORM DEGRADATION

Subroutine: PACKAG

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

INTEGRATE TOTAL REMOVAL FROM CONTAINED WASTE OVER ONE YEAR

$$\begin{aligned}
 & \text{Waste Removal Rate} \cdot \frac{1.0 - e^{-\left(\lambda_{\text{package}} \cdot 1 \text{ yr} \right)}}{\lambda_{\text{package}}} = \text{Waste Package Degradation Contribution} \\
 & \left[\frac{c}{\text{RTWAS}} \cdot \frac{\text{UoA}}{3} \text{ yr} - \left(\frac{c}{\text{PACKHL}} \text{ yr}^{-1} \cdot 1 \text{ yr} \right) \right] \cdot \frac{1.0 - e^{-\left(\lambda_{\text{package}} \cdot 1 \text{ yr} \right)}}{\lambda_{\text{package}}} = \frac{c}{\text{RTWAS PAKADD}} \cdot \frac{\text{UoA}}{3} \\
 & \quad \quad \quad \text{PACKHL} \quad \quad \quad \text{debug}
 \end{aligned}$$

REMOVE AVAILABLE WASTE FROM WASTE FORM / PACKAGE

$$\begin{aligned}
 & \text{Contained Waste Concentration} - \text{Available Waste Concentration} = \text{Remaining Contained Waste Concentration} \\
 & \left[\frac{i/c}{\text{QWAS}} \cdot \frac{\text{UoA}}{3} - \frac{c}{\text{RTWAS}} \cdot \frac{\text{UoA}}{3} \right] = \frac{c}{\text{QWAS}} \cdot \frac{\text{UoA}}{3} \\
 & \quad \quad \quad \text{debug}
 \end{aligned}$$

RADIOLOGICAL DECAY AND HARVEST REMOVAL OF DEEP SOIL FOR PREVIOUS YEAR

$$\begin{aligned}
 & \left[\text{Deep Soil Concentration} \cdot e^{-\left(\lambda_{\text{decay}} \cdot 1 \text{ yr} \right)} - \text{Harvest of Previous Year} \right] = \text{Deep Soil Concentration} \\
 & \left[\frac{i/c}{\text{DSCON DS2CON DSRES NONAGD}} \cdot \frac{\text{UoA}}{3} - \left(\frac{c}{\text{AL}} \text{ yr}^{-1} \cdot 1 \text{ yr} \right) \right] \cdot \frac{1.0 - e^{-\left(\lambda_{\text{decay}} \cdot 1 \text{ yr} \right)}}{\lambda_{\text{decay}}} = \frac{c}{\text{HARVT(in,itf,2) HARVA(in,ian,2)}} \cdot \frac{\text{UoA}}{3} \\
 & \quad \quad \quad \text{DSCON / DS2CON DSRES / NONAGD}
 \end{aligned}$$

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

MEDIA CONCENTRATION: BURIED WASTE AND DEEP SOIL
Subroutines: EDRANW, EDRCRP, EDRNQN, EDRRES, PACKAV

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

DEEP SOIL CONCENTRATION AT END OF YEAR (Prior to Biotic Transport Removal)

Deep Soil Concentration + Waste Package Degradation Contribution = Deep Soil Concentration

$$\frac{c}{\frac{\text{UoA}}{3}} + \frac{c}{\frac{\text{UoA}}{3}} = \frac{c}{\frac{\text{UoA}}{3}}$$

DSCON PAKADD DSCON
 DS2CON DS2CON
 DSRES DSRES
 NONAGD NONAGD

MEDIA.OUT

MANUAL REDISTRIBUTION

Surface Soil Concentration + (Deep Soil Concentration • Deep Volume/ Surface Area Dilution Factor • Surface Soil Density) = Surface Soil Concentration

$$\frac{i/c}{\frac{\text{UoA}}{2}} + \left[\frac{1/c}{\frac{\text{UoA}}{3}} \cdot i \cdot \frac{d}{224.0} \cdot \frac{\frac{\text{UoA}}{3}}{\frac{\text{UoA}}{2}} \right] = \frac{i/c}{\frac{\text{UoA}}{2}}$$

SOLCON DSCON MANULR SLDN SOLCON
 SL2CON DS2CON SL2CON
 RESSOL DSRES RESSOL

debug

SOIL EXCAVATED BY BIOTIC TRANSPORT

Fraction of total soil brought to surface from within the waste • Total Soil Excavated by Animals = Soil Excavated From the Waste Rate

$$\frac{\text{EXCAV}(ID, IC)}{\frac{\text{UoA}}{2}} \cdot \frac{\text{TOTEXC}}{\frac{\text{UoA}}{2} \text{ yr}} = \frac{\text{EXCAMT}}{\frac{\text{UoA}}{2} \text{ yr}}$$

debug

Parameter Source Legend:

i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

MEDIA CONCENTRATION: DEEP AND SURFACE SOIL
 Subroutines: EDRAWM, EDRCRP, EDNRON, EDRRES

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

BIOTIC TRANSPORT RATE

Concentration Ratio $\cdot$ Fraction $\cdot$ Yield $\cdot$ Surface / Soil Density = Intermediate Value

$$\frac{i}{c} \cdot \frac{\text{UoA/kg (wet plant)}}{\text{UoA/kg (dry soil)}} \cdot \frac{i}{\text{RF2}} \cdot \frac{i/d}{\text{YELD YELDA YELDBT}} \cdot \frac{\text{kg}}{\text{m}^2 \text{ yr}} / \frac{d}{1.5 \text{E3}} \cdot \frac{\text{kg}}{\text{m}^3} = \frac{c}{\text{RTMP}} \cdot \frac{\text{m}^3}{\text{m}^2 \text{ yr}}$$

BVI
 RF2
 YELD
 YELDA
 YELDBT
 SSDLN
 RTMP
 debug

Decayed Deep Soil Concentration $\cdot$ (Excavated Soil + Plant Uptake) / Depth = Biotic Transport Rate

$$\frac{i/c}{\text{DSCON DS2CON DSRES NONAGD}} \cdot \frac{\text{UoA}}{\text{m}^3} \cdot \left[\frac{d}{\text{EXCAMT}} \cdot \frac{\text{m}^3}{\text{m}^2 \text{ yr}} + \frac{c}{\text{RTMP}} \cdot \frac{\text{m}^3}{\text{m}^2 \text{ yr}} \right] / \frac{i}{\text{WASDEP}} \cdot \text{m} = \frac{c}{\text{RTBIO}} \cdot \frac{\text{UoA}}{\text{m}^2 \text{ yr}}$$

DSCON
 DS2CON
 DSRES
 NONAGD
 EXCAMT
 RTMP
 WASDEP
 RTBIO
 debug

INTEGRATE CONTRIBUTION FROM BIOTIC TRANSPORT TO DEEP SOIL

$$\frac{\text{Biotic Transport Rate} \cdot \left(1.0 - e^{-\left[\frac{\lambda_{\text{decay}} \cdot 1 \text{ yr}}{\lambda_{\text{decay}}} \right]} \right)}{\lambda_{\text{decay}}} = \text{Deep Soil Contribution}$$

$$\frac{c}{\text{RTBIO}} \cdot \frac{\text{UoA}}{\text{m}^3 \text{ yr}} \cdot \frac{1.0 - e^{-\left[\frac{c}{\text{AL}} \text{ yr}^{-1} \cdot 1 \text{ yr} \right]}}{\frac{c}{\text{AL}} \text{ yr}^{-1}} = \frac{c}{\text{RTAVAL}} \cdot \frac{\text{UoA}}{\text{m}^3}$$

RTBIO
 AL
 RTAVAL
 debug

Parameter Source Legend:

i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

MEDIA CONCENTRATION: DEEP AND SURFACE SOIL
 Subroutines: EDRANM, EDRCRP, EDRNON, EDRRES

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
		Reviewed by:	Date:

DEEP SOIL CONCENTRATION AFTER BIOTIC TRANSPORT REMOVAL

Deep Soil Concentration $-$ Biotic Transport Removal $=$ Deep Soil Concentration

$$\frac{c}{3} \cdot \frac{UoA}{3} - \frac{c}{3} \cdot \frac{UoA}{3} = \frac{c}{3} \cdot \frac{UoA}{3}$$

DSCON RTAVAL DSCON
 DS2CON DS2CON
 DSRES DSRES
 NONAGD NONAGD

MEDIA.OUT

RADIOLOGICAL DECAY AND HARVEST REMOVAL FROM SURFACE SOIL FOR PREVIOUS YEAR

Surface Soil Concentration $\cdot e^{-\left(\lambda_{\text{decay}} + \lambda_{\text{weathering}}\right) \cdot 1 \text{ yr}}$ $-$ Harvest of Previous Year $=$ Surface Soil Concentration

$$\left[\frac{i/c}{3} \cdot \frac{UoA}{3} \cdot e^{-\left(\frac{c}{AL} \text{ yr}^{-1} + \frac{c}{LEACHR} \text{ yr}^{-1} \right) \cdot 1 \text{ yr}} \right] - \frac{c}{2} \cdot \frac{UoA}{2} = \frac{c}{2} \cdot \frac{UoA}{2}$$

SOLCON HARVT(in,itf,1) SOLCON
 SL2CON HARVA(in,ian,1) SL2CON
 RESSOL RESSOL
 NONAGS NONAGS

debug

Parameter Source Legend:
 i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

MEDIA CONCENTRATION: DEEP AND SURFACE SOIL
 Subroutines: EDRANM, EDRCRP, EDRNON, EDRRES

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

SURFACE SOIL INPUT UNITS ADJUSTMENT

Surface Soil Input Concentration • Input Units Adjustment = Surface Soil Concentration

$$\begin{array}{c}
 \boxed{i} \frac{\text{UoA}}{\text{m}^3 \text{ or } \text{m}^2 \text{ or } \text{kg}} \cdot \boxed{} \frac{\text{m}^2}{\text{m}^3} = \boxed{c} \frac{\text{UoA}}{\text{m}^2 \text{ yr}} \\
 \text{CASCON} \qquad \qquad \qquad \text{SVU} \\
 \qquad \qquad \qquad 0.15 \text{ m}^3/\text{m}^2 \\
 \qquad \qquad \qquad 1.0 \text{ m}^2/\text{m}^2 \\
 \qquad \qquad \qquad 224.0 \text{ kg}/\text{m}^2 \\
 \qquad \qquad \qquad \boxed{\text{ENV.IN}}
 \end{array}$$

IRRIGATION DEPOSITION RATE

Water Concentration • Irrigation Rate • Unit / Conversion • Unit Conversion = Irrigation Deposition Rate

$$\begin{array}{c}
 \boxed{i/c} \frac{\text{UoA}}{\text{L}} \cdot \boxed{i} \frac{\text{in}}{\text{yr}} / 12 \frac{\text{mo}}{\text{yr}} \cdot 25.4 \frac{\text{L}}{\text{m}^2 \text{ in}} = \boxed{c} \frac{\text{UoA}}{\text{m}^2 \text{ yr}} \\
 \text{GWCON} \qquad \qquad \text{RIRR} \qquad \qquad \text{MOYR} \qquad \qquad \text{LM2IN} \qquad \qquad \text{RTIRR} \\
 \text{SWIRR} \qquad \qquad \text{RIRRA} \\
 \qquad \qquad \qquad \text{RIRRR} \\
 \qquad \qquad \qquad \boxed{\text{debug}}
 \end{array}$$

AIR DEPOSITION RATE

Average Food-weighted Decayed Air Concentration • Deposition Velocity = Air Deposition Rate

$$\begin{array}{c}
 \boxed{c} \frac{\text{UoA sec}}{\text{m}^3 \text{ yr}} \cdot \boxed{1} \frac{\text{m}}{\text{sec}} = \boxed{c} \frac{\text{UoA}}{\text{m}^2 \text{ yr}} \\
 \text{ARFCON} \qquad \qquad \text{DPVL} \qquad \qquad \text{RTATM} \\
 \text{ARF2CN} \qquad \qquad \qquad \boxed{\text{debug}}
 \end{array}$$

Parameter Source Legend:

i - GENII.IN
i - library value
d - DEFAULT.IN
c - calculated value

MEDIA CONCENTRATION: SURFACE SOIL
Subroutines: EDRANM, EDRCRP, EDRNON, EDRRES

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

TOTAL ENVIRONMENTAL DEPOSITION/REMOVAL RATE TO SURFACE SOIL

Irrigation
Deposition
Rate + Atmospheric
Deposition
Rate + Biotic
Transport
Rate = Environmental
Deposition/
Removal Rate

$$\frac{c}{RTIRR} \frac{UoA}{a^2 \text{ yr}} + \frac{c}{RTATM} \frac{UoA}{a^2 \text{ yr}} + \frac{c}{RTBIO} \frac{UoA}{a^2 \text{ yr}} = \frac{c}{RTENV} \frac{UoA}{a^2 \text{ yr}}$$

RTIRR RTATM RTBIO RTENV

debug

ENVIRONMENTAL DEPOSITION/REMOVAL CONTRIBUTION TO SURFACE SOIL

Environmental
Deposition/
Removal Rate * $\frac{1.0 - e^{-\left[\left(\lambda_{\text{decay}} + \lambda_{\text{leaching}} \right) \cdot 1 \text{ yr} \right]}}{\lambda_{\text{decay}} + \lambda_{\text{leaching}}}$ = Environmental
Deposition/
Removal
Contribution

$$\frac{c}{RTENV} \frac{UoA}{a^2 \text{ yr}} \cdot \left[\frac{1.0 - e^{-\left[\left(\frac{c}{AL} + \frac{l}{LEACHR} \right) \text{ yr}^{-1} \cdot 1 \text{ yr} \right]}}{\frac{c}{AL} + \frac{l}{LEACHR}} \right] = \frac{c}{RTENV} \frac{UoA}{a^2}$$

RTENV AL LEACHR

debug

SURFACE SOIL CONCENTRATION

Surface
Soil
Concentration * Net Environmental
Deposition/Removal
Contribution = Surface
Soil
Concentration

$$\frac{i/c}{SOLCON / SL2CON} \frac{UoA}{a^2} + \frac{c}{RTENV} \frac{UoA}{a^2} = \frac{c}{SOLCON / SL2CON} \frac{UoA}{a^2}$$

SOLCON / SL2CON
RESSOL / NONACS RTENV SOLCON / SL2CON
RESSOL / NONACS

MEDIA OUT

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

MEDIA CONCENTRATION: SURFACE SOIL
Subroutines: EDRANM, EDRCRP, EDRNON, EDRRES

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
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			Date:

AIR INTERCEPTION FRACTION

$$\begin{aligned}
 & \left[\begin{array}{l} \text{Standing Biomass} \\ \text{Dry Weight/} \\ \text{Wet Weight Ratio} \end{array} \right] \cdot \text{Constant} \\
 & \left[\begin{array}{l} \text{d/i} \text{ kg} \\ \text{BIOMAS} \\ \text{BIOMA2} \end{array} \right] \cdot \left[\begin{array}{l} \text{d/i} \\ \text{DRYFAC} \\ \text{DRYFR2} \end{array} \right] \cdot \left[\begin{array}{l} 2.9^* \\ 3.0^{**} \end{array} \right] \\
 & \text{Air Interception} = \text{Fraction} \\
 & = \text{c} \\
 & \text{DEPFR1}
 \end{aligned}$$

* Leafy veg., Fruit
** Other veg., Grains

LEAF DEPOSITION RATE FROM AIR

$$\begin{aligned}
 & \text{Food-Weighted Air Concentration} \cdot \text{Deposition Velocity} \cdot \text{Air Interception Fraction} = \text{Intermediate Leaf Deposition Rate from Air} \\
 & \left[\begin{array}{l} \text{c} \\ \text{ARFCN} \\ \text{ARF2CN} \end{array} \right] \frac{\text{UoA}}{\text{yr}} \cdot \left[\begin{array}{l} \text{l} \\ \text{DPVL} \end{array} \right] \frac{\text{sec}}{\text{yr}} \cdot \left[\begin{array}{l} \text{d/i} \\ \text{DEPFR1} \end{array} \right] = \left[\begin{array}{l} \text{c} \\ \text{LEAF1a} \end{array} \right] \frac{\text{UoA}}{\text{yr}} \\
 & \text{debug}
 \end{aligned}$$

LEAF DEPOSITION RATE FROM RESUSPENSION

$$\begin{aligned}
 & \text{Soil Concentration} \cdot \text{Leaf Resuspension Factor} \cdot \text{Resuspension Deposition Velocity} \cdot \text{Unit Conversion} \cdot \text{Air Interception Fraction} = \text{Intermediate Leaf Deposition Rate from Resuspension} \\
 & \left[\begin{array}{l} \text{i/c} \\ \text{SOLCON} \\ \text{SL2CON} \end{array} \right] \frac{\text{UoA}}{\text{yr}} \cdot \left[\begin{array}{l} \text{d/i} \\ \text{LEAFRS} \end{array} \right] \cdot \left[\begin{array}{l} \text{d/i} \\ \text{DPVRES} \end{array} \right] \frac{\text{sec}}{\text{yr}} \cdot 3.15 \times 10^7 \frac{\text{sec}}{\text{yr}} \cdot \left[\begin{array}{l} \text{c} \\ \text{DEPFR1} \end{array} \right] = \left[\begin{array}{l} \text{c} \\ \text{LEAF1b} \end{array} \right] \frac{\text{UoA}}{\text{yr}} \\
 & \text{debug}
 \end{aligned}$$

Parameter Source Legend:
i - GENII.IN
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c - calculated value

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutines: CRPCAL, ANMCL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

LEAF DEPOSITION RATE FROM IRRIGATION

Water Concentration	Irrigation Application Rate	Mo/yr of Irrigation	Unit Conversion	Unit Conversion	Irrigation Deposition Fraction	Intermediate Leaf Deposition Rate from Irrigation
i/c	$\cdot UoA$	$/$	$\cdot 12.0$	$\cdot 25.4$	$\cdot \frac{L}{0.25}$	$= \frac{c}{UoA}$
GWCON SWIRR	RIRR RIRRA	son	son MOYR	LM2IN	DEPFR2	LEAF2
		IRTINT IRTIMA IRTIMR				debug

TOTAL LEAF DEPOSITION RATE

(Sum of Deposition Rates onto Leaves)	• Trans- location Factor	/ Standing Biomass	= Total Deposition Rate onto Edible Parts
$\left[\frac{c}{UoA} + \frac{c}{UoA} + \frac{c}{UoA} \right]$	$\cdot \frac{d}{kg}$	$/ \frac{i}{kg}$	$= \frac{c}{UoA}$
LEAF1a LEAF1b LEAF2	TRANS TRANSA	BIOMAS BIOMA2	LEAF
			debug

WEATHERING CONSTANT

Natural Log 2.0 /	Weathering Half Time	Unit Conversion	Weathering Constant
$0.693 /$	$\frac{d}{14.0}$	$/ 2.74 \times 10^{-3} \frac{yr}{d}$	$= \frac{c}{yr^{-1}}$
ALOG2	WTIM	YRDA	TENV2
			debug

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutines: CRPCAL, ANMICAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

LEAF CONTRIBUTION

$$\begin{aligned}
 & \left[1.0 - e^{-\left(\lambda_{\text{decay}} + \lambda_{\text{weathering}} \right)} \right] \cdot \text{Growing Period} \cdot \text{Unit Conversion} \\
 & \text{Leaf Deposition Rate} \cdot \frac{\lambda_{\text{decay}} + \lambda_{\text{weathering}}}{\lambda_{\text{decay}} + \lambda_{\text{weathering}}} = \text{Leaf Contribution}
 \end{aligned}$$

$$\begin{aligned}
 & \left[1.0 - e^{-\left(\frac{c}{AL} + \frac{c}{TENV2} \right) \text{yr}^{-1}} \right] \cdot \frac{i}{GRWP} \cdot d \cdot 2.74 \times 10^{-3} \frac{\text{yr}}{d} \\
 & \frac{c}{\text{LEAF}} \frac{\text{UoA}}{\text{kg yr}} \cdot \frac{\left[1.0 - e^{-\left(\frac{c}{AL} + \frac{c}{TENV2} \right) \text{yr}^{-1}} \right] \cdot \frac{i}{GRWP} \cdot d \cdot 2.74 \times 10^{-3} \frac{\text{yr}}{d}}{\frac{c}{AL} \text{yr}^{-1} + \frac{c}{TENV2} \text{yr}^{-1}} = \frac{c}{\text{LEAF}} \frac{\text{UoA}}{\text{kg}}
 \end{aligned}$$

debug

ROOT UPTAKE FROM SURFACE SOIL

Surface Soil Concentration	Soil Density	Concentration Ratio	Fraction	Root Uptake
	/	• UoA/kg (wet plant)/	• Roots in	= From Surface
		UoA/kg (dry soil)	Surface Soil	Soil

$$\begin{aligned}
 & \frac{c/i}{\frac{2}{\text{SOLCON}}} \cdot \frac{d}{224.0} \frac{\text{kg}}{\text{m}^3} \cdot \frac{l}{\text{BVI}} \frac{\text{UoA/kg}}{\text{UoA/kg}} \cdot \frac{i}{\text{RF1}} = \frac{c}{\text{ROOT1}} \frac{\text{UoA}}{\text{kg}}
 \end{aligned}$$

debug

ROOT UPTAKE FROM DEEP SOIL

Deep Soil Concentration	Soil Density	Concentration Ratio	Fraction	Root Uptake
	/	• UoA/kg (wet plant)/	• Roots in	= From Deep
		UoA/kg (dry soil)	Deep Soil	Soil

$$\begin{aligned}
 & \frac{c/i}{\frac{3}{\text{DSCON}}} \cdot \frac{d}{1.5 \times 10^3} \frac{\text{kg}}{\text{m}^3} \cdot \frac{l}{\text{BVI}} \frac{\text{UoA/kg}}{\text{UoA/kg}} \cdot \frac{i}{\text{RF2}} = \frac{c}{\text{ROOT2}} \frac{\text{UoA}}{\text{kg}}
 \end{aligned}$$

debug

Parameter Source Legend:

i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

PLANT AND ANIMAL PRODUCT CONCENTRATION
 Subroutines: CRPCAL, ANMCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

SAVE PLANT UPTAKE CONTRIBUTION FROM SURFACE SOIL AND HARVEST REMOVAL

$$\left[\begin{array}{c} \text{Leaf Contribution} \\ \text{c} \\ \text{LEAF} \end{array} \frac{\text{UoA}}{\text{kg}} + \begin{array}{c} \text{Root Uptake From Surface Soil} \\ \text{c} \\ \text{ROOT1} \end{array} \frac{\text{UoA}}{\text{kg}} \right] \cdot \begin{array}{c} \text{Yield} \\ \text{YELD} \\ \text{YELDA} \end{array} \cdot \begin{array}{c} \text{Fraction of Roots in Surface Soil} \\ \text{i} \\ \text{RF1} \end{array} = \begin{array}{c} \text{Next Year's Harvest Removal From Surface Soil} \\ \text{HARVT(in,itf,1)} \\ \text{HAVRA(in,ian,1)} \end{array}$$

SAVE ROOT UPTAKE FROM DEEP SOIL CONTRIBUTION AS HARVEST REMOVAL

$$\begin{array}{c} \text{Root Uptake From Deep Soil} \\ \text{ROOT2} \end{array} \frac{\text{UoA}}{\text{kg}} \cdot \begin{array}{c} \text{Yield} \\ \text{YELD} \end{array} \frac{\text{kg}}{\text{m}^2} / \begin{array}{c} \text{Waste Thickness} \\ \text{WASDEP} \end{array} \cdot \begin{array}{c} \text{Fraction of Roots in Deep Soil} \\ \text{RF2} \end{array} = \begin{array}{c} \text{Next Year's Harvest Removal From Deep Soil} \\ \text{HARVA(in,ian,2)} \\ \text{HARVA(in,ian,2)} \end{array}$$

TOTAL PLANT CONCENTRATION

$$\begin{array}{c} \text{Leaf Contribution} \\ \text{c} \\ \text{LEAF} \end{array} \frac{\text{UoA}}{\text{kg}} + \begin{array}{c} \text{Surface Soil Root Contribution} \\ \text{c} \\ \text{ROOT1} \end{array} \frac{\text{UoA}}{\text{kg}} + \begin{array}{c} \text{Deep Soil Root Contribution} \\ \text{c} \\ \text{ROOT2} \end{array} \frac{\text{UoA}}{\text{kg}} = \begin{array}{c} \text{Total Plant Concentration} \\ \text{c} \\ \text{PLTCON} \end{array} \frac{\text{UoA}}{\text{kg}}$$

debug

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutines: CRPCAL, ANMCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
		Reviewed by:	Date:

ANIMAL PRODUCT CONCENTRATION FROM EACH TYPE OF FODDER

Feed or Forage Concentration	• Animal Consumption Rate	• Plant/Animal Transfer Coefficient	• Fraction of Diet this Fodder Type	Animal Product = Concentration From Fodder
<div style="border: 1px solid black; padding: 5px; display: inline-block;">c</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>	•	<div style="border: 1px solid black; padding: 5px; display: inline-block;">d</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{kg}}{\text{d}}$ </div>	•	<div style="border: 1px solid black; padding: 5px; display: inline-block;">l</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA/kg}}{\text{UoA/d}}$ </div>
•		•		•
<div style="border: 1px solid black; padding: 5px; display: inline-block;">i</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>		=		<div style="border: 1px solid black; padding: 5px; display: inline-block;">c</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>
PLT		CONSUM		FMI
			DIETFR	EDBL
				<div style="border: 1px solid black; padding: 5px; display: inline-block;">debug</div>

ANIMAL DRINKING WATER CONTRIBUTION

Animal Drinking Water Concentration	• Animal Consumption Rate	• Plant/Animal Transfer Coefficient	• Fraction of Water from This Source	Animal Product • Contribution from Drinking Water
<div style="border: 1px solid black; padding: 5px; display: inline-block;">c</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{L}}$ </div>	•	<div style="border: 1px solid black; padding: 5px; display: inline-block;">d</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{L}}{\text{d}}$ </div>	•	<div style="border: 1px solid black; padding: 5px; display: inline-block;">l</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA/L}}{\text{UoA/d}}$ </div>
•		•		•
<div style="border: 1px solid black; padding: 5px; display: inline-block;">i</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>		=		<div style="border: 1px solid black; padding: 5px; display: inline-block;">c</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>
GWCON SWIRR		DWTERR		FMI
			DWFACA	DW
				<div style="border: 1px solid black; padding: 5px; display: inline-block;">debug</div>

TOTAL ANIMAL PRODUCT CONCENTRATION

Animal Product Concentration From Feed	+ Animal Product Concentration From Forage	+ Animal Product Concentration From Drinking Water	= Total Animal Product Concentration
<div style="border: 1px solid black; padding: 5px; display: inline-block;">c</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>	+	<div style="border: 1px solid black; padding: 5px; display: inline-block;">c</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>	+
•		•	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">c</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>		=	<div style="border: 1px solid black; padding: 5px; display: inline-block;">c</div> <div style="display: inline-block; vertical-align: middle; text-align: center;"> $\frac{\text{UoA}}{\text{kg}}$ </div>
EDBL(1-4)		EDBL(5-8)	ANMCON
			<div style="border: 1px solid black; padding: 5px; display: inline-block;">debug</div>

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutines: CRPCAL, ANMCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

RESUSPENSION FACTOR - MASS LOADING MODEL

Mass Loading Factor / Surface Soil Density • Unit Conversion = Resuspension Factor

$$\boxed{i} \frac{\text{g}}{\text{m}^3} / \boxed{d} \frac{\text{kg}}{\text{m}^2} \cdot 1.0 \times 10^{-3} \frac{\text{kg}}{\text{g}} = \boxed{c} \text{m}^{-1}$$

XMLF SLON KQG RESFAC

RESUSPENSION FACTOR - AMSPAUGH MODEL

Resuspension Factor at Time zero • $e^{-\left[\begin{array}{l} \text{Effective Decay Constant Controlling Availability of Material} \cdot \left(\begin{array}{l} \text{Time after Deposition} \cdot \text{Unit Conversion} \end{array} \right) \end{array} \right]}$ Resuspension Intermediate Factor after 17 years = Value

$$1.0 \times 10^{-4} \text{m}^{-1} \cdot e^{-\left[\boxed{d} 0.15 \text{d}^{-1} \cdot \left[\boxed{i} \text{yr} \cdot 365.25 \frac{\text{d}}{\text{yr}} \right]^{\frac{1}{2}} \right]} + 1.0 \times 10^{-9} \text{m}^{-1} = \boxed{c} \text{m}^{-1}$$

ITIME

Intermediate Value • Depth of Soil Available For Resuspension / Depth of Surface Soil = Resuspension Factor

$$\boxed{c} \text{m}^{-1} \cdot \boxed{i} \text{cm} / \boxed{d} 15.0 \text{cm} = \boxed{c} \text{m}^{-1}$$

AVASL SVRCM RESFAC

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: INHALATION
Subroutines: INHCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

INHALATION AIR CONCENTRATION

$$\text{Average Population-weighted Air concentration} \cdot \text{Unit Conversion} + \left[\text{Residential/Resuspension Surface Soil Concentration} \cdot \text{Resuspension Factor} \right] = \text{Air Concentration For Inhalation}$$

$$\frac{i/c}{\text{ARPCON}} \frac{\text{UoA sec}}{\text{yr}} \cdot 3.17 \times 10^{-8} \frac{\text{yr}}{\text{sec}} + \left[\frac{i/c}{\text{RESSOL}} \frac{\text{UoA}}{\text{yr}} \cdot \frac{c}{\text{RESFAC}} \right] = \frac{c}{\text{INHCON}} \frac{\text{UoA}}{\text{yr}}$$

debug

INHALATION EXPOSURE FROM INFINITE PLUME

$$\text{Air Concentration For Inhalation} \cdot \text{Inhalation Rate} \cdot \text{Unit Conversion} \cdot \text{Unit Conversion} = \text{Intermediate Value}$$

$$\frac{i}{\text{INHCON}} \frac{\text{UoA}}{\text{yr}} \cdot \frac{d/i}{\text{RINH}} \frac{\text{cm}^3}{\text{sec}} \cdot 1.0 \times 10^{-6} \frac{\text{m}^3}{\text{cm}^3} \cdot 3.15 \times 10^7 \frac{\text{sec}}{\text{yr}} = \frac{c}{\text{yr}}$$

$$\text{Intermediate Value} \cdot \text{Exposure Duration} \cdot \text{Unit Conversion} \cdot \text{Population Exposed to Air} = \text{Inhalation Exposure}$$

$$\frac{c}{\text{yr}} \cdot \frac{i}{\text{HRINH}} \frac{\text{hr}}{\text{person yr}} \cdot 1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}} \cdot \frac{i/c}{\text{POPT}} \text{person} = \frac{c}{\text{EXPOS}} \frac{\text{UoA}}{\text{yr}}$$

ENV. OUT

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: INHALATION
Subroutines: INHCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
		Reviewed by:	Date:

EXTERNAL EXPOSURE FROM INFINITE PLINE

Population-weighted Air Concentration	• Unit Conversion	Duration • Exposure	• Unit Conversion	Exposed • Population	=	External Exposure Rate from Infinite Plume
<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">c</div> <div style="text-align: center;">ARPCN</div>	$\frac{\text{UoA sec}}{\text{yr}} \cdot 3.17 \times 10^{-8} \frac{\text{yr}}{\text{sec}}$	<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">i</div> <div style="text-align: center;">HRIPL</div>	$\frac{\text{hr}}{\text{person yr}} \cdot 1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$	<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">c/i</div> <div style="text-align: center;">POPT</div>	=	<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">c</div> <div style="text-align: center;">EXPOS</div> <div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">ENV.OUT</div>

EXTERNAL EXPOSURE FROM FINITE PLINE

Population-weighted Air Dose Factor	• Duration of Exposure	• Unit Conversion	= Intermediate Value
<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">c</div> <div style="text-align: center;">ARPCN</div>	$\frac{\text{UoA person rem}}{\text{yr Ci}} \cdot 1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$	<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">i</div> <div style="text-align: center;">HRIPL</div>	=

Intermediate Value	• Exposed Population	= External Exposure Rate from Finite Plume
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<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">c</div>	•	<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">c</div> <div style="text-align: center;">POPT</div>	=	<div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">c</div> <div style="text-align: center;">EXPOS</div> <div style="border: 1px solid black; width: 60px; height: 30px; margin: 0 auto; text-align: center; line-height: 30px;">ENV.OUT</div>
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Parameter Source Legend:

i - GENII.IN
t - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: EXTERNAL
Subroutines: EXTCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

EXTERNAL EXPOSURE FACTOR FROM THE SURFACE SOIL

Residential/ Resuspension Surface Soil Concentration	•	Duration of Exposure	•	Unit Conversion	•	Exposed Population	=	External Exposure Factor from Surface Soil
$\frac{c/i}{a^2}$ RESSOL	•	$\frac{i}{\text{person yr}}$ HRGRD	•	$1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$ YRHR	•	$\frac{i/c}{\text{person}}$ POPT	=	$\frac{c}{a^2}$ EXPOS <div style="border: 1px solid black; padding: 2px; display: inline-block;">ENV. OUT</div>

EXTERNAL EXPOSURE FACTOR FROM THE DEEP SOIL

Residential/ Resuspension Deep Soil Concentration	•	Duration of Exposure	•	Unit Conversion	•	Exposed Population	=	External Exposure Factor from Deep Soil
$\frac{c/i}{a^3}$ DSRES	•	$\frac{i}{\text{person yr}}$ HRGRD	•	$1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$ YRHR	•	$\frac{i/c}{\text{person}}$ POPT	=	$\frac{c}{a^3}$ EXPOS <div style="border: 1px solid black; padding: 2px; display: inline-block;">ENV. OUT</div>

EXTERNAL EXPOSURE FACTOR FROM CONTAINED BURIED WASTE

Contained Buried Waste Concentration	•	Duration of Exposure	•	Unit Conversion	•	Exposed Population	=	External Exposure Factor from Buried Waste
$\frac{c/i}{a^3}$ QWAS	•	$\frac{i}{\text{person yr}}$ HRGRD	•	$1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$ YRHR	•	$\frac{i/c}{\text{person}}$ POPT	=	$\frac{c}{a^3}$ EXPOS <div style="border: 1px solid black; padding: 2px; display: inline-block;">ENV. OUT</div>

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: EXTERNAL
Subroutines: EXTCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

EXTERNAL EXPOSURE FACTOR FROM SWIMMING

Decayed Surface Water Concentration	•	Duration • Of Exposure	•	Unit • Conversion	•	Exposed • Population	=	External Exposure = Factor from Swimming
$\frac{c}{L}$	•	$\frac{i}{\text{person yr}}$	•	$1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$	•	i person	=	$\frac{c}{L}$
WATCON		HRSWIM		YRHR		POPT		EXPOS
								ENV. OUT

EXTERNAL EXPOSURE FACTOR FROM BOATING

Decayed Surface Water Concentration	•	Duration • Of Exposure	•	Unit • Conversion	•	Exposed • Population	=	External Exposure = Factor from Boating Exposure
$\frac{c}{L}$	•	$\frac{i}{\text{person yr}}$	•	$1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$	•	i person	=	$\frac{c}{L}$
WATCON		HRBOAT		YRHR		POPT		EXPOS
								ENV. OUT

EXTERNAL EXPOSURE FACTOR FROM FISHING AND SHORELINE ACTIVITIES

Sediment Concentration	•	Duration of • Exposure	•	Unit • Conversion	•	Shore • Width Factor	•	Exposed • Population	=	External Exposure = Factor from Shoreline Activities
$\frac{c}{m^2}$	•	$\frac{i}{\text{person yr}}$	•	$1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$	•	$\frac{i}{d}$	•	i person	=	$\frac{c}{m^2}$
SEDCON		HRSHOR		YRHR		SHORWI (SHRTYP)		POPT		EXPOS
										ENV. OUT

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: EXTERNAL
Subroutines: EXTCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

DRINKING WATER CONCENTRATION

Water Concentration • Factor • $\left[\begin{array}{l} \lambda \text{ decay} \\ \text{Hold Up/} \\ \text{Transit Time} \\ \text{Unit Conversion} \end{array} \right] = \text{Intermediate Value}$

$$\frac{i/c}{\text{SWCON} \cdot \text{GWCON} \cdot \text{DWCON}} \cdot \frac{\text{UoA}}{\text{L}} \cdot \frac{\text{I}}{\text{DWCLEN}} \cdot \left[\frac{\text{c}}{\text{AL}} \cdot \text{yr}^{-1} \cdot \frac{\text{i}}{\text{HOLDDW}} \cdot \text{d} \cdot 2.74 \times 10^{-3} \frac{\text{yr}}{\text{d}} \right] = \frac{\text{c}}{\text{L}} \cdot \frac{\text{UoA}}{\text{L}}$$

YRDA

EXPOSURE FROM INGESTION OF DRINKING WATER

Intermediate Value • Consumption Rate • Drinking Water Population • Drinking Water = Exposure

$$\frac{\text{c}}{\text{L}} \cdot \frac{\text{UoA}}{\text{L}} \cdot \frac{\text{i}}{\text{DWUSAG}} \cdot \frac{\text{L}}{\text{person yr}} \cdot \frac{\text{i}}{\text{DWPOP}} \cdot \text{person} = \frac{\text{c}}{\text{yr}} \cdot \frac{\text{UoA}}{\text{yr}}$$

EXPOS

ENV.OUT

AQUATIC FOODS EXPORT ADJUSTMENT FACTOR (If Food is Not Exported)

Total Production / Population Ingesting Aquatic Foods / Consumption Rate = Export Adjustment Factor

$$\frac{i/c}{\text{TPRODQ}} \cdot \frac{\text{kg}}{\text{yr}} / \frac{\text{c}}{\text{AQUPOP}} \cdot \frac{\text{person}}{\text{yr}} / \frac{\text{i}}{\text{USAG2}} \cdot \frac{\text{kg}}{\text{person yr}} = \frac{\text{c}}{\text{ADJETQ}}$$

GENII.OUT

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: DRINKING WATER
Subroutines: DRKCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

AQUATIC FOOD CONCENTRATION

DECAY AQUATIC FOODS FOR HARVEST / CONSUMPTION HOLDUP TIME

EXPOSURE FROM CONSUMPTION OF AQUATIC FOODS

Parameter Source Legend:

i - GENII.IN
t - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: AQUATIC FOOD INGESTION
Subroutines: AQUICAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:

DECAY FOR HOLDUP BETWEEN HARVEST AND CONSUMPTION OF TERRESTRIAL FOODS AND ANIMAL PRODUCTS

Food Concentration $\cdot e^{-\left(\lambda_{\text{decay}} \cdot \text{Holdup} \cdot \text{Unit Conversion} \right)}$ = Food Concentration

$$\left[\frac{c}{\text{PLTCON ANMCON}} \frac{\text{UoA}}{\text{kg}} \cdot e^{-\left[\frac{c}{\text{AL}} \text{yr}^{-1} \cdot \frac{i}{\text{HLDUP HLDUPA}} \text{d} \cdot 2.74\text{E-3} \frac{\text{yr}}{\text{d}} \right]} \right] = \frac{c}{\text{PLTCON ANMCON}} \frac{\text{UoA}}{\text{kg}}$$

YRDA

EFFECTIVE POPULATION FOR TERRESTRIAL FOODS AND ANIMAL PRODUCTS (When Food Production Grid Used)

Summed Over Each Distance and Direction $\left[\frac{\text{Food Production In each Grid}}{\text{Consumption of Food Product per Person}} \right]$ = Effective Population For Terrestrial Foods And Animal Products

$$\sum_{i=1} \sum_{j=1} \left[\frac{\frac{i/c}{\text{FPRD } ij} \frac{\text{kg}}{\text{yr}}}{\frac{i}{\text{CONS CONS2}} \frac{\text{kg}}{\text{yr person}}} \right] = \frac{c}{\text{EFPOP EFPOPA}} \text{person}$$

GENII.OUT

EXPORT/IMPORT ADJUSTMENT FACTOR FOR TERRESTRIAL FOODS AND ANIMAL PRODUCTS

Total Production / Effective Population / Consumption Rate = Export = Adjustment Factor

$$\frac{\frac{i/c}{\text{TPRODT TPRODA}} \frac{\text{kg}}{\text{yr}}}{\frac{c}{\text{EFPOP EFPOPA POPT TPOPS}} \text{person}} \cdot \frac{i}{\text{CONS CONS2}} \frac{\text{kg}}{\text{person yr}} = \frac{c}{\text{ADJEAT ADJET2}}$$

debug

Parameter Source Legend:
i - GENII.IN
f - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: TERRESTRIAL FOOD AND ANIMAL PRODUCT INGESTION
Subroutines: CRPCAL, ANMCA

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

HUMAN UPTAKE RATE FROM TERRESTRIAL FOODS AND ANIMAL PRODUCTS

$$\text{Food Concentration} \times \text{Human Consumption Rate} \times \text{Effective Population} \times \text{Export Adjustment} = \text{Human Uptake Rate from Consumption of Foods}$$

$$\begin{array}{ccccccc}
 \boxed{\text{c}} & \xleftarrow{\text{UoA}} & \boxed{\text{i}} & \xrightarrow{\text{kg}} & \boxed{\text{c}} & \xrightarrow{\text{person}} & \boxed{\text{c}} = \boxed{\text{c}} \xrightarrow{\text{UoA}} \\
 \text{PLTCOM} & & \text{CONS} & & \text{EFPOP} & & \text{ADJEAT} \\
 \text{ANMCOM} & & \text{CONSA} & & \text{EFPOPA} & & \text{ADJET2} \\
 & & & & & & \boxed{\text{ENV}} \text{ DATE}
 \end{array}$$

EXPOSURE FROM INADVERTENT INGESTION OF SOIL

Residential/ Surface Soil Concentration	Quantity of • Soil Ingested	Surface / Soil Density	Unit • Conversion	Intermediate = Value
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$$\frac{\text{RESSL}}{\text{UoA}} \cdot \frac{\text{SOLNG}}{\text{person d}} / \frac{\text{SLDM}}{\text{kg}} \cdot \frac{\text{KGMG}}{\text{kg}} = \frac{\text{c}}{\text{person d}}$$

Intermediate Value	Unit • Conversion	Exposed • Population	Inadvertent Soil = Ingestion Exposure
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$$\frac{c}{\text{person d}} \cdot \frac{\text{UoA}}{\text{DAYR}} \cdot \frac{362.25}{\text{yr}} \cdot \frac{d}{\text{yr}} \cdot \frac{i}{\text{POPT}} \cdot \text{person} = \frac{c}{\text{EXPOS}} \cdot \frac{\text{UoA}}{\text{yr}}$$

INTERNAL EXPOSURE FACTOR FROM INADVERTENT INGESTION OF SWIMMING WATER

$$\text{Decayed Surface Water Concentration} \times \text{Duration Of Exposure} \times \text{Ingestion Rate} \times \text{Exposed Population} = \text{Internal Exposure Factor from Ingestion Of Swimming Water}$$

$$\begin{array}{c} \boxed{c} \xrightarrow{UoA} \boxed{i} \xrightarrow{hr} \boxed{d} \xrightarrow{L} \boxed{i} \xrightarrow{person} \boxed{c} \xrightarrow{UoA} \boxed{ENV_OUT} \\ \text{WATCON} \quad \text{HRSWIM} \quad \text{INGWAT} \quad \text{POPT} \quad \text{EXPOS} \end{array}$$

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: TERRESTRIAL FOOD AND ANIMAL PRODUCT INGESTION
Subroutines: CRPCAL, ANMCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:

SURFACE WATER CONCENTRATION FROM ACUTE RELEASE

$$\begin{array}{c} \text{Surface Water} \\ \text{Release Term} \end{array} \cdot \begin{array}{c} \text{Mixing} \\ \text{Ratio} \end{array} / \begin{array}{c} \text{Surface Water} \\ \text{Flow Rate} \end{array} \cdot \begin{array}{c} \text{Unit} \\ \text{Conversion} \end{array} \cdot \begin{array}{c} \text{Conversion} \\ \text{Factor} \end{array} = \begin{array}{c} \text{Time-Integrated} \\ \text{Surface Water} \\ \text{Concentration} \end{array}$$

$$\begin{array}{c} i \\ \text{QSW} \end{array} \text{UoA} \cdot \begin{array}{c} i/c \\ \text{MIXR} \end{array} / \begin{array}{c} i \\ \text{SWFLOW} \end{array} \frac{\text{m}^3}{\text{sec}} \cdot 1.0 \times 10^{-3} \frac{\text{m}^3}{\text{L}} \cdot 3.17 \times 10^{-8} \frac{\text{yr}}{\text{sec}} = \begin{array}{c} c \\ \text{WATCON} \end{array} \frac{\text{UoA yr}}{\text{L}}$$

DECAY SURFACE WATER FOR TRANSIT TIME TO IRRIGATION WITHDRAWAL / AQUATIC FOOD HARVEST LOCATION - ACUTE RELEASE

$$\begin{array}{c} \text{Time-Integrated} \\ \text{Surface Water} \\ \text{Concentration} \end{array} \cdot \begin{array}{c} \lambda \\ \text{decay} \end{array} \cdot \begin{array}{c} \text{Transit} \\ \text{Time} \end{array} \cdot \begin{array}{c} \text{Unit} \\ \text{Conversion} \end{array} = \begin{array}{c} \text{Time-Integrated} \\ \text{Decayed} \\ \text{Surface Water} \\ \text{Concentration} \end{array}$$

$$\begin{array}{c} c \\ \text{SWACUT} \end{array} \frac{\text{UoA yr}}{\text{L}} \cdot \begin{array}{c} \lambda \\ \text{decay} \end{array} \cdot \begin{array}{c} c \\ \text{AL} \end{array} \text{yr}^{-1} \cdot \begin{array}{c} i \\ \text{SWTT} \\ \text{AQU TT} \end{array} \text{hr} \cdot 1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}} = \begin{array}{c} c \\ \text{WATCON} \\ \text{SWDK} \end{array} \frac{\text{UoA yr}}{\text{L}}$$

MEDIA.OUT

DECAY SURFACE WATER FOR TRANSIT TIME TO DRINKING WATER WITHDRAWAL LOCATION - ACUTE RELEASE

$$\begin{array}{c} \text{Time-Integrated} \\ \text{Surface Water} \\ \text{Concentration} \end{array} \cdot \begin{array}{c} \lambda \\ \text{decay} \end{array} \cdot \begin{array}{c} \text{Transit/} \\ \text{Hold-up Time} \end{array} \cdot \begin{array}{c} \text{Unit} \\ \text{Conversion} \end{array} = \begin{array}{c} \text{Time-Integrated} \\ \text{Decayed} \\ \text{Drinking Water} \\ \text{Concentration} \end{array}$$

$$\begin{array}{c} c \\ \text{SWACUT} \end{array} \frac{\text{UoA yr}}{\text{L}} \cdot \begin{array}{c} \lambda \\ \text{decay} \end{array} \cdot \begin{array}{c} c \\ \text{AL} \end{array} \text{yr}^{-1} \cdot \begin{array}{c} i \\ \text{HOLDDW} \end{array} \text{d} \cdot 2.74 \times 10^{-3} \frac{\text{yr}}{\text{d}} = \begin{array}{c} c \\ \text{WATCON} \end{array} \frac{\text{UoA yr}}{\text{L}}$$

debug

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

MEDIA CONCENTRATION: SURFACE WATER
Subroutine: ACUTE1, ACUTE2, ACUTE3, DRXCAL, AQUICAL

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:

ACUTE AIR RELEASE DECAY FOR TRANSIT TIME FOR EACH DISTANCE (i) IN SPECIFIED DIRECTION

$$\begin{aligned}
 &\text{Acute Air Release Term} \cdot e^{-\left[\lambda_{\text{decay}} \cdot \text{Travel Time to Distance} \cdot \text{Unit Conversion} \right]} = \text{Decayed Acute Air Release Term} \\
 &\left[\frac{c}{\text{AL}} \text{ yr}^{-1} \cdot \frac{i}{\text{TTAIR}_i} \text{ sec} \cdot 3.17 \times 10^{-8} \frac{\text{yr}}{\text{sec}} \right] = \frac{c}{\text{DKAIR}_i} \text{ UoA} \\
 &\text{QAIR} \cdot e^{-\left[\frac{c}{\text{AL}} \text{ yr}^{-1} \cdot \frac{i}{\text{TTAIR}_i} \text{ sec} \cdot 3.17 \times 10^{-8} \frac{\text{yr}}{\text{sec}} \right]} = \frac{c}{\text{DKAIR}_i} \text{ UoA} \\
 &\text{debug}
 \end{aligned}$$

AVERAGE OR MAXIMUM INDIVIDUAL AIR CONCENTRATION AT DISTANCE (i) FROM ACUTE RELEASE - INFINITE PLUME

$$\begin{aligned}
 &\text{Decayed Air Release Term} \cdot E/Q = \text{Individual Acute Air Exposure} \\
 &\frac{c}{\text{DKAIR}_i} \text{ UoA} \cdot \frac{i/c}{\text{XQOI}} \text{ sec} = \frac{c}{\text{PMTAIR}} \text{ UoA sec} \\
 &\text{QAIR} \cdot \frac{i/c}{\text{XQOI}} \text{ sec} = \frac{c}{\text{PMTAIR}} \text{ UoA sec} \\
 &\text{MEDIA.OUT}
 \end{aligned}$$

AVERAGE POPULATION-WEIGHTED AIR CONCENTRATION FROM ACUTE RELEASE - INFINITE PLUME (Population, XQOPT=3)

$$\begin{aligned}
 &\text{Summed Over Each Distance In Sector} \left[\frac{\text{Decayed Air Release Term} \cdot \text{Population-Weighted E/Q by Distance}}{\text{Total Population In Sector}} \right] = \text{Average Population-Weighted Air Exposure} \\
 &\sum_{i=1}^{\text{NDIST}} \left[\frac{\frac{c}{\text{DKAIR}_i} \text{ UoA} \cdot \frac{i/c}{\text{PWT}_i} \text{ person sec}}{\text{TPOPS}} \right] = \frac{c}{\text{PMTAIR}} \text{ UoA sec} \\
 &\text{MEDIA.OUT}
 \end{aligned}$$

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

MEDIA CONCENTRATION: AIR
Subroutine: ACUTE1

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

INDIVIDUAL DOSE FACTOR AT DISTANCE (i) FROM ACUTE RELEASE - FINITE PLUME

Summed Over Energy Groups

Air Release Term • External Dose Rate Factor For Finite Plume • Energy per Disintegration • Surface Dose Correction = Individual Acute = Air Exposure

$$\sum_{k=1}^6 \left[\frac{c}{DKAIRA_i} \cdot UoA \cdot \frac{i/c}{DRFSAV_k} \cdot \frac{rem\ dis}{Ci\ MeV} \cdot \frac{1}{EDIS_k} \cdot \frac{MeV}{dis} \cdot FC_k \right] = \frac{c}{PWTXAR} \cdot \frac{UoA\ rem}{Ci}$$

debug

AVERAGE POPULATION-WEIGHTED SUBMERSION DOSE COEFFICIENTS FROM ACUTE RELEASE - FINITE PLUME

Summed Over Each Distance In Sector and Energy Group

Decayed Air Release Term • Population-weighted Dose Rate Factor by Distance and Energy • Energy per Disintegration • Surface Dose Correction = Intermediate Value

$$\sum_{k=1}^6 \sum_{i=1}^{NDIST} \left[\frac{c}{DKAIRA_i} \cdot UoA \cdot \frac{i/c}{PWTX_i} \cdot \frac{person\ rem\ dis}{Ci\ MeV} \cdot \frac{1}{EDIS} \cdot \frac{MeV}{dis} \cdot FC \right] = \frac{c}{PWTXAR}$$

Intermediate Value / Total Population In Sector = Average Population-weighted Air Exposure

$$\frac{c}{TPOPS} \cdot person = \frac{c}{PWTXAR} \cdot \frac{UoA\ rem}{Ci}$$

debug

Parameter Source Legend:

i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

MEDIA CONCENTRATION: AIR
 Subroutine: ACUTE1

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

ACUTE SOIL DEPOSITION FROM AIR

Air Concentration • Deposition Velocity = Initial Soil Deposition From Air

$$c \frac{\text{UoA sec}}{\text{PWTAIR}} \cdot \frac{\text{DPVL}}{\text{sec}} = c \frac{\text{UoA}}{\text{CT0AIR}}$$

debug

IRRIGATION DEPOSITION RATE ONTO SOIL FROM AN ACUTE RELEASE

Water Concentration • Irrigation Application Rate • Unit Conversion = Initial Soil Deposition From Irrigation

$$\frac{i/c}{\text{WATCON}} \cdot \frac{\text{UoA yr}}{\text{L}} \cdot \frac{\text{RIRR}}{\text{yr}} \cdot \frac{25.4 \text{ L}}{\text{LM2IN}} = c \frac{\text{UoA}}{\text{CT0IRR}}$$

RIRR
RIRRA
RIRRR

TOTAL SURFACE ACUTE DEPOSITION

Initial Deposition From Air + Initial Deposition From Irrigation = Initial Surface = Soil Deposition*

$$\frac{i/c}{\text{CT0AIR}} \cdot \frac{\text{UoA}}{\text{2}} + \frac{i}{\text{CT0IRR}} \cdot \frac{\text{UoA}}{\text{2}} = c \frac{\text{UoA}}{\text{2}}$$

SOLCON
SL2CON
RESSOL

MEDIA.OUT

*Winter: Contamination is from air only

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value
p - program constant

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutine: ACUTEA ACUTEC

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

AVERAGE RESIDENTIAL SURFACE SOIL CONCENTRATION - ACUTE RELEASE

$$\text{Initial Surface Soil Deposition} \cdot \frac{1.0 - e^{-\left(\lambda_{\text{decay}} \cdot 1 \text{ yr}\right)}}{\lambda_{\text{decay}}} = \text{Residential Surface Soil Concentration}$$

$$\frac{c}{\text{RESSOL}} \frac{\text{UoA}}{\text{m}^2} \cdot \frac{1.0 - e^{-\left[\frac{c}{\text{AL}} \text{yr}^{-1} \cdot 1 \text{ yr}\right]}}{\frac{c}{\text{AL}} \text{yr}^{-1}} = \frac{c}{\text{RESSOL}} \frac{\text{UoA}}{\text{m}^2}$$

DECAY SOILS TO TIME OF HARVEST - ACUTE RELEASE

$$\text{Surface Soil Concentration* (Food Production)} \cdot e^{-\left(\lambda_{\text{decay}} \cdot \text{Time to Harvest**}\right)} = \text{Decayed Surface Soil Concentration}$$

$$\frac{i}{\text{SOLCON}} \frac{\text{UoA}}{\text{m}^2} \cdot e^{-\left[\frac{c}{\text{AL}} \text{yr}^{-1} \cdot \text{p} \text{yr}\right]} = \frac{c}{\text{SOLHAR}} \frac{\text{UoA}}{\text{m}^2}$$

* Winter: Contamination is from air only

** Winter: 6 mo
Spring: 3 mo
Summer: 1 mo

Parameter Source Legend:

i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value
p - program constant

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutine: ACUTEA ACUTEC

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

PLANT CONCENTRATION FROM ROOT UPTAKE - ACUTE RELEASE (LEAFY VEGETABLES / FRESH FORAGE) SPRING AND SUMMER

Surface Soil Concentration	Soil / Density	Concentration Ratio • UoA/kg (wet plant)/ UoA/kg (dry soil)	Fraction • Roots in Surface Soil	Dry Weight/ Wet Weight Ratio	Intermediate Value
$\frac{c/i}{2}$	$\frac{d/i}{224.0} \frac{kg}{2}$	$\frac{1}{BVI} \frac{UoA/kg}{UoA/kg}$	$\frac{i}{RF1}$	$\frac{d/i}{DRYFAC}$	$=$
SOLCON SL2CON	SLDN	BVI	RF1	DRYFAC DRYFA2	

Intermediate Value

$$= \frac{1.0 - e^{-\left(\lambda_{decay} \cdot 1 \text{ yr}\right)}}{\lambda_{decay}} = \text{Time-Integrated Plant Concentration From Root Uptake}$$

$$\frac{c}{kg} \cdot \frac{1.0 - e^{-\left[\frac{c}{AL} \text{ yr}^{-1} \cdot 1.0 \text{ yr}\right]}}{\frac{c}{AL} \text{ yr}^{-1}} = \frac{c}{kg} \text{ ROOTCN}$$

PLANT CONCENTRATION FROM ROOT UPTAKE FOR OTHER SEASONS AND OTHER FOODS - ACUTE RELEASE

Decayed Surface Soil Concentration	Soil / Density	Concentration Ratio • UoA/kg (wet plant)/ UoA/kg (dry soil)	Fraction • Roots in Surface Soil	Dry Weight/ Wet Weight Ratio	Root Uptake From Surface Soil
$\frac{c/i}{2}$	$\frac{d/i}{224.0} \frac{kg}{2}$	$\frac{1}{BVI} \frac{UoA/kg}{UoA/kg}$	$\frac{i}{RF1}$	$\frac{d/i}{DRYFAC}$	$= \frac{\text{ROOTCN}}{kg}$
SOLHAR	SLDN	BVI	RF1	DRYFAC	ROOTCN
					debug

Note: No Root Uptake in Autumn

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value
p - program constant

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutine: ACUTEA ACUTEC

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

TIME-INTEGRATED LEAF CONTRIBUTION FROM ACUTE AIR DEPOSITION (EXCEPT WINTER)

$$\begin{array}{ccccccc}
 \text{Initial Soil} & \cdot & \text{Air} & / & \text{Standing} & \cdot & \text{Translocation} & = & \text{Intermediate} \\
 \text{Deposition} & & \text{Interception} & & \text{Biomass} & & \text{Factor} & & \text{Value} \\
 \text{From Air} & & \text{Fraction}^* & & & & & & \\
 \\
 \boxed{c} & \cdot & \boxed{c} & / & \boxed{\frac{d/i}{2}} & \cdot & \boxed{\frac{d/i}{2}} & = & \boxed{\frac{c}{kg}} \\
 \text{CT0AIR} & & \text{DEPFR1}^* & & \text{BIOMAS} & & \text{TRANS} & & \text{CBARA} \\
 & & & & \text{BIOMA2} & & \text{TRANSA} & &
 \end{array}$$

* Use worksheet in chronic release section

TIME-INTEGRATED LEAF CONTRIBUTION FROM IRRIGATION (EXCEPT WINTER)

$$\begin{array}{ccccccc}
 \text{Initial Soil} & \cdot & \text{Irrigation} & / & \text{Standing} & \cdot & \text{Translocation} & = & \text{Intermediate} \\
 \text{Deposition} & & \text{Interception} & & \text{Biomass} & & \text{Factor} & & \text{Value} \\
 \text{From Water} & & \text{Fraction} & & & & & & \\
 \\
 \boxed{c} & \cdot & \boxed{\frac{d/i}{2}} & / & \boxed{\frac{d/i}{2}} & \cdot & \boxed{\frac{d/i}{2}} & = & \boxed{\frac{c}{kg}} \\
 \text{CT0IRR} & & \text{DEPFR2} & & \text{BIOMAS} & & \text{TRANS} & & \text{CBARI} \\
 & & & & \text{BIOMA2} & & \text{TRANSA} & &
 \end{array}$$

TOTAL LEAF CONCENTRATION - ACUTE RELEASE

$$\begin{array}{ccc}
 \text{Air} & \text{Irrigation} & \text{Total Leaf} \\
 \text{Contribution} & + \text{Contribution} & = \text{Concentration} \\
 \\
 \boxed{\frac{c}{kg}} & + \boxed{\frac{c}{kg}} & = \boxed{\frac{c}{kg}} \\
 \text{CBARA} & \text{CBARI} & \text{LEAFCN}
 \end{array}$$

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value
p - program constant

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutine: ACUTEA ACUTEC

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

LEAFY VEGETABLES / FRESH FORAGE (SPRING, SUMMER, AND FALL)

$$\text{Leaf Concentration} \cdot \frac{1.0 - e^{-\left(\lambda_{\text{decay}} + \lambda_{\text{weathering}^*}\right)} \cdot 12 \text{ mo}}{\lambda_{\text{decay}} + \lambda_{\text{weathering}^*}} = \text{Time-Integrated Plant Contribution From Air Deposition onto Leaves}$$

$$\frac{c}{\text{LEAFCN}} \frac{\text{UoA}}{\text{kg}} \cdot \frac{1.0 - e^{-\left[\frac{c}{\text{AL}} + \frac{c}{\text{TENV2}^*} \right] \text{yr}^{-1}} \cdot 1.0 \text{ yr}}{\frac{c}{\text{AL}} \text{yr}^{-1} + \frac{c}{\text{TENV2}^*} \text{yr}^{-1}} = \frac{c}{\text{CBARA}} \frac{\text{UoA}}{\text{kg}} \text{ yr}$$

* No weathering in autumn, set to 0.0

OTHER VEGETABLES, FRUIT AND GRAIN (SUMMER)

$$\text{Leaf Contribution} \cdot e^{-\left(\lambda_{\text{decay}} + \lambda_{\text{weathering}}\right)} \cdot 1 \text{ mo} = \text{Leaf Contribution}$$

$$\frac{i}{\text{LEAFCN}} \frac{\text{UoA}}{\text{kg}} \cdot e^{-\left[\frac{c}{\text{AL}} + \frac{c}{\text{TENV TENV2}} \right] \text{yr}^{-1}} \cdot 0.083 \text{ yr} = \frac{c}{\text{LEAFCN}} \frac{\text{UoA}}{\text{kg}}$$

TOTAL TERRESTRIAL FOOD CONTRIBUTION - ACUTE RELEASE

$$\left[\text{Leaf Contribution} + \text{Surface Soil Root Contribution} \right] = \text{Total Forage Contribution}$$

$$\left[\frac{c}{\text{LEAFCN}} \frac{\text{UoA}}{\text{kg}} + \frac{c}{\text{ROOTCN}} \frac{\text{UoA}}{\text{kg}} \right] = \frac{c}{\text{FOODCN}} \frac{\text{UoA}}{\text{kg}}$$

debug

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value
p - program constant

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutine: ACUTEA ACUTEC

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

TOTAL FORAGE CONCENTRATION - ACUTE RELEASE

$$\begin{aligned}
 & \left[\begin{array}{c} \text{Leaf} \\ \text{Contribution} \end{array} + \begin{array}{c} \text{Surface} \\ \text{Soil Root} \\ \text{Contribution} \end{array} \right] \cdot \begin{array}{c} \text{Animal Diet} \\ \text{Forage Fraction} \end{array} = \begin{array}{c} \text{Total Forage} \\ \text{Contribution} \end{array} \\
 & \left[\begin{array}{c} c \\ \text{LEAFCN} \end{array} \frac{\text{UoA}}{\text{kg}} + \begin{array}{c} c \\ \text{ROOTCN} \end{array} \frac{\text{UoA}}{\text{kg}} \right] \cdot \begin{array}{c} \text{FRACUT} \end{array} = \begin{array}{c} c \\ \text{FORAGE} \end{array} \frac{\text{UoA}}{\text{kg}} \\
 & \quad \quad \quad \text{debug}
 \end{aligned}$$

TOTAL STORED FEED CONCENTRATION - ACUTE RELEASE

$$\begin{aligned}
 & \left[\begin{array}{c} \text{Leaf} \\ \text{Contribution} \end{array} + \begin{array}{c} \text{Surface} \\ \text{Soil Root} \\ \text{Contribution} \end{array} \right] \cdot \begin{array}{c} \text{Animal Diet Stored} \\ \text{Feed Fraction} \end{array} = \begin{array}{c} \text{Intermediate} \\ \text{Value} \end{array} \\
 & \left[\begin{array}{c} c \\ \text{LEAFCN} \end{array} \frac{\text{UoA}}{\text{kg}} + \begin{array}{c} c \\ \text{ROOTCN} \end{array} \frac{\text{UoA}}{\text{kg}} \right] \cdot \left[1.0 - \begin{array}{c} \text{FRACUT} \end{array} \right] = \begin{array}{c} c \\ \text{UoA} \\ \text{kg} \end{array}
 \end{aligned}$$

$$\begin{aligned}
 & \text{Intermediate Value} \cdot \frac{1.0 - e^{-\left(\lambda_{\text{decay}} \cdot 12 \text{ mo} \right)}}{\lambda_{\text{decay}}} = \begin{array}{c} \text{Time-Integrated} \\ \text{Grain Concentration} \end{array}
 \end{aligned}$$

$$\begin{aligned}
 & \begin{array}{c} c \\ \text{UoA} \\ \text{kg} \end{array} \cdot \frac{1.0 - e^{-\left[\begin{array}{c} c \\ \text{AL} \end{array} \text{yr}^{-1} \cdot 1.0 \text{ yr} \right]}}{\begin{array}{c} c \\ \text{AL} \end{array} \text{yr}^{-1}} = \begin{array}{c} c \\ \text{GRAIN} \end{array} \frac{\text{UoA}}{\text{kg}}
 \end{aligned}$$

Parameter Source Legend:
 i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value
 p - program constant

PLANT AND ANIMAL PRODUCT CONCENTRATION
 Subroutine: ACUTEA ACUTEC

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:

ANIMAL CONSUMPTION OF DRINKING WATER - ACUTE RELEASE

Time-Integrated Decayed Surface Water Concentration • Animal Drinking Water Consumption Rate • Fraction Water from This Source = Animal Drinking Water Factor

$$\frac{c}{\text{WATCON}} \frac{\text{UoA yr}}{\text{L}} \cdot \frac{d/i}{\text{DWATER}} \frac{\text{L}}{\text{d}} \cdot \frac{i}{\text{DWFACA}} = \frac{c}{\text{DW}} \frac{\text{UoA yr}}{\text{d}}$$

ANIMAL INTAKE - ACUTE DEPOSITION

[Time-Integrated Forage Concentration • Animal Consumption Rate] + [Time-Integrated Stored Feed Concentration • Animal Consumption Rate] + Animal Drinking Water Contribution = Animal Feed and Forage Contribution

$$\left[\frac{\text{FORAGE}}{\text{kg}} \frac{\text{UoA yr}}{\text{kg}} \cdot \frac{\text{CONSUM}}{\text{d}} \frac{\text{kg}}{\text{d}} \right] + \left[\frac{\text{GRAIN}}{\text{kg}} \frac{\text{UoA yr}}{\text{kg}} \cdot \frac{\text{CONSUM}}{\text{d}} \frac{\text{kg}}{\text{d}} \right] + \frac{\text{DW}}{\text{d}} \frac{\text{UoA yr}}{\text{d}} = \frac{\text{ANIMCN}}{\text{d}} \frac{\text{UoA yr}}{\text{d}}$$

ANIMAL PRODUCT CONCENTRATION - ACUTE DEPOSITION

Plant/Animal Transfer Coefficient • Time-Integrated Animal Product Concentration = Animal Product Concentration

$$\frac{\text{ANIMCN}}{\text{d}} \frac{\text{UoA yr}}{\text{d}} \cdot \frac{I}{\text{FMI}} \frac{\text{UoA/kg}}{\text{UoA/d}} = \frac{c}{\text{ANIMCN}} \frac{\text{UoA yr}}{\text{kg}}$$

DECAY FOR HOLDUP BETWEEN HARVEST AND CONSUMPTION OF TERRESTRIAL FOODS AND ANIMAL PRODUCTS - ACUTE RELEASE

Food Concentration • $e^{-\left(\lambda_{\text{decay}} \cdot \text{Holdup Period} \cdot \text{Unit Conversion} \right)}$ = Food Concentration

$$\frac{c}{\text{FOODCN ANIMCN}} \frac{\text{UoA}}{\text{kg}} \cdot e^{-\left[\frac{c}{\text{AL}} \text{yr}^{-1} \cdot \frac{i}{\text{HLDUP HLDUPA}} \text{d} \cdot 2.74\text{E-}3 \frac{\text{yr}}{\text{d}} \right]} = \frac{c}{\text{FOODCN ANIMCN}} \frac{\text{UoA}}{\text{kg}}$$

Parameter Source Legend:
i - GENII.IN
I - library value
d - DEFAULT.IN
c - calculated value
p - program constant

PLANT AND ANIMAL PRODUCT CONCENTRATION
Subroutine: ACUTEA ACUTEC

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

HUMAN CONSUMPTION INTEGRAL (LEAFY VEGETABLES IN WINTER, OTHERS ALWAYS)

Terrestrial Food Contribution

$$c \cdot \frac{1.0 - e^{-\left(\lambda_{\text{decay}} \cdot 12 \text{ mo}\right)}}{\lambda_{\text{decay}}} = \text{Time-Integrated Food Concentration}$$

$$\frac{c \cdot \text{UoA}}{\text{kg}} \cdot \frac{1.0 - e^{-\left[\frac{c}{\text{AL}} \text{ yr}^{-1} \cdot 1.0 \text{ yr}\right]}}{\frac{c}{\text{AL}} \text{ yr}^{-1}} = \frac{c \cdot \text{UoA}}{\text{kg}} \cdot \text{yr}$$

FOODCN

HUMAN UPTAKE RATE FROM TERRESTRIAL FOODS AND ANIMAL PRODUCTS - ACUTE RELEASE

Food Concentration • Human Consumption Rate • Effective Population • Export Adjustment = Human Uptake Rate from Consumption of Foods

$$\frac{c}{\text{kg}} \cdot \frac{i}{\text{person yr}} \cdot c \cdot \text{person} \cdot c = \frac{c \cdot \text{UoA}}{\text{yr}}$$

FOODCN ANIMCN CONS CONS2 EFPOP EFPOPA ADJEAT ADJET2 EXPOS

ENV.OUT

EXTERNAL EXPOSURE FROM INFINITE PLUME - ACUTE RELEASE

Population-weighted Air Concentration • Unit Conversion • Average Fraction of Time Submersed in Cloud • Exposed Population in Sector = Exposure = Rate from Infinite Plume

$$\frac{c}{\text{UoA sec}} \cdot \frac{3.17 \times 10^{-8} \text{ yr}}{\text{sec}} \cdot \frac{i}{\text{person hr}} \cdot \frac{i/c}{\text{person}} = \frac{c \cdot \text{UoA in 1st yr}}{\text{yr}}$$

PWTAIR YRSEC FRCL0D TPOPS EXPOS

ENV.OUT

Parameter Source Legend:
 i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

EXPOSURE: TERRESTRIAL FOOD AND ANIMAL PRODUCT INGESTION
 Subroutines: ACUTEC, ACUTEA

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

EXTERNAL EXPOSURE FROM FINITE PLUME - ACUTE RELEASE

Average Population-Weighted Air Exposure $\cdot$ Average Fraction of Time Spent in Cloud $\cdot$ Exposed Population In Sector = External Exposure From Finite Plume

$$\frac{c}{\text{PWTXAR}} \frac{\text{UoA rem}}{Ci} \cdot \frac{i}{\text{HREFPL}} \frac{\text{hr}}{\text{person hr}} \cdot \frac{i/c}{\text{TPOPS}} \text{person} = \frac{c}{\text{EXPOS}} \frac{\text{UoA rem}}{Ci}$$

ENV. OUT

EXTERNAL EXPOSURE FACTOR FROM THE SURFACE SOIL - ACUTE RELEASE

Residential/Resuspension Surface Soil Concentration $\cdot$ Duration of Exposure $\cdot$ Unit Conversion $\cdot$ Exposed Population in Sector = External Exposure Factor from Surface Soil

$$\frac{c/i}{\text{RESSOL}} \frac{\text{UoA yr}}{m^2} \cdot \frac{i}{\text{HRRGD}} \frac{\text{hr}}{\text{person yr}} \cdot 1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}} \cdot \frac{i/c}{\text{TPOPS}} \text{person} = \frac{c}{\text{EXPOS}} \frac{\text{UoA yr}}{m^2}$$

ENV. OUT

EXPOSURE FROM INGESTION OF DRINKING WATER - ACUTE RELEASE

Time-Integrated Decayed Surface Water Concentration $\cdot$ Drinking Water Clean Up Factor $\cdot$ Drinking Water Consumption Rate $\cdot$ Drinking Water Population = Drinking Water Exposure

$$\frac{c}{\text{WATCON}} \frac{\text{UoA yr}}{L} \cdot \frac{i}{\text{DWCLEN}} \cdot \frac{i}{\text{DWUSAG}} \frac{L}{\text{person yr}} \cdot \frac{i}{\text{DWPOP}} \text{person} = \frac{c}{\text{EXPOS}} \text{UoA}$$

ENV. OUT

Parameter Source Legend:

i - GENII.IN
 l - library value
 d - DEFAULT.IN
 c - calculated value

EXPOSURE: EXTERNAL
 Subroutines: EXTCAL

CHRONIC RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

INHALATION EXPOSURE (ACUTE PORTION) - ACUTE RELEASE

Average Population- Weighted Air Exposure	•	Acute Exposure Breathing Rate	•	Unit Conversion	•	Average Fraction of Time Spent in Cloud	•	Exposed Population In Sector	=	Inhalation Exposure (Acute Portion)
$\frac{c}{\text{PWTAIR}} \frac{\text{UoA sec}}{\text{m}^3}$	•	$\frac{d/i}{\text{RINHA}} \frac{\text{cm}^3}{\text{sec}}$	•	$1.0 \times 10^{-6} \frac{\text{m}^3}{\text{cm}^3}$	•	$\frac{i}{\text{FRCLD}} \frac{\text{hr}}{\text{person hr}}$	•	$\frac{i/c}{\text{TPQPS}} \text{ person}$	=	$\frac{c}{\text{ACUTE P}} \text{ UoA}$

INHALATION EXPOSURE (CHRONIC PORTION) - ACUTE RELEASE

Residential/ Resuspension Surface Soil Concentration	•	Resuspension Factor	•	Chronic Breathing Rate	•	Unit Conversion	•	Unit Conversion	=	Intermediate Value
$\frac{i/c}{\text{RESSOL}} \frac{\text{UoA yr}}{\text{m}^2}$	•	$\frac{c}{\text{RESFAC}} \text{ m}^{-1}$	•	$\frac{d/i}{\text{RINH}} \frac{\text{cm}^3}{\text{sec}}$	•	$1.0 \times 10^{-6} \frac{\text{m}^3}{\text{cm}^3}$	•	$3.15 \times 10^7 \frac{\text{sec}}{\text{yr}}$	=	$\frac{c}{\text{SECYR}} \text{ UoA}$

Intermediate Value	•	Exposure Duration	•	Unit Conversion	•	Exposed Population In Sector	=	Inhalation Exposure (Chronic Portion)
$\frac{c}{\text{UoA}}$	•	$\frac{i}{\text{HRINH}} \frac{\text{hr}}{\text{person yr}}$	•	$1.14 \times 10^{-4} \frac{\text{yr}}{\text{hr}}$	•	$\frac{i/c}{\text{TPQPS}} \text{ person}$	=	$\frac{c}{\text{CHRONP}} \text{ UoA}$

TOTAL INHALATION EXPOSURE FROM AN ACUTE RELEASE

Inhalation Exposure (Acute)	+	Inhalation Exposure (Chronic)	=	Total Inhalation Exposure
$\frac{c}{\text{ACUTE P}} \text{ UoA}$	+	$\frac{c}{\text{CHRONP}} \text{ UoA}$	=	$\frac{\text{EXPOS}}{\text{ENV.OUT}} \text{ UoA in 1st year}$

Parameter Source Legend:
i - GENII.IN
l - library value
d - DEFAULT.IN
c - calculated value

EXPOSURE: Inhalation
Subroutine: INHCAL

ACUTE RELEASE

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

INTERNAL DOSE INCREMENT FOR EACH INGESTION PATHWAY

Uptake/ Exposure Rate	• Dose Rate Factor	Unit • Conversion Factor	= Internal Dose Increment in Sieverts	Unit • Conversion Factor	= Internal Dose Increment In Rem
-----------------------------	-----------------------	--------------------------------	---	--------------------------------	--

INHALATION:

$$\boxed{\text{EXPOS}} \frac{\text{UoA}}{\text{yr}} \cdot \boxed{\text{DFH}} \frac{\text{person Sv}}{\text{Bq}} \cdot \boxed{\text{NVU}} \frac{\text{Bq}}{\text{UoA}} = \boxed{\text{DOSINC}} \text{ Sv} \cdot 100.0 \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \frac{\text{person rem}}{\text{yr}}$$

TERRESTRIAL FOOD INGESTION:

$$\boxed{\text{EXPOS}} \frac{\text{UoA}}{\text{yr}} \cdot \boxed{\text{DFG}} \frac{\text{person Sv}}{\text{Bq}} \cdot \boxed{\text{NVU}} \frac{\text{Bq}}{\text{UoA}} = \boxed{\text{DOSINC}} \text{ Sv} \cdot 100.0 \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \frac{\text{person rem}}{\text{yr}}$$

ANIMAL PRODUCT INGESTION:

$$\boxed{\text{EXPOS}} \frac{\text{UoA}}{\text{yr}} \cdot \boxed{\text{DFG}} \frac{\text{person Sv}}{\text{Bq}} \cdot \boxed{\text{NVU}} \frac{\text{Bq}}{\text{UoA}} = \boxed{\text{DOSINC}} \text{ Sv} \cdot 100.0 \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \frac{\text{person rem}}{\text{yr}}$$

INADVERTENT SOIL INGESTION:

$$\boxed{\text{EXPOS}} \frac{\text{UoA}}{\text{yr}} \cdot \boxed{\text{DFG}} \frac{\text{person Sv}}{\text{Bq}} \cdot \boxed{\text{NVU}} \frac{\text{Bq}}{\text{UoA}} = \boxed{\text{DOSINC}} \text{ Sv} \cdot 100.0 \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \frac{\text{person rem}}{\text{yr}}$$

INADVERTENT SWIMMING WATER INGESTION:

$$\boxed{\text{EXPOS}} \frac{\text{UoA}}{\text{yr}} \cdot \boxed{\text{DFG}} \frac{\text{person Sv}}{\text{Bq}} \cdot \boxed{\text{NVU}} \frac{\text{Bq}}{\text{UoA}} = \boxed{\text{DOSINC}} \text{ Sv} \cdot 100.0 \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \frac{\text{person rem}}{\text{yr}}$$

DRINKING WATER INGESTION:

$$\boxed{\text{EXPOS}} \frac{\text{UoA}}{\text{yr}} \cdot \boxed{\text{DFG}} \frac{\text{person Sv}}{\text{Bq}} \cdot \boxed{\text{NVU}} \frac{\text{Bq}}{\text{UoA}} = \boxed{\text{DOSINC}} \text{ Sv} \cdot 100.0 \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \frac{\text{person rem}}{\text{yr}}$$

AQUATIC FOOD INGESTION:

$$\boxed{\text{EXPOS}} \frac{\text{UoA}}{\text{yr}} \cdot \boxed{\text{DFG}} \frac{\text{person Sv}}{\text{Bq}} \cdot \boxed{\text{NVU}} \frac{\text{Bq}}{\text{UoA}} = \boxed{\text{DOSINC}} \text{ Sv} \cdot 100.0 \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \frac{\text{person rem}}{\text{yr}}$$

If input units = pCi, then NVU = 0.037 Bq/UoA
 If input units = uCi, then NVU = 3.7E+4 Bq/UoA
 If input units = mCi, then NVU = 3.7E+7 Bq/UoA
 If input units = Ci, then NVU = 3.7E+10 Bq/UoA
 If input units = Bq, then NVU = 1.0 Bq/UoA

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

EXTERNAL DOSE INCREMENT FOR EACH EXTERNAL EXPOSURE PATHWAY

Uptake/
Exposure
Rate • Dose Rate
Factor Unit
• Conversion External Dose
= Increment in Unit
Sieverts • Conversion = Increment
In Rem

INFINITE PLUME

$$\boxed{\text{UoA}} \xrightarrow{\frac{\text{UoA}}{\text{m}^3}} \boxed{\text{DAIT}} \xrightarrow{\frac{\text{person Sv/yr}}{\text{Bq/m}^3}} \boxed{\text{NVU}} \xrightarrow{\frac{\text{Bq}}{\text{UoA}}} \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{Sv} \cdot 100.0}{\text{Sv}}} \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{person rem}}{\text{yr}}}$$

FINITE PLUME

$$\boxed{\text{UoA}} \xrightarrow{\frac{\text{UoA person rem}}{\text{Ci yr}}} \boxed{\text{NVU}} \xrightarrow{\frac{\text{Bq}}{\text{UoA}}} \cdot 2.7 \times 10^{-11} \frac{\text{Ci}}{\text{Bq}} = \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{person rem}}{\text{yr}}}$$

SURFACE SOIL

$$\boxed{\text{UoA}} \xrightarrow{\frac{\text{UoA}}{\text{m}^2}} \boxed{\text{DSIT}} \xrightarrow{\frac{\text{person Sv/yr}}{\text{Bq/m}^3} / 0.15 \frac{\text{m}^3}{\text{m}^2}} \boxed{\text{NVU}} \xrightarrow{\frac{\text{Bq}}{\text{UoA}}} \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{Sv} \cdot 100.0}{\text{Sv}}} \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{person rem}}{\text{yr}}}$$

DEEP SOIL

$$\boxed{\text{UoA}} \xrightarrow{\frac{\text{UoA}}{\text{m}^3}} \boxed{\text{DDIT(1)}} \xrightarrow{\frac{\text{person Sv/yr}}{\text{Bq/m}^3}} \boxed{\text{NVU}} \xrightarrow{\frac{\text{Bq}}{\text{UoA}}} \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{Sv} \cdot 100.0}{\text{Sv}}} \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{person rem}}{\text{yr}}}$$

CONTAINED BURIED WASTE

$$\boxed{\text{UoA}} \xrightarrow{\frac{\text{UoA}}{\text{m}^3}} \boxed{\text{DDIT(1,2,or3)}} \xrightarrow{\frac{\text{person Sv/yr}}{\text{Bq/m}^3}} \boxed{\text{NVU}} \xrightarrow{\frac{\text{Bq}}{\text{UoA}}} \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{Sv} \cdot 100.0}{\text{Sv}}} \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{person rem}}{\text{yr}}}$$

SWIMMING

$$\boxed{\text{UoA}} \xrightarrow{\frac{\text{UoA}}{\text{L}}} \cdot 2.0(a) \cdot \boxed{\text{DBIT}} \xrightarrow{\frac{\text{person Sv/yr}}{\text{Bq/L}}} \boxed{\text{NVU}} \xrightarrow{\frac{\text{Bq}}{\text{UoA}}} \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{Sv} \cdot 100.0}{\text{Sv}}} \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{person rem}}{\text{yr}}}$$

BOATING

$$\boxed{\text{UoA}} \xrightarrow{\frac{\text{UoA}}{\text{L}}} \boxed{\text{DBIT}} \xrightarrow{\frac{\text{person Sv/yr}}{\text{Bq/L}}} \boxed{\text{NVU}} \xrightarrow{\frac{\text{Bq}}{\text{UoA}}} \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{Sv} \cdot 100.0}{\text{Sv}}} \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{person rem}}{\text{yr}}}$$

FISHING AND SHORELINE ACTIVITIES

$$\boxed{\text{UoA}} \xrightarrow{\frac{\text{UoA}}{\text{L}}} \boxed{\text{DSIT}} \xrightarrow{\frac{\text{person Sv/yr}}{\text{Bq/m}^2}} \boxed{\text{NVU}} \xrightarrow{\frac{\text{Bq}}{\text{UoA}}} \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{Sv} \cdot 100.0}{\text{Sv}}} \frac{\text{rem}}{\text{Sv}} = \boxed{\text{DOSINC}} \xrightarrow{\frac{\text{person rem}}{\text{yr}}}$$

(a) Correction factor for semi-infinite to infinite

If input units = pCi, then NVU = 0.037 Bq/UoA
 If input units = uCi, then NVU = 3.7E+4 Bq/UoA
 If input units = mCi, then NVU = 3.7E+7 Bq/UoA
 If input units = Ci, then NVU = 3.7E+10 Bq/UoA
 If input units = Bq, then NVU = 1.0 Bq/UoA

Exhibit 4.1. GENII Hand Calculation Worksheets

Title:	Pathway or Organ:	Prepared by:	Date:
	Radionuclide:	Year:	Reviewed by:
			Date:

DOSE

Dose Commitment Year (IY):

	1	2	3	4	5
Internal Intake Year (IE):					
5					ID=1
4				ID=1	ID=2
3			ID=1	ID=2	ID=3
2		ID=1	ID=2	ID=3	ID=4
1	ID=1	ID=2	ID=3	ID=4	ID=5

Committed Dose Equivalent

Internal Annual Dose

Year 1 Year 2 Year 3 Year 4 Year 5

Cumulative Internal Dose

External Annual Dose

Year 1 Year 2 Year 3 Year 4

External Dose

Annual Dose

Year 1 (One Year Dose) Year 2 Year 3 Year 4 Year 5

Cumulative Dose

Maximum Annual Dose Increment

(Largest annual dose listed above)

Committed Dose Equivalent + External Annual Dose Year 1 = Annual Effective Dose Equivalent

If input units = pCi, then NVU = 0.037 Bq/UoA
 If input units = uCi, then NVU = 3.7E+4 Bq/UoA
 If input units = mCi, then NVU = 3.7E+7 Bq/UoA
 If input units = Ci, then NVU = 3.7E+10 Bq/UoA
 If input units = Bq, then NVU = 1.0 Bq/UoA

5.0 LISTINGS

This section consists of listings of all computer codes, data libraries, and support data files. All computer codes are listed in Section 5.1. Following are listing of all data files, ordered by external file assignments as contained in the file named FILENAME.DAT, in Section 5.2.

5.1 CODE LISTINGS

Table 5.1 is a table of contents for the programs listed in this section. Listings of two utility codes are included in addition to listings of APPRENTICE and the six codes in the GENII Integrated Design/Maintenance Environment. GENERAL modules, COMMON BLOCKS, and the text of the APPRENTICE help screens are also included.

TABLE 5.1. Code Listings Table of Contents

APPRENTICE	5.3
APPRENTICE Help Screen Text	5.113
ENVIN	5.129
ENV	5.231
DOSE	5.345
DITTY	5.391
INTDF	5.507
EXTDF	5.587
UNFORMAT	5.663
UNSEE	5.667
GENERAL	5.669
COMMON BLOCKS	5.695

APPRENTICE

Program title:	APPRENTICE - A module of the GENII environmental dosimetry software package.
Prepared for:	U. S. Department of Energy under Contract DE-AC06-76RLO 1830
Contact:	Bruce Napier Pacific Northwest Laboratory Richland WA 99352 (509) 375-3916
Code developers:	R. A. Peloquin and B. A. Napier Pacific Northwest Laboratory Richland WA 99352

This code was prepared for an agency of the United States Government. Neither the United States Government or any agency thereof, or any of their employees, make any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use, or the results of such use, of any portion of this program or represents that its use by such third party would not infringe privately owned rights.

--- Program Information -----

Problem description:	To provide interactive input to the major modules of the GENII system.
Results format:	The output of APPRENTICE is an output file that can be used as GENII.IN.
Computer:	This version is for the IBM PC/AT.
Programming language:	Compiled BASIC using FINALLY (c) and FINALLY Modules (c).
Machine requirements:	IBM PC/AT with a minimum of 512 Kbytes random access memory and 1 20-Mbyte fixed disk drive.
Reference:	B. A. Napier, R. A. Peloquin, D. L. Strenge, and J. V. Ramsdell. 1988. "GENII - The Hanford Environmental Radiation Dosimetry Software

APPRENTICE

System." PNL-6584, Volumes 1, 2, and 3.
Pacific Northwest Laboratory, Richland, WA
99352

APPRENTICE

User interface control module with pull-down menus and pop-up
help screens for GENII

Control Module of Program APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 1-Sep-88 RAP
Reviewed and Approved: 14-Sept-88 BA Napier

This program uses FINALLY (c) and FINALLY MODULES (c) libraries,
(Copyright 1986 Komputererk Inc., Pittsburgh, PA).

Call msmenu.1 (z.i\$, z.h\$, iopt(), cmd\$(), zh.ch, ich)

z.i\$ - Initialization flag: if length $\diamond$ 0 then initialize arrays,
display banner and exit, if length=0 then make normal
entry to menu (input)
z.h\$ - Menu description goes to the right of the menu list (input)
iopt() - Number of options (commands) in each menu; iopt(1) for
main menu commands (the number of sub-menus), iopt(n) for
each sub-menu (input). OPTION BASE 1. (input)
jopt() - Default or currently selected option in each submenu
cmd\$(i,j) - Command titles; where i is the menu number (1 for the
main menu) and j is the command number 1 to iopt(i). (input)
iman - Starting command in main menu to be highlighted; 1 is
default for first entry, 0 will highlight the last entry
(wrap). (Input)
imenu - Index of current menu
isub - Starting command of the iman sub-menu to be highlighted.
0 is the default for no sub-menu to appear. (Input)
nmenu - Number of menus available
nopt - number of options in main menu, also number of submenus

DEFINT i-n
COMMON /errors/ nerr%
OPTION BASE 1
KEY OFF

APPRENTICE

```
DIM iopd(6), iopt(6), cmd$(5,5), jopt(5)
DIM iopd2(5), iopt2(5), cmd2$(5,13), jtrans(5), jinv(12)
DIM iopd3(5), iopt3(5), cmd3$(5,11), jexp(10), jrpt(4)
DIM iopd4(6), iopt4(6), cmd4$(6,5), jtf(5), jan(5), jaq(5)
DIM jflag(20), jrad(300), rmd$(300)
DIM ipage1(1300), ipage2(1300)

' Error handling for invalid numbers--
ON ERROR GOTO errhand

x= FRE("")
j$="Free string space: "+STR$(x) : CALL messag(j$)

' Initialize parameters--

CALL init ( iopd%, iopt%, cmd$, jopt%,
            iopd2%, iopt2%, cmd2$, jtrans%, jinv%,
            iopd3%, iopt3%, cmd3$, jexp%,
            iopd4%, iopt4%, cmd4$, jtf%, jan%, jaq%,
            z.h$ )

ON KEY ( 2) GOSUB updater
ON KEY ( 3) GOSUB switchr
ON KEY (11) GOSUB moveu
ON KEY (12) GOSUB move1
ON KEY (13) GOSUB mover
ON KEY (14) GOSUB moved
ON KEY (10) GOSUB doner
KEY 2, "Select"
KEY 3, "Page"
KEY 4, "" : KEY 5, "" : KEY 6, "" : KEY 7, "" : KEY 8, "" : KEY 9, ""
KEY 10, "End"

' Rad input page parameters; must be here because of function keys--
ib1 = 3 : ib2 = 8 : ib3 = 23 : ib4 = 68

nmenu = 12                                'number of menus
imenu = 1                                'start with first menu
jrpt(1) = 1                               'set AEDE only report as default

' Set up first help screen library--
GOSUB help1

'---- Display introduction, read master radionuclide library -----

CLS
CALL helpmenu.1 (-1, 1, ibuf, 1, 1, ilr, ilc, h$, iherr)
CALL helpmenu.1 (-1, 2, ibuf, iur, iuc, ilr, ilc, h$, iherr)
LOCATE 14,10 : PRINT "GENII Version 1.357"
LOCATE 3,60 : PRINT "Please wait, ";
```

APPRENTICE

```
LOCATE 4,60 : PRINT "loading files...";

' Read master radionuclide library--
CALL menu5 (7, imenu, jopt(), jinv(), jexp(), _
            nirmd, jrad(), rmd$(), cmd2$(), _
            ir, ic, icur, ib1, ib2, ib3, ib4, _
            idle, notdone, ipage1(), ipage2(), z.h$)

CALL helpmenu.1 (-1, 3, ibuf, iur, iuc, ilr, ilc, h$, iherr)

' Read parameter file--
CALL params (0, 0, 7, par$, jflag()) 'read parameter file

CALL music2
LOCATE 3,60 : PRINT "Press any key";
LOCATE 4,60 : PRINT "to continue... ";

waitb:
z$=INKEY$ : IF z$="" THEN GOTO waitb

CALL tblank (14,10,14,20)
CALL helpmenu.1 (0, 3, ibuf, iur, iuc, ilr, ilc, h$, iherr)
CALL helpmenu.1 (0, 2, ibuf, iur, iuc, ilr, ilc, h$, iherr)
CALL helpmenu.1 (0, 1, ibuf, 1, 1, ilr, ilc, h$, iherr)
CALL tblank (3,60,4,79)

CALL helpmenu.1 (-1, 4, ibuf, iur, iuc, ilr, ilc, h$, iherr)
LOCATE 24,10
PRINT "If you wish instruction on using APPRENTICE, press H:";
LOCATE 25,24 :PRINT "otherwise, any other key.";

waitc:
z$=INKEY$ : IF z$="" THEN GOTO waitc
CALL helpmenu.1 (0, 4, ibuf, iur, iuc, ilr, ilc, h$, iherr)
CALL tblank (24,1,25,79)

IF z$ = "H" OR z$ = "h" THEN
  FOR i = 1 TO 3
    CALL helpmenu.1 (-1, 4+i, ibuf, iur, iuc, ilr, ilc, h$, iherr)
    CALL waita
  NEXT i
  FOR i = 3 TO 1 STEP -1
    CALL helpmenu.1 (0, 4+i, ibuf, iur, iuc, ilr, ilc, h$, iherr)
  NEXT i
END IF

CALL genbox

'---- Primary control loop -----
```

APPRENTICE

```
      iold = 0 : idir = 1

main:

      Check if change of help screen library is necessary--
      IF imenu < 6 AND ihelp=2 THEN GOSUB help1
      IF imenu => 6 AND ihelp=1 THEN GOSUB help2

      IF imenu = 0 THEN
      imenu = 12

      ELSEIF imenu > nmenu THEN
      GOTO done

      ELSEIF imenu = 1 THEN
      CALL menu1 (iopd(), iopt%(), cmd$(), jopt%(), imenu%, z.h$ )

      ELSEIF imenu = 2 THEN

      Set no. of transport options for far-field scenario (move to menu2)--
      IF jopt(1) = 2 THEN
        iopt2(3) = 3 : jtrans(3) = 0 : jtrans(4) = 0
      ELSE
        iopt2(3) = iopd2(3)
      END IF

      CALL menu2 (iopd2(), iopt2(), cmd2$(), jtrans(), imenu, z.h$, _
        jinv(), jexp(), jopt())

      ELSEIF imenu = 3 THEN
      CALL menu3 (iopd3(), iopt3(), cmd3$(), jexp(), jrpt(), imenu, z.h$ )
      CALL tblank (2,1,24,80) : CALL genbox

      ELSEIF imenu = 4 THEN

      IF jexp(7)=1 OR jexp(8)=1 OR jexp(9)=1 THEN
        CALL tblank (2,1,24,80) : CALL genbox
      CALL menu4 (iopd4(), iopt4(), cmd4$(), jtf(), jan(), jaq(), _
        jexp(), imenu, z.h$)
      END IF
      CALL tblank (2,1,24,80) : CALL genbox

      ELSEIF imenu = 5 THEN
      CALL menu5 (0, imenu, jopt(), jinv(), jexp(), _
        nirmd, jrad(), rmd$(), cmd2$(), _
        ir, ic, icur, ib1, ib2, ib3, ib4, _
        idle, notdone, ipage1(), ipage2(), z.h$)
      CALL tblank (2,1,24,80) : CALL genbox

      ELSEIF imenu = 6 THEN      'air and water transport
```

APPRENTICE

```
IF jtrans(1)=1 OR jtrans(2)=1 THEN
  CALL menu7 (imenu, jopt(), jtrans(), jexp(), z.h$)
  CALL tblank (2,1,24,80) : CALL genbox
END IF

ELSEIF imenu = 7 THEN      'waste form degradation & biotic transport

  IF jtrans(3)=1 OR jtrans(4)=1 THEN
    CALL menu8 (imenu, jopt(), jtrans(), z.h$)
    CALL tblank (2,1,24,80) : CALL genbox
  END IF

ELSEIF imenu = 8 THEN      'times, near and far-field

  CALL menu6 (imenu, jopt(), jtrans(), jinv(), jexp(), z.h$)
  CALL tblank (2,1,24,80) : CALL genbox

ELSEIF imenu = 9 THEN

  IF jexp(1)=1 OR jexp(2)=1 OR jexp(3)=1 OR jexp(4)=1 OR jexp(5)=1 THEN
    CALL menu9 (imenu, jopt(), jtrans(), jinv(), jexp(), z.h$)
    CALL tblank (2,1,24,80) : CALL genbox
  END IF

ELSEIF imenu = 10 THEN

  IF jexp(6)=1 OR jexp(7)=1 OR jexp(8)=1 OR jexp(9)=1 THEN
    CALL menu10 (imenu, jopt(), jtrans(), jinv(), jexp(), z.h$)
    CALL tblank (2,1,24,80) : CALL genbox
  END IF

ELSEIF imenu = 11 THEN

  IF jexp(7)=1 OR jexp(8)=1 OR jexp(9)=1 THEN
    CALL menu11 (imenu, jopt(), jtrans(), jinv(), jexp(), _
                 jaq(), jtf(), jan(), z.h$)
    CALL tblank (2,1,24,80) : CALL genbox
  END IF

ELSEIF imenu = 12 THEN

  CALL menu12 (imenu, jopt(), jtrans(), jinv(), jexp(), _
               jaq(), jtf(), jan(), jrpt(), _
               jrad(), rmd$(), nirmd,
               cmd$(), cmd2$(), cmd3$(T), z.h$)
  IF imenu = 1 THEN CALL tblank (2,1,24,80) : CALL genbox

END IF
```


APPRENTICE

```
IF iold < imenu THEN
    idir = I
ELSEIF iold > imenu THEN
    idir = -1
ELSE
    IF idir = I THEN
        imenu = imenu + 1
    ELSEIF idir = -1 THEN
        imenu = imenu - 1
        IF imenu = 3 THEN CALL tblank (3,1,25,79) : CALL genbox
    END IF
END IF
iold = imenu

GOTO main

' Error handing--
err1:
GOTO done

done:

PRINT "APPRENTICE execution completed."
END

'---- Set up first help screen library -----
help1:

h$ = "\genif\aprhelp1.dat"
CALL helpmenu.1 (+1, nhelp, ibuf, iur, iul, ilr, ilc, h$, iherr)
IF iherr <> 0 THEN CALL messag ("Error "+STR$(iherr)+" with "+h$)
ihelp = 1
RETURN

'---- Set up second help screen library -----
help2:

h$ = "\genii\aprhelp2.dat"
CALL helpmenu.1 (+1, nhelp, ibuf, iur, iul, ilr, ilc, h$, iherr)
IF iherr <> 0 THEN CALL messag ("Error "+STR$(iherr)+" with "+h$)
ihelp = 2
RETURN

'---- Inventory input subs -----
updater:

CALL keystop
GOSUB getpos
```

APPRENTICE

```
IF jrad(i) = 0 THEN
  CALL intense (1)
  jrad(i) = 1
ELSE
  jrad(i) = 0
END IF
```

```
LOCATE ir, ic : GOSUB prtrmd : CALL intense (0) : CALL keystart
RETURN
```

switchr:

```
CALL keystop
LOCATE ir, ic : CALL reverse (0) : GOSUB prtrmd
IF icur = 1 THEN
  CALL textsave (ib1,ib2,ib3,ib4,ipage1(),ierr)
  icur = 2
ELSE
  CALL textsave (ib1,ib2,ib3,ib4,ipage2(),ierr)
  icur = 1
END IF
CALL tblank (ib1,ib2,ib3,ib4)
idle = 0 : CALL keystart
RETURN
```

doner:

```
notdone = 0 : idle = 0
CALL keystop : KEY OFF

IF icur = 1 THEN
  CALL textsave (ib1,ib2,ib3,ib4,ipage1(),ierr)
ELSE
  CALL textsave (ib1,ib2,ib3,ib4,ipage2(),ierr)
END IF
CALL tblank (2,1,25,80) : CALL reverse (0)
RETURN
```

mover:

```
CALL keystop
GOSUB prtrmd : ic = ic + 10
IF ic > ib4 THEN ic = ib2+3 : ir = ir + 1
IF ir > ib3 THEN CALL music : ir = ir - 1
LOCATE ir, ic : CALL reverse (1) : GOSUB prtrmd : CALL reverse (0)
CALL keystart
RETURN
```

move1:

```
CALL keystop
GOSUB prtrmd : ic = ic - 10
```

APPRENTICE

```
IF ic < ib2 THEN ic = 61 : ir = ir - 1
IF ir < ib1 THEN CALL music : ir = ir + 1
LOCATE ir, ic : CALL reverse (1) : GOSUB ptrmd : CALL reverse (0)
CALL keystart
RETURN
```

moveu:

```
CALL keystop
GOSUB ptrmd : ir = ir - 1
IF ir < ib1 THEN ir = ib3 : ic = ic - 10
IF ic < ib2 THEN CALL music : ic = ic + 1
LOCATE ir, ic : CALL reverse (1) : GOSUB ptrmd : CALL reverse (0)
CALL keystart
RETURN
```

moved:

```
CALL keystop
GOSUB ptrmd : ir = ir + 1
IF ir > ib3 THEN ir = ib1 : ic = ic + 10
IF ic > ib4 THEN CALL music : ic = ic - 10
LOCATE ir, ic : CALL reverse (1) : GOSUB ptrmd : CALL reverse (0)
CALL keystart
RETURN
```

ptrmd:

```
GOSUB getpos : IF jrad(i) = 1 THEN CALL intense (1)
LOCATE ir, ic : PRINT rmd$(i) : CALL intense (0)
LOCATE ir, ic ,1
RETURN
```

getpos:

```
ic = POS(0) : ir = CSRLIN
i = (ic/10) - 1 : i = i * 21 + ir - 2
IF icur = 2 THEN i = i + 126
RETURN
```

'----- Error handing for invalid numbers -----

errhand:

```
nerr = err
CALL messag ("Error:" + STR$(nerr))
IF nerr = 5 THEN
    CALL messag ("Illegal number, reenter")
    RESUME NEXT
ELSEIF nerr = 6 THEN
    CALL messag ("Number too large, reenter")
    RESUME NEXT
ELSEIF nerr = 76 THEN
    CALL messag ("Path not found")
```

APPRENTICE

```
RESUME NEXT
ELSEIF nerr = 75 THEN
  CALL messag ("Path/file access error")
  RESUME NEXT
ELSEIF nerr = 67 THEN
  CALL messag ("Too many files")
  RESUME NEXT
ELSEIF nerr = 64 THEN
  CALL messag ("Bad file name")
  RESUME NEXT
ELSEIF nerr = 55 THEN
  CALL messag ("File already open")
  RESUME NEXT
ELSEIF nerr = 53 THEN
  CALL messag ("File not found")
  RESUME NEXT
ELSEIF nerr = 58 THEN
  CALL messag ("File already exists")
  RESUME NEXT
ELSE
  ERROR nerr
  ON ERROR GOTO 0
END IF
RETURN
```

```
SUB genbox STATIC
```

```
Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System
```

```
Last Modification: 1-Jan-88 RAP
Reviewed and Approved: 14-Sept-88 BA Napier
```

```
DEFINT i-n
DIM iboxs(120)

ibox = ibox + 1
IF ibox = 1 THEN
  CALL tborder.1 (1,2,63,8,79)
  LOCATE 3,65 : PRINT "GENII:"
  LOCATE 4,65 : PRINT "Hanford"
  LOCATE 5,65 : PRINT "Environmental"
  LOCATE 6,65 : PRINT "Dosimetry"
  LOCATE 7,65 : PRINT "System"
  CALL textsave (2,63,8,79,iboxs(),ierr)
ELSE
  CALL textstr (2,63,8,79,iboxs(),ierr)
END IF
```

APPRENTICE

EXIT SUB

END SUB

SUB waita STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 22-Nov-87 RAP
Reviewed and Approved: 14-Sept-88 8A Napier

LOCATE 25,26 : PRINT "Press any key to continue...";

waitk:

z\$=INKEY\$
IF z\$="" THEN GOTO waitk

CALL tblank (25,1,25,79)

EXIT SUB

END SUB

SUB messag (j\$) STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 6-Mar-88 RAP
Reviewed and Approved: 14-Sept-88 BA Napier

DEFINT i-n
DIM isave(80)

CALL textsave (24,1,24,80,isave(),ierr)

CALL music

LOCATE 24

CALL tcenter.1 (1, 80, j\$)

PRINT j\$;

CALL waita

CALL textstr (24,1,24,80,isave(),ierr)

EXIT SUB

APPRENTICE

END SUB

SUB messag2 (j\$) STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 6-Mar-88 RAP
Reviewed and Approved: 14-Sept-88 BA Napier

DEFINT i-n
DIM isave(80)
CALL textsave (24,1,24,80,isave(),ierr)
CALL music2
LOCATE 24
CALL tcenter.1 (1, 80, j\$)
PRINT j\$;
CALL waita
CALL textstr (24,1,24,80,isave(),ierr)

EXIT SUB

END SUB

SUB music STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 29-Nov-87 RAP
Reviewed and Approved: 14-Sept-88 BA Napier

listen\$ = "mb T240 o1 L8 ms c o0 G3"
PLAY "X" + VARPTR\$(listen\$)

EXIT SUB

END SUB

SUB music2 STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 1-Jan-88 RAP

APPRENTICE

Reviewed and Approved: 14-Sept-88 BA Napier

listen\$ = "mb T240 o1 L8 ms G3"
PLAY "X" + VARPTR\$(listen\$)

EXIT SUB

END SUB

SUB strip (array\$(2)) STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 7-Jul-88 RAP
Reviewed and Approved: 14-Sept-88 BA Napier

DEFINT i-n

istop1 = UBOUND (array\$,1)
istop2 = UBOUND (array\$,2)

FOR i = 1 TO istop1
 FOR j = 1 to istop2
 IF i = 1 THEN
 CALL strplead.1 (array\$(i,j),array\$(i,j))
 ELSE
 CALL stripper.1 (array\$(i,j),array\$(i,j))
 END IF
 NEXT j
NEXT i

EXIT SUB

END SUB

SUB keystart STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 6-Mar-88 RAP
Reviewed and Approved: 14-Sept-88 BA Napier

DEFINT i-n

KEY (2) ON

APPRENTICE

KEY (3) ON
KEY (10) ON
KEY (11) ON
KEY(12) ON
KEY(13) ON
KEY(14) ON

EXIT SUB

END SUB

SUB keystop STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 6-Mar-88 RAP
Reviewed and Approved: 14-Sept-88 BA Napier

DEFINT i-n

KEY (2) OFF
KEY (3) OFF
KEY (10) OFF
KEY (11) OFF
KEY(12) OFF
KEY(13) OFF
KEY(14) OFF

EXIT SUB

END SUB

APPRENTICE

```
SUB init ( iopd%(1), iopt%(1), cmd$(2), jopt%(1),_
            iopd2%(1), iopt2%(1), cmd2$(2), jtrans%(1), jinv%(1),_
            iopd3%(1), iopt3%(1), cmd3$(2), jexp%(1),_
            iopd4%(1), iopt4%(1), cmd4$(2), jtf%(1), jan%(1), jaq%(1),_
            z.h$ ) STATIC
```

User interface control module which is the initialization
part of the \GENII\APPRENTICE program.

Module of Program APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 7-Jul-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

----- Initialization -----

DEFINT i-n

Find out what kind of hardware is being used and set screen --
SCREEN 0,0

Initialize Menu 1--

z.h\$ = " | GENII's APPRENTICE"

```
iopd(1) = 5 : cmd$(1,1) = "Scenario "
iopd(2) = 3 : cmd$(2,1) = "Help....F1"
               cmd$(2,2) = "Far-field "
               cmd$(2,3) = "Near-field" : jopt(1) = 2
               cmd$(1,2) = "Dose to "
iopd(3) = 3 : cmd$(3,1) = "Help....F1"
               cmd$(3,2) = "Population"
               cmd$(3,3) = "Individual" : jopt(2) = 3
               cmd$(1,3) = "Release "
iopd(4) = 3 : cmd$(4,1) = "Help....F1"
               cmd$(4,2) = "Chronic"
               cmd$(4,3) = "Acute " : jopt(3) = 2
               cmd$(1,4) = "Individual Type "
iopd(5) = 3 : cmd$(5,1) = "Help.....F1"
               cmd$(5,2) = "Average Individual" : jopt(4) = 2
               cmd$(5,3) = "Maximum Individual"
iopd(6) = 0 : cmd$(1,5) = "Next"
```

APPRENTICE

Initialize Menu 2--

```
iopd2(1) = 4
iopd2(2) = 0 :cmd2$(1,1) = "Previous Menu "
               cmd2$(1,2) = "Transport "
iopd2(3) = 5 :cmd2$(3,1) = "Help.....F1"
               cmd2$(3,2) = "Air "
               cmd2$(3,3) = "Surface Water "
               cmd2$(3,4) = "Biotic Transport "
               cmd2$(3,5) = "Waste Form Degradation"

               cmd2$(1,3) = "Inventory Location "
iopd2(4) = 13 :cmd2$(4,1) = "Help.....F1"
               cmd2$(4,2) = "Air -> "
               cmd2$(4,3) = "Surface Water -> "
               cmd2$(4,4) = "Buried Waste -> "
               cmd2$(4,5) = "Air "
               cmd2$(4,6) = "Surface soil "
               cmd2$(4,7) = "Deep Soil "
               cmd2$(4,8) = "Ground Water "
               cmd2$(4,9) = "Surface Water "
               cmd2$(4,10) = "Terrestrial Foods"
               cmd2$(4,11) = "Animal Products "
               cmd2$(4,12) = "Drinking Water "
               cmd2$(4,13) = "Aquatic Foods "

iopd2(5) = 0 :cmd2$(1,4) = "Next"
```

initialize menu 3--

```
iopd3(1) = 4
iopd3(2) = 0 :cmd3$(1,1) = "Previous Menu "
               cmd3$(1,2) = "Exposure "
iopd3(3) = 11:cmd3$(3,1) = "Help.....F1"
               cmd3$(3,2) = "External: Finite plume "
               cmd3$(3,3) = "External: Infinite plume "
               cmd3$(3,4) = "External: Ground "
               cmd3$(3,5) = "External: Recreation "
               cmd3$(3,6) = "Inhalation "
               cmd3$(3,7) = "Ingestion: Drinking water "
               cmd3$(3,8) = "Ingestion: Aquatic food "
               cmd3$(3,9) = "Ingestion: Terrestrial food"
               cmd3$(3,10) = "Ingestion: Animal product "
               cmd3$(3,11) = "Inadvertent soil ingestion "

iopd3(4) = 5 :cmd3$(1,3) = "Report "
               cmd3$(4,1) = "Help.....F1"
               cmd3$(4,2) = "AEDE Only "
               cmd3$(4,3) = "By Radionuclide"
```

APPRENTICE

```
cmd3$(4,4) = "By Pathway      "  
cmd3$(4,5) = "Screen Debug   "  
iopd3(5) = 0 : cmd3$(1,4) = "Next"
```

Initialize menu 4--

```
iopd4(1) = 5  
iopd4(2) = 0 : cmd4$(1,1) = "Previous Menu "  
cmd4$(1,2) = "Aquatic Foods "  
iopd4(3) = 5 : cmd4$(3,1) = "Help.....F1"  
cmd4$(3,2) = "Fish          "  
cmd4$(3,3) = "Mollusc       "  
cmd4$(3,4) = "Crustaceae    "  
cmd4$(3,5) = "Aquatic plants"  
cmd4$(1,3) = "Terrestrial Foods "  
iopd4(4) = 5 : cmd4$(4,1) = "Help.....F1"  
cmd4$(4,2) = "Leafy Vegetables"  
cmd4$(4,3) = "Other Vegetables"  
cmd4$(4,4) = "Fruit         "  
cmd4$(4,5) = "Cereal        "  
cmd4$(1,4) = "Animal Products "  
iopd4(5) = 5 : cmd4$(5,1) = "Help.....F1"  
cmd4$(5,2) = "Meat          "  
cmd4$(5,3) = "Poultry       "  
cmd4$(5,4) = "Milk          "  
cmd4$(5,5) = "Eggs          "  
iopd4(6) = 0 : cmd4$(1,5) = "Next"
```

```
FOR i = 1 TO 5  
  iopt(i) = iopd(i)  
  iopt2(i) = iopd2(i)  
  iopt3(i) = iopd3(i)  
  iopt4(i) = iopd4(i)
```

NEXT i

```
  iopt(6) = iopd(6)  
  iopt4(6) = iopd4(6)
```

EXIT SUB

END SUB

APPRENTICE

```
-----
SUB MENU1 (iopd%(1), iopt%(1), cmd$(2), jopt%(1), imenu%, z.h$ )_
    STATIC

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 8-Jul-88 RAP
Reviewed and Approved: 14-Sept-88 BA Napier
----- Menu 1 Setup and Control -----

DEFINT i-n
ir = 8 : ir2 = 5 : ic = 3 : ic2 = 6

GOSUB setup

Initialize Menu 1 --

iman = 1 : isub = 0
CALL strip (cmd$())
z.i$ = "i"
CALL msmenu.1 (z.i$, z.h$, iopt(), cmd$(), iman, isub)
z.i$ = ""

Menu 1 Control Loop--

loop1:

CALL msmenu.1 (z.i$, z.h$, iopt(), cmd$(), iman, isub)
CALL strip (cmd$())

IF iman = iopt(1) THEN
    imenu = imenu + 1
    GOTO next1

ELSEIF iman = 0 AND isub = 0 THEN
    imenu = 0
    GOTO next1

ELSEIF isub=1 THEN

    IF iman = 1 THEN
        CALL helpmenu.1 (-1, 8, ibuf, iur, iul, ilr, ilc, h$, iherr)
        CALL waita
        CALL helpmenu.1 (0, 8, ibuf, iur, iul, ilr, ilc, h$, iherr)
        CALL helpmenu.1 (-1, 9, ibuf, iur, iul, ilr, ilc, h$, iherr)
        FOR i = 1 TO 4
```

APPRENTICE

```
CALL helpmenu.1 (-1, 9+i, ibuf, iur, iul, ilr, ilc, h$, iherr)
CALL waita
CALL helpmenu.1 (0, 9+i, ibuf, iur, iul, ilr, ilc, h$, iherr)
NEXT i
CALL helpmenu.1 (0, 9, ibuf, iur, iul, ilr, ilc, h$, iherr)
CALL helpmenu.1 (-1, 14, ibuf, iur, iul, ilr, ilc, h$, iherr)
FOR i = 1 TO 4
  CALL helpmenu.1 (-1, 14+i, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (0, 14+i, ibuf, iur, iul, ilr, ilc, h$, iherr)
NEXT i
CALL helpmenu.1 (0, 14, ibuf, iur, iul, ilr, ilc, h$, iherr)

ELSEIF iman = 2 THEN
  CALL helpmenu.1 (-1, 28, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (0, 28, ibuf, iur, iul, ilr, ilc, h$, iherr)

ELSEIF iman = 3 THEN
  CALL helpmenu.1 (-1, 29, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (0, 29, ibuf, iur, iul, ilr, ilc, h$, iherr)

ELSEIF iman = 4 THEN
  CALL helpmenu.1 (-1, 30, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (-1, 31, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (0, 31, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL helpmenu.1 (0, 30, ibuf, iur, iul, ilr, ilc, h$, iherr)

END IF

ELSEIF iman = 4 THEN
  jopt(4) = isub
  GOSUB defin

ELSEIF iman = 2 AND isub = 2 AND jopt(1)=3 THEN
  CALL messag (
    "Cannot calculate population dose in near-field scenario.")

ELSE
  jopt(iman) = isub
  ir = 5 + iman*3 + isub
  LOCATE ir, ic2 : CALL intense (1) : PRINT cmd$(iman+1,isub);
  IF isub = 2 THEN isub = 3 : ir = ir + 1 ELSE isub = 2 : ir = ir - 1
  LOCATE ir, ic2 : CALL intense (0) : PRINT cmd$(iman+1,isub);
  iman = iman+1 : IF jopt(iman)=2 THEN isub = 3 ELSE isub = 2

  jopt(4) = 2 : IF jopt(1) = 3 THEN jopt(4) = 3
```

APPRENTICE

```
GOSUB defin1

END IF

GOTO loop1

next1:

CALL params (1, jopt(4), 5, par$, jopt())

IF jopt(1)=3 AND jopt(2)=2 THEN
  CALL messag (
    "Cannot calculate population dose in near-field scenario.")
  iman = 2 : isub = 1 : GOTO loop1
END IF

EXIT SUB

'----- Set up Screen boxes -----
setup:

'   Set up scenario box--
CALL tborder.1 (1,9,1,18,20)

FOR i = 1 TO iopt(1)-2
  IF MID$(cmd$(1,i),1,1) = " " THEN cmd$(1,i) = MID$(cmd$(1,i),2)
  ir = ir + 1 : LOCATE ir, ic : PRINT cmd$(1,i);
  ir = ir + 1 : LOCATE ir, ic2 : IF jopt(i)=2 THEN CALL intense (1)
  IF MID$(cmd$(2,i),1,1) = " " THEN cmd$(2,i) = MID$(cmd$(2,i),2)
  PRINT cmd$(i+1,2); : CALL intense (0)
  ir = ir + 1 : LOCATE ir, ic2 : IF jopt(i)=3 THEN CALL intense (1)
  IF MID$(cmd$(3,i),1,1) = " " THEN cmd$(3,i) = MID$(cmd$(3,i),2)
  PRINT cmd$(i+1,3); : CALL intense (0)
NEXT i

'   Set up default box--
CALL tborder.1 (1,5,1,8,20)

LOCATE ir2, ic : PRINT cmd$(1,4);
GOSUB defin1

RETURN

'----- Default individual -----
defin1:

LOCATE ir2+1, ic2 : IF jopt(4)=2 THEN CALL intense (1)
PRINT "Average Ind."; : CALL intense (0)
LOCATE ir2+2, ic2 : IF jopt(4)=3 THEN CALL intense (1)
```

APPRENTICE

```
PRINT "Maximum Ind."; : CALL intense (0)  
RETURN
```

END SUB

APPRENTICE

```
SUB MENU2 (iopd2%(1), iopt2%(1), cmd2$(2), jtrans%(1), imenu%, _  
          z.h$, jinv%(1), jexp%(1), jopt%(1) ) STATIC
```

```
Menu 2 Setup and Control (Transport and Inventory Location)
```

```
Subprogram for APPRENTICE of the GENII Software Package  
Pacific Northwest Laboratory Environmental Dosimetry System
```

```
Last Modification: 8-Jul-88 RAP
```

```
Reviewed and Approved: 14-Sept-88 BA Napier
```

```
DEFINT i-n
```

```
irb1 = 7 : ic1 = 25 : irb2 = 11 : ic2 = 58  
IF jopt(1)=2 THEN jtrans(3)=0 : jtrans(4)=0  
GOSUB trnbox : GOSUB invbox
```

```
Initialize Menu 2 --  
iman = 2 : isub = 2
```

```
CALL strip (cmd2$())  
z.i$ = "i"  
CALL msmenu.1 (z.i$, z.h$, iopt2(), cmd2$(), iman, isub)  
z.i$ = ""
```

```
Menu 2 Control Loop--  
loop2:
```

```
CALL msmenu.1 (z.i$, z.h$, iopt2(), cmd2$(), iman, isub)  
CALL strip (cmd2$())
```

```
IF iman = iopt2(1) THEN  
  imenu = imenu + 1  
  GOTO next2
```

```
ELSEIF iman = 1 THEN  
  imenu = imenu - 1  
  GOTO next2
```

```
ELSEIF iman = 0 AND isub = 0 THEN  
  imenu = 0  
  GOTO next2
```

```
ELSEIF isub = 1 THEN
```


APPRENTICE

```
IF iman = 2 THEN
  CALL helpmenu.1 (-1, 19, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (0, 19, ibuf, iur, iul, ilr, ilc, h$, iherr)

ELSEIF iman = 3 THEN
  CALL helpmenu.1 (-1, 20, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  FOR i = 1 TO 3
    CALL helpmenu.1 (-1, 20+i, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
  NEXT i
  FOR i = 3 TO 1 STEP -1
    CALL helpmenu.1 (0, 20+i, ibuf, iur, iul, ilr, ilc, h$, iherr)
  NEXT i
  CALL helpmenu.1 (0, 20, ibuf, iur, iul, ilr, ilc, h$, iherr)
END IF

ELSEIF iman=2 THEN                                     'transport menu update

  ir = irb1 + isub - 1 : LOCATE ir, ic1

  IF jtrans(isub-1) = 0 THEN                             'select and print RV

    CALL intense (1) : PRINT cmd2$(iman+1,isub); : CALL intense (0)
    jtrans(isub-1) = 1
    IF isub-1=3 THEN
      jtrans(4) = 1
      LOCATE irb1+4, ic1
      CALL intense (1) : PRINT cmd2$(iman+1,5); : CALL intense (0)
    END IF
    IF isub-1 < 4 THEN jinv(isub-1) = 1
    IF isub-1 = 4 THEN jinv(3) = 1

  ELSE

    PRINT cmd2$(iman+1,isub);
    jtrans(isub-1) = 0
    IF isub-1 < 4 THEN jinv(isub-1) = 0
    IF isub-1 = 4 THEN jinv(3) = 0

  END IF

  IF isub-1 < 5 THEN GOSUB invbox
  isub = isub+1
  IF isub > iopt2(3) THEN iman = iman+1

ELSEIF iman=3 THEN                                     'inventory location

  ir = irb2 + isub - 1 : LOCATE ir, ic2
```

APPRENTICE

```
IF jinv(isub-1) = 0 THEN
  IF isub-1 = 3 AND jopt(1) = 2 THEN                                'far-field
    CALL messag ("Buried waste not allowed in far-field scenario")
  ELSEIF isub-1 = 4 AND jtrans(1) THEN
    GOSUB errmes2
  ELSEIF isub-1 = 8 AND jtrans(2) THEN
    GOSUB errmes2
  ELSE
    CALL intense (1) : PRINT cmd2$(iman+1,isub); : CALL intense (0)
    jinv(isub-1) = 1
    IF isub-1 = 9 THEN
      jexp(8) = 1
    ELSEIF isub-1 = 10 THEN
      jexp(9) = 1
    ELSEIF isub-1 = 11 THEN
      jexp(6) = 1
    ELSEIF isub-1 = 12 THEN
      jexp(7) = 1
    END IF
    IF isub-1 = 1 AND jtrans(1) = 0 THEN                                'air transport
      jtrans(1) = 1 : GOSUB trnbox
    ELSEIF isub-1 = 2 AND jtrans(2) = 0 THEN 'surface water transport
      jtrans(2) = 1 : GOSUB trnbox
    ELSEIF isub-1 = 3 AND jtrans(4) = 0 THEN                                'buried waste
      jtrans(4) = 1 : GOSUB trnbox
    END IF
  END IF
ELSE
  PRINT cmd2$(iman+1,isub);
  jinv(isub-1) = 0
  IF isub-1 = 9 THEN
    jexp(8) = 0
  ELSEIF isub-1 = 10 THEN
    jexp(9) = 0
  ELSEIF isub-1 = 11 THEN
    jexp(6) = 0
  ELSEIF isub-1 = 12 THEN
    jexp(7) = 0
  END IF
END IF

isub = isub+1
IF isub > lopt2(4) THEN iman = iman+1

END IF
GOTO loop2
```

next2:

APPRENTICE

```
IF jopt(3)=3 THEN
  IF jtrans(1)=0 AND jtrans(2)=0 THEN
    CALL messag ("Transport must be specified for acute release.")
    iman = 2 : isub = 1 : GOTO loop2
  END IF
END IF

EXIT SUB

'---- Set up transport status box -----
trnbox:

  CALL tborder.1 (1,7,22,12,54)
  LOCATE irb1,ic1-1 : PRINT cmd2$(1,2);
  ir = irb1

  FOR i = 2 TO iopt2(3)
    ir = ir + 1 : LOCATE ir, ic1 : IF jtrans(i-1)=1 THEN CALL intense (1)
    PRINT cmd2$(3,i); : IF jtrans(i-1) THEN CALL intense (0)
  NEXT i

  RETURN

'---- Set up inventory location status box -----
invbox:

  CALL tborder.1 (1,11,56,24,77)
  LOCATE irb2,ic2-1 : PRINT cmd2$(1,3);
  ir = irb2

  FOR i = 2 TO iopt2(4)
    ir = ir + 1 : LOCATE ir, ic2 : IF jinv(i-1)=1 THEN CALL intense (1)
    PRINT cmd2$(4,i); : IF jinv(i-1) THEN CALL intense (0)
  NEXT i
  RETURN

'---- Option incompatibility -----
errmes2:
  CALL messag (
    "Cannot consider both transport and basic concentration.")
  RETURN

'-----
END SUB
```

APPRENTICE

```
SUB MENU3 ( iopd3%(1), iopt3%(1), cmd3$(2), jexp%(1), jrpt%(1),_  
            imenu%, z.h$ ) STATIC
```

```
Menu 3 Setup and Control (Exposure and Report)
```

```
Subprogram for APPRENTICE of the GENII Software Package  
Pacific Northwest Laboratory Environmental Dosimetry System
```

```
Last Modification: 7-Jul-88 RAP
```

```
Reviewed and Approved: 14-Sept-88 BA Napier
```

```
DEFINT i-n  
irb = 13 : icb = 25 : irb2 = 19 : ic2 = 4  
GOSUB setup
```

```
Initialize Menu 3 --  
iman = 2 : isub = 3
```

```
CALL strip (cmd3$())  
z.i$ = "i"  
CALL msmenu.1 (z.i$, z.h$, iopt3(), cmd3$(), iman, isub)  
z.i$ = ""
```

```
Menu 3 Control Loop--
```

```
loop3:
```

```
CALL msmenu.1 (z.i$, z.h$, iopt3(), cmd3$(), iman, isub)  
CALL strip (cmd3$())
```

```
IF iman = iopt3(1) THEN  
  imenu = imenu + 1  
  GOTO next3
```

```
ELSEIF iman = 1 THEN  
  imenu = imenu - 1  
  GOTO next3
```

```
ELSEIF iman = 0 AND isub = 0 THEN  
  imenu = 0  
  GOTO next3
```

```
ELSEIF isub = 1 THEN
```

APPRENTICE

```
IF iman = 2 THEN
  CALL helpmenu.1 (-1, 24, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (0, 24, ibuf, iur, iul, ilr, ilc, h$, iherr)
  iman = 2 : isub = 3

ELSEIF iman = 3 THEN
  CALL helpmenu.I (-1, 32, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (0, 32, ibuf, iur, iul, ilr, ilc, h$, iherr)
END IF

ELSEIF iman = 2 THEN

  ir = irb + isub - 1 : LOCATE ir,icb
  IF jexp(isub-1)=0 THEN
    CALL intense (1) : PRINT cmd3$(iman+1,isub); : CALL intense(0)
  jexp(isub-1)=1
  IF isub-1 < 3 THEN GOSUB chkfin
  ELSE
    PRINT cmd3$(iman+1,isub);
  jexp(isub-1)=0
  END IF

  isub = isub+1
  IF isub > iopt3(3) THEN isub = 2 : iman = iman + 1

ELSEIF iman = 3 THEN

  ir = irb2 + isub - 1 : LOCATE ir,ic2
  IF jrpt(isub-1)=0 THEN
    CALL intense (1) : PRINT cmd3$(iman+1,isub); : CALL intense (0)
  jrpt(isub-1)=1
  ELSE
    PRINT cmd3$(iman+1,isub)
  jrpt(isub-1)=0
  END IF

  isub = isub+1
  IF isub > iopt3(4) THEN isub = 0 : iman = iman+ 1

END IF
GOTO loop3

next3:

EXIT SUB

'---- Set up exposure and report status boxes -----
```

APPRENTICE

setup:

```
CALL tborder.1 (1,13,22,24,54)
LOCATE 13,24 : PRINT cmd3$(1,2);
ir = irb
```

```
FOR i = 2 TO iopt3(3)
ir = ir + 1 : LOCATE ir, icb : IF jexp(i-1)=1 THEN CALL intense (1)
PRINT cmd3$(3,i); : IF jexp(i-1)=1 THEN CALL intense (0)
NEXT i
```

```
CALL tborder.1 (1,19,1,24,20)
LOCATE 19,3 : PRINT cmd3$(1,3);
ir = irb2
```

```
FOR i = 2 TO iopt3(4)
ir = ir + 1 : LOCATE ir, ic2 : IF jrpt(i-1)=1 THEN CALL intense (1)
PRINT cmd3$(4,i); : IF jrpt(i-1)=1 THEN CALL intense (0)
NEXT i
RETURN
```

'---- Check for finite / infinite plume incompatibility -----

chkfin:

```
IF jexp(1) = 1 AND jexp(2) = 1 THEN
  IF isub = 3 THEN
    jexp(1) = 0
    ir = irb + 1 : LOCATE ir,icb
    PRINT cmd3$(iman+1,isub-1);
  ELSE
    jexp(2) = 0
    ir = irb + 2 : LOCATE ir,icb
    PRINT cmd3$(iman+1,isub+1);
  END IF
END IF

RETURN
```

END SUB

APPRENTICE

```
SUB MENU4 ( iopd4%(1), iopt4%(1), cmd4$(2), jtf%(1), jan%(1), _  
            jaq%(1), jexp%(1), imenu%, z.h$ ) STATIC
```

```
Menu 4 Setup and Control
```

```
Subprogram for APPRENTICE of the GENII Software Package  
Pacific Northwest Laboratory Environmental Dosimetry System
```

```
Last Modification: 26-Jul-88 RAP
```

```
Reviewed and Approved: 14-Sept-88 BA Napier
```

```
DEFINT i-n
```

```
ifirst = ifirst + 1
```

```
iopt4(3) = iopd4(3)
```

```
iopt4(4) = iopd4(4)
```

```
iopt4(5) = iopd4(5)
```

```
iman = 5 : isub = 0
```

```
IF jexp(9) = 0 THEN iopt4(5) = 0 ELSE iman = 4
```

```
IF jexp(8) = 0 THEN iopt4(4) = 0 ELSE iman = 3
```

```
IF jexp(7) = 0 THEN iopt4(3) = 0 ELSE iman = 2
```

```
IF iman < 5 THEN isub = 2
```

```
GOSUB setup
```

```
CALL strip (cmd4$())
```

```
z.i$ = "i"
```

```
CALL msmenu.1 (z.i$, z.h$, iopt4(), cmd4$(), iman, isub)
```

```
z.i$ = ""
```

```
Menu 4 Control Loop--
```

```
loop4:
```

```
IF iman < iopt4(1) THEN
```

```
    IF iopt4(iman+1)=0 AND iman < iopt4(1) THEN iman = iman+1 : GOTO loop4
```

```
END IF
```

```
IF isub > 0 AND iopt4(iman+1) = 0 THEN isub = 0
```

```
CALL msmenu.1 (z.i$, z.h$, iopt4(), cmd4$(), iman, isub)
```

```
CALL strip (cmd4$())
```

```
IF iman = iopt4(1) THEN
```

```
    imenu = imenu + 1
```

```
GOTO next4
```

APPRENTICE

```
ELSEIF iman = 1 THEN
  imenu = imenu - 1
  GOTO next4
```

```
ELSEIF iman = 0 AND isub = 0 THEN
  imenu = 0
  GOTO next4
```

```
ELSEIF isub = 1 THEN
  IF iman = 2 THEN
    CALL helpmenu.1 (-1, 34, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 34, ibuf, iur, iul, ilr, ilc, h$, iherr)
  ELSEIF iman = 3 THEN
    CALL helpmenu.1 (-1, 35, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 35, ibuf, iur, iul, ilr, ilc, h$, iherr)
  ELSEIF iman = 4 THEN
    CALL helpmenu.1 (-1, 36, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 36, ibuf, iur, iul, ilr, ilc, h$, iherr)
  END IF
```

```
ELSEIF iman=2 THEN
```

```
  IF isub=0 THEN iman = iman + 1 : GOTO loop4
  ic = 4 : ir = 13 + isub : LOCATE ir,ic
  IF jaq(isub-1)=0 THEN
    CALL intense (1) : PRINT cmd4$(iman+1,isub); : CALL intense (0)
    jaq(isub-1)=1
  ELSE
    PRINT cmd4$(iman+1,isub);
    jaq(isub-1)=0
  END IF
  isub = isub+1 : IF isub>5 THEN isub = 2 : iman = iman+1
```

```
ELSEIF iman=3 THEN
```

```
  IF isub=0 THEN iman = iman + 1 : GOTO loop4
  ic = 29 : ir = 13 + isub : LOCATE ir,ic
  IF jtf(isub-1)=0 THEN
    CALL intense (1) : PRINT cmd4$(iman+1,isub); : CALL intense (0)
    jtf(isub-1)=1
  ELSE
    PRINT cmd4$(iman+1,isub);
    jtf(isub-1)=0
  END IF
  isub = isub+1 : IF isub>5 THEN isub = 2 : iman = iman+1
```


APPRENTICE

```
ELSEIF iman=4 THEN
    IF isub=0 THEN iman = iman + 1 : GOTO loop4
    ic = 54 : ir = 13 + isub : LOCATE ir,ic
    IF jan(isub-1)=0 THEN
        CALL intense (1) : PRINT cmd4$(iman+1,isub); : CALL intense (0)
    jan(isub-1)=1
ELSE
    PRINT cmd4$(iman+1,isub);
    jan(isub-1)=0
END IF
    isub = isub+1 : IF isub>5 THEN isub = 2 : iman = iman+1

END IF

GOTO loop4

next4:
GOSUB check
CALL tblank (10,1,24,80)
EXIT SUB

'----- Set up status page -----

setup:

CALL tblank (10,1,24,80)

IF jexp(7) THEN                                'aquatic foods selected
    CALL tborder.1 (1,13,1,20,23)
    ir = 14 : ic = 4
    FOR i = 2 TO iopt4(3)
        ir = ir + 1
        LOCATE ir, ic : IF jaq(i-1) = 1 THEN CALL intense (1)
        PRINT cmd4$(3,i); : CALL intense (0)
    NEXT i
    CALL tborder.1 (1,10,1,12,23)
    LOCATE 11,ic : PRINT cmd4$(1,2);
END IF

IF jexp(8) THEN                                'terrestrial foods selected
    CALL tborder.1(1,13,26,20,48)
    ir = 14 : ic = 29
    FOR i = 2 TO iopt4(4)
        ir = ir + 1
        LOCATE ir, ic : IF jtf(i-1) = 1 THEN CALL intense(1)
        PRINT cmd4$(4,i); : CALL intense (0)
    NEXT i
    CALL tborder.1 (1,10,26,12,48)
    LOCATE 11,ic : PRINT cmd4$(1,3);
```

APPRENTICE

END IF

```
IF jexp(9) THEN                                'animal products selected
  CALL tborder.1 (1,13,51,20,73)
  ir = 14 : ic = 54
  FOR i = 2 TO iopt4(5)
    ir = ir + 1
  LOCATE ir,ic : IF jan(i-1) = 1 THEN CALL intense (1)
    PRINT cmd4$(5,i); : CALL intense (0)
  NEXT i
  CALL tborder.1 (1,10,51,12,73)
  LOCATE 11,ic : PRINT cmd4$(1,4);
END IF

RETURN
```

'---- Ensured that food types have been selected -----

check:

```
IF jexp(7) > 0 THEN
  icnt = 0
  FOR i = 1 TO 4
    IF jaq(i)>0 THEN icnt = icnt + 1
  NEXT i
  IF icnt = 0 THEN
    j$ = "Select aquatic food types now." : CALL messag (j$)
    iman = 4 : isub = 2 : GOTO loop4
  END IF
END IF

IF jexp(8) > 0 THEN
  icnt = 0
  FOR i = 1 TO 4
    IF jtf(i)>0 THEN icnt = icnt + 1
  NEXT i
  IF icnt = 0 THEN
    j$ = "Select terrestrial food types now." : CALL messag (j$)
    iman = 2 : isub = 2 : GOTO loop4
  END IF
END IF

IF jexp(9) > 0 THEN
  icnt = 0
  FOR i = 1 TO 4
    IF jan(i)>0 THEN icnt = icnt + 1
  NEXT i
  IF icnt = 0 THEN
    j$ = "Select animal products now." : CALL messag (j$)
    iman = 3 : isub = 2 : GOTO loop4
  END IF
END IF
```

APPRENTICE

END IF

RETURN

END SUB

APPRENTICE

```
SUB MENU5 (i5flag%, imenu%, jopt%(1), jinv%(1), jexp%(1), _  
          nirmd%, jrad%(1), rmd$(1), cmd2$(2),  
          ir%, ic%, icur%, ib1%, ib2%, ib3%, ib4%,  
          idle%, notdone%, ipage1%(1), ipage2%(1), z.h$ ) STATIC
```

Menu 5 Setup and Control (Radiological inventory)

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 11-Jul-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

Argument list:

I5flag - Flag set to:

0 - process menu 5

7 - read master radionuclide library

8 - write inventory portion of output file

DEFINT i-n

ifirst = ifirst + 1

IF ifirst=1 THEN

DIM iopd5(5), iopt5(5), cmd5\$(4,6), rad\$(8)

DIM jrow(300), jcol(300)

DIM irmd(100), iloc(3), icloc(3), q(3,300), locunt\$(12)

DIM jflag(20), jinvold(12), dir\$(10)

icheck = 0 : iold = 0 : mor3 = 0

iopd5%(1) = 4

iopd5%(2) = 0 : cmd5\$(1,1) = "Previous Menu "

cmd5\$(1,2) = "Activity Units"

iopd5%(3) = 6 : cmd5\$(3,1) = "Help...F1"

cmd5\$(3,2) = "pCi"

cmd5\$(3,3) = "uCi"

cmd5\$(3,4) = "mCi"

cmd5\$(3,5) = "Ci "

cmd5\$(3,6) = "Bq"

cmd5\$(1,3) = "Inventory "

iopd5%(4) = 6 : cmd5\$(4,1) = "Help.....F1"

cmd5\$(4,2) = "Select Radionuclides"

cmd5\$(4,3) = "Input Inventory Quantities"

APPRENTICE

```
cmd5$(4,4) = "Display Inventory"
cmd5$(4,5) = "Add / Delete Radionuclides"
cmd5$(4,6) = "Change Quantities"
iopd5%(5) = 0 : cmd5$(1,4) = "Next"

FOR i = 1 TO 5 : iopt5(i) = iopd5(i) : NEXT i

' Initialize location units --
locunt$(1) = "/yr" : locunt$(2) = "/yr" : locunt$(3) = "/m3"
locunt$(4) = "/m3" : locunt$(6) = "/m3"
locunt$(7) = "/L" : locunt$(8) = "/L" : locunt$(9) = "/kg"
locunt$(10) = "kg" : locunt$(11) = "/L" : locunt$(12) = "/kg"

END IF

'----- Main process loop -----

IF i5flag = 0 THEN

' Process menu 5--
GOTO menu5

ELSEIF i5flag = 7 THEN

' Read master radionuclide library--
GOSUB redrmd

ELSEIF i5flag = 8 THEN

' Write inventory portion of output file--
GOSUB ritinv

END IF
EXIT SUB

'----- Menu 5 (inventory) control -----

menu5:

iman = 2 : isub = 5
z.i$ = "i"
CALL msmenu.1 (z.i$, z.h$, iopt5(), cmd5$(), iman, isub)
z.i$ = ""
first1 = 0 : first2 = 0
IF iunit > 0 THEN GOSUB prtunt

' Menu 5 Control Loop--
loop5:
CALL msmenu.1 (z.i$, z.h$, iopt5(), cmd5$(), iman, isub)
```

APPRENTICE

```
IF iman = iopt5(1) THEN
  imenu = imenu + 1
  GOTO next5

ELSEIF isub = 1 THEN
  IF iman = 2 THEN
    CALL helpmenu.1 (-1, 33, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 33, ibuf, iur, iul, ilr, ilc, h$, iherr)
  ELSEIF iman = 3 THEN
    CALL helpmenu.1 (-1, 25, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 25, ibuf, iur, iul, ilr, ilc, h$, iherr)
  END IF

ELSEIF iman = 1 THEN
  IF jexp(7)=0 AND jexp(8)=0 AND jexp(9)=0 THEN
    imenu=imenu - 2
  ELSE
    imenu = imenu - 1
  END IF
  GOTO next5

ELSEIF iman = 0 AND isub = 0 THEN
  imenu = 0
  GOTO next5

ELSEIF iman = 2 THEN
  iunit = isub-1
  GOSUB prtunt
  IF jinv(5) = 1 THEN GOSUB getsoil
  iman = 3 : isub=2

ELSEIF iman = 3 THEN
  IF iunit = 0 THEN
    j$ = "Enter activity units first." : CALL messag (j$)
    iman = 2 : isub=2
  ELSE
    GOSUB radin
    isub = isub + 1
    IF isub > iopt5(iman+1) THEN iman = iman + 1 : isub = 0
  END IF
END IF

GOTO loop5

next5:
```

APPRENTICE

```
IF icheck > 0 THEN GOSUB chkold
IF iold=1 THEN
  CALL messag ("Note: inventory locations have been changed.")
  IF jinv(5)=1 AND iunit=0 THEN GOSUB getsoil : GOSUB prtunt
  iman = 3 : isub = 4 : GOSUB setold : GOTO loop5
END IF
GOSUB setold

KEY OFF
EXIT SUB
```

'---- Display selected units -----

prtunt:

```
LOCATE 10,69 : CALL intense (1)
PRINT "Units: "; cmd5$(3,iunit+1);
CALL intense (0)
RETURN
```

'---- Get soil source parameter -----

getsoil:

```
CALL params (1, 41, 1, par$, jflag())
CALL tblank (10,1,24,79)
iunit2 = VAL (par$)
```

```
IF iunit2 = 1 THEN
  locunt$(5) = "/m2"
ELSEIF iunit2 = 2 THEN
  locunt$(5) = "/m3"
ELSEIF iunit2 = 3 THEN
  locunt$(5) = "/kg"
END IF
```

RETURN

'---- Set previous inventory location for next time -----

setold:

```
FOR i = 1 TO 12 : jinvold(i) = jinv(i) : NEXT i
icheck = icheck + 1
iold = 0
RETURN
```

'---- Check if changes made to inventory location since last here -----

chkold:

APPRENTICE

```
iold = 0
FOR i = 1 TO 12
  IF jinv(i) <> jinvold(i) THEN iold = 1
NEXT i
RETURN
```

'---- Inventory control -----

radin:

```
ir1 = 5 : ic1 = 10
icloc(1) = 23 : icloc(2) = 41 : icloc(3) = 59

IF isub = 1 THEN

CALL helpmenu.1 (-1, 25, ibuf, iur, iul, ilr, ilc, h$, iherr)
CALL waita
CALL helpmenu.1 (0, 25, ibuf, iur, iul, ilr, ilc, h$, iherr)

ELSEIF isub = 2 OR isub = 5 THEN

  KEY ON
  icur = 1 : notdone = 1

  WHILE notdone = 1

    IF icur = 1 THEN
      ifirst1 = ifirst1 + 1
      GOSUB displa1
    ELSEIF icur = 2 THEN
      ifirst2 = ifirst2 + 1
      GOSUB displa2
    END IF

    ir = ib1 : ic = ib2 + 3
    CALL reverse (1) : GOSUB prtrmd : CALL reverse (0)

    idle = 1 : CALL keystart
    WHILE idle = 1 : WEND
    CALL keystop : LOCATE ,,0 'turn off cursor

  WEND

  KEY OFF : firstr = 2

ELSEIF isub > 2 AND firstr < 2 THEN

  j$ = "Select radionuclides first." : CALL messag (j$)
  isub = 2
```


APPRENTICE

```
ELSEIF isub = 3 OR isub = 4 OR isub = 6 THEN
  GOSUB chkinv
  IF nloc > 0 THEN
    nopass = 1
    WHILE nopass > 0
      IF nopass = 1 THEN
        istart = 1
      ELSE
        istart = istop + 1
      END IF

      istop = istart + 18
      IF istop > nirmd THEN istop = nirmd

      GOSUB prtinv
      IF isub=4 THEN CALL waita
      IF isub=3 OR isub = 6 THEN GOSUB inputq

      IF istop = nirmd THEN nopass = 0 ELSE nopass = nopass + 1

      CALL tblank (2,1,24,80)
    WEND
  END IF
END IF
RETURN

'---- Establish list of selected radionuclides, check locations -----
chkinv:
  nirmd = 0
  FOR i = 1 TO nrmd
    IF jrad(i) THEN
      nirmd = nirmd + 1
      irmd(nirmd) = i
    END IF
  NEXT i

  ' Check for inventory location--
  nloc = 0
  FOR i = 1 TO 12
    IF jinv(i) = 1 THEN
      nloc = nloc + 1
      IF nloc < 4 THEN iloc(nloc) = i
    END IF
  
```

APPRENTICE

```
NEXT i

IF nloc = 0 THEN
  j$ = "Inventory location must be specified first." : CALL messag (j$)
  imenu = 2 : GOTO next5

mor3 = mor3 + 1
ELSEIF nloc > 3 AND mor3 = 1 THEN
  CALL messag (
    "WARNING: Only first 3 locations can be entered in APRENTICE.")
  CALL messag ("WARNING: Remember to add others to input file")
  nloc = 3

END IF
RETURN

'---- Input and test inventory quantity -----
inputq:

  j = 1 : i = istart
  ir = ir1 : ir2 = istop - istart + ir1

loopi:
  rnum = (q(j,irmd(i)))
  IF rnum > 0.0 THEN in$ = STR$ (rnum) ELSE in$ = SPACE$(8)

  CALL innum (in$, 2, rnum, ir, icloc(j), nflag)
  q(j,irmd(i)) = rnum : narrow = nflag

  IF narrow = -1 THEN
    IF i > istart THEN
      i = i - 1 : ir = ir - 1
    ELSEIF j > 1 THEN
      j = j - 1 : i = istop : ir = ir2
    END IF
  ELSE
    IF i < istop THEN
      i = i + 1 : ir = ir + 1
    ELSEIF j < nloc THEN
      j = j + 1 : i = istart : ir = ir1
    ELSE
      RETURN
    END IF
  END IF
  GOTO loopi

RETURN

'---- Print page of inventory on screen -----
```

APPRENTICE

prtinvs:

```
CALL reverse (0)
ir = ir1
FOR i = istart TO istop
  LOCATE ir, icl : PRINT rmd$(irmd(i));
  ir = ir + 1
NEXT i

FOR j = 1 TO nloc

  ir = ir1
  LOCATE 3, icloc(j)+1 : PRINT cmd2$(4,iloc(j)+1);
  LOCATE 4, icloc(j) : PRINT cmd5$(3,iunit+1);
  IF jopt(3) <> 3 THEN PRINT locunt$(iloc(j));
  FOR i = istart TO istop
    LOCATE ir,icloc(j) : PRINT USING " ##.##^"; q(j,irmd(i))
    ir = ir + 1
  NEXT i

NEXT j
RETURN
```

'---- Inventory input subs -----

displa1:

```
IF ifirst1 = 1 THEN
  CALL tblank (2,7,24,69)
  CALL tborder.1 (2,2,7,24,69)
  FOR i = 1 TO nhalf
    LOCATE jrow(i), jcol(i)
    IF jrad(i) = 1 THEN CALL intense (1)
    PRINT rmd$(i); : CALL intense (0)
  NEXT i
ELSE
  CALL textstr (ib1,ib2,ib3,ib4,ipage1(),ierr)
END IF
RETURN
```

displa2:

```
IF ifirst2 = 1 THEN
  FOR i = nhalf+1 TO nrmd
    LOCATE jrow(i), jcol(i)
    IF jrad(i) = 1 THEN CALL intense (1)
    PRINT rmd$(i); : CALL intense (0)
  NEXT i
```

APPRENTICE

```
ELSE
  CALL textstr (ib1,ib2,ib3,ib4,ipage2(),ierr)
END IF
RETURN
```

```
prtrmd:
  GOSUB getpos : IF jrad(i) = 1 THEN CALL intense (1)
  LOCATE ir, ic, 1 : PRINT rmd$(i); : CALL intense (0)
  RETURN
```

```
getpos:
  i = (ic/10) - 1 : i = i * 21 + ir - 2
  IF icur = 2 THEN i = i + 126
  RETURN
```

'----- Read radionuclide master library -----

```
redrmd:

  CALL getdir.2 ("filename.dat", dir$(), idir)
  IF idir = 0 THEN
    OPEN "I", #1, "\genii\filename.dat"
  ELSE
    OPEN "I", #1, "filename.dat"
  END IF

  LINE INPUT #1, dum$ : LINE INPUT #1, dum$
  LINE INPUT #1, fil$
  CLOSE (1)
  fil$ = MID$ (fil$, 11)
  OPEN "I", #1, fil$
  LINE INPUT #1, dum$

  i = 1
  ir = ib1 : ic = ib2+3

  ' Temporary fix until another page needed--
  WHILE NOT EOF(1) AND i < 253

    LINE INPUT #1, l$
    rmd$(i) = MID$(l$,1,6)
    CALL strptral.1 (rmd$(i), rmd$(i))

    ' Set row and column indices--
    IF ir > ib3 THEN
      ic = ic + 10 : ir = ib1
      IF ic > 61 THEN ir = ib1 : ic = ib2+3 : nhalf = i - 1
    END IF
    jrow(i) = ir : jcol(i) = ic
```

APPRENTICE

```
    ir = ir + 1
    i = i + 1
WEND

nrmd = i - 1
CLOSE (1)

RETURN
-----
ritinv:

LINE INPUT #1, l$ : MID$(l$,1,5) = STR$(iunit) : PRINT #2, l$
LINE INPUT #1, l$ : MID$(l$,1,5) = STR$(iunit2) : PRINT #2, l$
LINE INPUT #1, l$ : PRINT #2, l$

FOR i = 1 TO 8 : LINE INPUT #1, l$ : PRINT #2, l$ : NEXT i

iset = 0
FOR i = 1 TO 8
    IF jinv(i) = 1 THEN iset = 1
NEXT i

IF iset = 1 THEN
    FOR i = 1 TO nrmd
        'print first inventory set
        PRINT #2, USING "    \    \"; rmd$(irmd(i));

        FOR k = 1 TO 8
            ifound = 0
            FOR j = 1 TO nloc
                IF iloc(j) = k THEN
                    ifound = 1
                    PRINT #2, USING "##.#####"; q(j,irmd(i));
                END IF
            NEXT j
            IF ifound = 0 THEN PRINT #2, SPACE$(8);
        NEXT k
        PRINT #2, " "

    NEXT i
    PRINT #2, " "
END IF

loop1:
LINE INPUT #1, l$ : IF MID$(l$,6,1) <> "-" THEN GOTO loop1
'Skip until next heading found
```

APPRENTICE

```
PRINT #2, 1$
FOR i = 1 TO 6 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i

iset = 0
FOR i = 9 TO 12
  IF jinv(i) = 1 THEN iset = 1
NEXT i

IF iset = 1 THEN
  FOR i = 1 TO nirmd                                'print second inventory set
    PRINT #2, USING "      \      \"; rmd$(irmd(i));

    FOR k = 9 TO 12
      ifound = 0
      FOR j = 1 TO nloc
        IF iloc(j) = k THEN
          ifound = 1
          PRINT #2, USING "##.#####"; q(j,irmd(i));
        END IF
      NEXT j
      IF ifound = 0 THEN PRINT #2, SPACE$(8);
    NEXT k
    PRINT #2, " "

  NEXT i
  PRINT #2, " "
END IF

loop2:
LINE INPUT #1, 1$ : IF MID$(1$,6,1) <> "#" THEN GOTO loop2

PRINT #2, CHR$(13)
PRINT #2, 1$
RETURN

-----
END SUB
```

APPRENTICE

```
SUB MENU6 ( imenu%, jopt%(1), jtrans%(1),  
            jinv%(1), jexp%(1), z.h$ ) STATIC
```

Menu 6 Setup and Control (Times, near and far field)

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 30-Aug-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

```
DEFINT i-n
```

```
ifirst = ifirst + 1
```

```
IF ifirst = 1 THEN
```

```
  x = FRE("")
```

```
  DIM iopd6(6), iopt6(6), cmd6$(5,5), jflag(20)
```

```
  iopd6(1) = 5
```

```
  iopd6(2) = 0 : cmd6$(1,1) = "Previous Menu "
```

```
                cmd6$(1,2) = "Times      "
```

```
  iopd6(3) = 2 : cmd6$(3,1) = "Help....F1"
```

```
                cmd6$(3,2) = "Input      "
```

```
                cmd6$(1,3) = "Far-field "
```

```
  iopd6(4) = 4 : cmd6$(4,1) = "Help.....F1"
```

```
                cmd6$(4,2) = "Sum population grid file"
```

```
                cmd6$(4,3) = "Input population total "
```

```
                cmd6$(4,4) = "Input      "
```

```
                cmd6$(1,4) = "Near-field "
```

```
  iopd6(5) = 2 : cmd6$(5,1) = "Help....F1"
```

```
                cmd6$(5,2) = "Input      "
```

```
  iopd6(6) = 0 : cmd6$(1,5) = "Next"
```

```
  FOR i = 1 TO 5 : iopt6(i) = iopd6(i) : NEXT i
```

```
END IF
```

```
Initialize Menu 6 --
```

```
iman = 2 : isub = 2
```

```
IF jtrans(1)=1 THEN
```

```
cmd6$(4,2) = "Use population grid file"
```

```
ELSE
```

APPRENTICE

```
cmd6$(4,2) = "Sum population grid file"
END IF

CALL params (1, 175, 6, par$, jflag())
ixoq = VAL (par$)

IF jopt(1) = 3 THEN      'near-field
    iopt6(4) = 0
    iopt6(5) = iopd6(5)

ELSEIF jopt(1) = 2 THEN  'far-field
    iopt6(5) = 0

    IF jopt(2) = 3 THEN 'individual
        iopt6(4) = 0

    ELSEIF jtrans(1)=1 AND ixoq>1 THEN 'population file to be used
        iopt6(4) = 0
        CALL params (1, 174, 8, "1", jflag()) 'set population

    ELSEIF jtrans(1)=0 AND jtrans(2)=1 THEN 'water only
        iopt6(4) = iopd6(4)
        cmd6$(4,2) = "unused"                " : isub = 3

    ELSE
        iopt6(4) = iopd6(4)
    END IF
ELSE
    CALL messag ("jopt not set.")
END IF

CALL strip (cmd6$())
z.i$ = "i"
CALL msmenu.1 (z.i$, z.h$, iopt6(), cmd6$(), iman, isub)
z.i$ = ""

' Menu 6 Control Loop--

loop6:

IF iman < iopt6(1) AND iopt6(iman+1)=0 THEN iman = iman+1 : GOTO loop6
IF isub > 0 AND iopt6(iman+1) = 0 THEN isub = 0

CALL msmenu.1 (z.i$, z.h$, iopt6(), cmd6$(), iman, isub)
CALL strip (cmd6$())

IF iman = iopt6(1) THEN
    imenu = imenu + 1
    GOTO next6
```


APPRENTICE

```
ELSEIF iman = 1 THEN
  imenu = imenu - 1
  GOTO next6
```

```
ELSEIF iman = 0 AND isub = 0 THEN
  imenu = 0
  GOTO next6
```

```
ELSEIF iman = 2 THEN 'times
```

```
  IF isub = 1 THEN
    CALL helpmenu.1 (-1, 16, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 16, ibuf, iur, iul, ilr, ilc, h$, iherr)
    isub = isub + 1
```

```
  ELSEIF isub = 2 THEN
```

```
    CALL params (2,1,1,par$,jflag())
```

```
    IF jopt(3)=2 AND (jtrans(1)=1 OR jtrans(2)=1) THEN
      CALL params (1,3,0,par$,jflag())
    END IF
```

```
    IF jopt(3)=2 AND jtrans(1)=1 THEN
      CALL params (1,4,0,par$, jflag())
    END IF
```

```
    IF jopt(3)=2 AND jtrans(1)=2 THEN
      CALL params (1,5,0,par$, jflag())
    END IF
```

```
    IF jopt(3)=2 THEN
      IF jtrans(3)=1 OR jtrans(4)=1 OR jinv(4)=1 OR jinv(5)=1 THEN
        CALL params (1,6,0,par$, jflag())
      END IF
      IF jtrans(3)=1 THEN
        CALL params (1,7,0,par$, jflag())
      END IF
    END IF
```

```
    CALL tblank (10, 1, 24, 80)
    iman = iman + 1
```

```
  END IF
```

```
ELSEIF iman = 3 THEN 'far-field
```

```
  IF iopt6(4) = 0 THEN
    iman = iman + 1 : isub = 0 : GOTO loop6
```

APPRENTICE

```
ELSEIF isub = 1 THEN
  CALL helpmenu.1 (-1, 17, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
CALL helpmenu.1 (0, 17, ibuf, iur, iul, ilr, ilc, h$, iherr)
  isub = isub + 1

ELSEIF isub = 2 THEN
  IF jtrans(1)=0 AND jtrans(2)=1 THEN 'water only, over write
    jpop = 2 : isub = 4
  ELSE
    jpop = 1 : isub=0 : iman = 5
  END IF

ELSEIF isub = 3 THEN
  jpop = 2 : isub = isub+1

ELSEIF isub = 4 THEN
  CALL params (1, 39, 1, par$,jflag()) : isub = 0 : iman = 5
END IF

par$ = STR$(jpop)
CALL params (1, 174, 8, par$, jflag())

ELSEIF iman = 4 THEN 'near-field

  IF iopt6(5) = 0 THEN
    iman = iman + 1 : isub = 0 : GOTO loop6

  ELSEIF isub = 1 THEN
    CALL helpmenu.1 (-1, 18, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (-1, 19, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (-1, 20, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 20, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL helpmenu.1 (0, 19, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL helpmenu.1 (0, 18, ibuf, iur, iul, ilr, ilc, h$, iherr)

  ELSEIF isub = 2 THEN

    IF jexp(8)=1 OR jexp(9)=1 OR jtrans(3)=1 THEN
      CALL params (1,8,1,par$,jflag())
      IF jtrans(4)=1 OR jinv(6)=1 THEN CALL params (1,9,0,par$,jflag())
    END IF

    CALL params (1,10,0,par$,jflag())
    IF jtrans(4)=0 AND jinv(6)=1 THEN CALL params (1,35,0,par$,jflag())
```

APPRENTICE

```
IF jexp(3)=1 THEN          'get source size for external dose mod.
  CALL params (1,179,0,par$,jflag())
  IF par$="T" THEN
    CALL params (1,180,0,par$,jflag())
  ELSE
    CALL params (1,180,8,"1250",jflag())
  END IF
ELSE
  CALL params (1,180,8,"1250",jflag())
END IF
```

```
CALL tblank (10,1,24,80) : isub = 0 : iman = 5
```

```
END IF
```

```
END IF
GOTO loop6
```

```
next6:
```

```
EXIT SUB
```

```
-----
END SUB
```

APPRENTICE

```
SUB MENU7 ( imenu%, jopt%(1), jtrans%(1), jexp%(1), z.h$ ) _  
    STATIC
```

Air and surface water transport selection and input control.

Module of Program APRENTIC of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 31-Aug-88 RAP

```
icheck - flag set if iold is not the same as inew indicating  
         that the user has modified previous options which  
         effect this menu  
inew    - index of current option combination selection  
         (population/individual, chronic/acute)  
iold    - index of previous option combination selection last  
         time in this menu, see inew  
iset    - flag set when user changes chi/q option while in this  
         menu, checked on exit to ensure that input parameters  
         have been updated
```

```
DEFINT i-n
```

```
inew = 0  
icheck = 0  
iset = 0
```

```
first = first + 1  
IF first = 1 THEN
```

```
    DIM iopd7(5), iopt7(5), cmd7$(4,6), imi$(5), ipop$(5), _  
        iai$(4), iap$(4), jflag(20)
```

```
    Initialize Chronic Maximum Individual Menu --
```

```
    imi$(1) = "Help.....F1"  
    imi$(2) = "Use chi/Q value"  
    imi$(3) = "Select MI dist. & dir."  
    imi$(4) = "Specify MI dist. & dir."  
    imi$(5) = "Input"
```

```
    Initialize Chronic Population Menu --
```

```
    ipop$(1) = "Help.....F1"  
    ipop$(2) = "Use population-weighted chi/Q value"  
    ipop$(3) = "Calculate from chi/Q & pop. grids"
```

APPRENTICE

```
ipop$(4) = "Calculate from joint freq. & pop."  
ipop$(5) = "Input"
```

```
' Initialize Acute Individual Menu--  
iai$(1) = "Help.....F1"  
iai$(2) = "Use E/Q value"  
iai$(3) = "Specify ind. dist. & dir."  
iai$(4) = "Input"
```

```
' Initialize Acute Population Menu--  
iap$(1) = "Help.....F1"  
iap$(2) = "Use E/Q value"  
iap$(3) = "Specify direction"  
iap$(4) = "Input"
```

```
' Initialize Transport Menu--
```

```
iopd7(1) = 4  
iopd7(2) = 0 : cmd7$(1,1) = "Previous Menu "  
              : cmd7$(1,2) = "Air Transport "  
iopd7(4) = 5 : cmd7$(1,3) = "Surface Water Transport"  
              : cmd7$(4,1) = "Help..... F1"  
iopd7(5) = 0 : cmd7$(1,4) = " Next"  
FOR i = 1 TO 5 : iopt7(i) = iopd7(i) : NEXT i
```

```
ioId = 0
```

```
END IF
```

```
' Initialize Air Transport Menu --
```

```
IF jtrans(1) = 1 THEN
```

```
  iman = 2
```

```
  IF jopt(3) = 2 THEN
```

'chronic pop and mi

```
    IF jopt(2) = 2 THEN
```

```
      FOR i = 1 TO 5 : cmd7$(3,i) = ipop$(i) : NEXT i
```

```
      inew = 1
```

```
    ELSE
```

```
      FOR i = 1 TO 5 : cmd7$(3,i) = imi$(i) : NEXT i
```

```
      inew = 2
```

```
    END IF
```

```
    iopt7(3) = 5
```

```
  ELSE
```

'acute pop and mi

APPRENTICE

```
IF jopt(2) = 2 THEN
  FOR i = 1 TO 4 : cmd7$(3,i) = iap$(i) : NEXT i
  inew = 3
ELSE
  FOR i = 1 TO 4 : cmd7$(3,i) = iai$(i) : NEXT i
  inew = 4
END IF
iopt7(3) = 4
END IF

ELSE
  iopt7(3) = 0
END IF

IF jtrans(2) = 1 THEN                                     'surface water
  IF jopt(3) = 3 THEN                                     'acute
    iopt7(4) = 2
    cmd7$(4,2) = "Input"
    CALL params (1, 178, 8, "1", jflag())                'set mixing ratio flag
  ELSE                                                    'chronic
    iopt7(4) = iopd7(4)
    cmd7$(4,2) = "Enter Mixing Ratio Value"
    cmd7$(4,3) = "Use River MR Model"
    cmd7$(4,4) = "Use Lake MR Model"
    cmd7$(4,5) = "Input"
  END IF
  IF iman = 0 THEN iman = 3
ELSE
  iopt7(4) = 0
END IF

isub = 2
CALL strip (cmd7$())
z.i$ = "i"
CALL msmenu.1 (z.i$, z.h$, iopt7(), cmd7$(), iman, isub)
z.i$ = ""

iset = 0
IF iold < inew THEN
  jair = 0
  icheck = 1
END IF

' Transport Control Loop--

loop7:

IF iopt7(iman+1) < iopt7(1) THEN
  IF iopt7(iman+1)=0 AND iman < iopt7(1) THEN iman = iman+1 : GOTO loop7
END IF
```

APPRENTICE

```
IF isub > 0 AND iopt7(iman+1) = 0 THEN isub = 0

CALL msmenu.1 (z.i$, z.h$, iopt7(), cmd7$(), iman, isub)
CALL strip (cmd7$())

IF iman = iopt7(1) THEN
    imenu = imenu + 1
GOTO next7

ELSEIF iman = 1 THEN
    imenu = imenu - 1
    GOTO next7

ELSEIF iman = 0 AND isub = 0 THEN
    imenu = 0
    GOTO next7

ELSEIF iman = 2 THEN

    IF iopt7(3) = 0 THEN
        iman = iman + 1 : isub = 2 : GOTO loop7

    ELSEIF isub = 1 THEN

        GOSUB airhlp

        IF iopt(3) = 2 THEN 'chronic
            IF iopt(2) = 3 THEN 'individual
                FOR ih = 1 TO 4
                    CALL helpmenu.1 (-1, ih, ibuf,iur,iul,ilr,ilc,h$,iherr)
                    CALL waita
                NEXT ih
                FOR ih = 4 to 1 STEP -1
                    CALL helpmenu.1 (0, ih, ibuf, iur, iul, ilr, ilc, h$, iherr)
                NEXT ih
            ELSE
                FOR ih = 1 TO 4
                    CALL helpmenu.1 (-1, 4+ih, ibuf,iur,iul,ilr,ilc,h$,iherr)
                    CALL waita
                NEXT ih
                FOR ih = 4 to 1 STEP -1
                    CALL helpmenu.1 (0, 4+ih, ibuf, iur, iul, ilr, ilc, h$, iherr)
                NEXT ih
            END IF
        ELSE 'acute
            IF iopt(2) = 3 THEN 'individual
                FOR ih = 1 TO 3
                    CALL helpmenu.1 (-1, 8+ih, ibuf,iur,iul,ilr,ilc,h$,iherr)
                    CALL waita
                NEXT ih
```

APPRENTICE

```
FOR ih = 3 to 1 STEP -1
  CALL helpmenu.1 (0, 8+ih, ibuf, iur, iul, ilr, ilc, h$, iherr)
NEXT ih
ELSE
  CALL helpmenu.1 (-1, 12, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (-1, 13, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (-1, 11, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL waita
  CALL helpmenu.1 (0, 11, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL helpmenu.1 (0, 13, ibuf, iur, iul, ilr, ilc, h$, iherr)
  CALL helpmenu.1 (0, 12, ibuf, iur, iul, ilr, ilc, h$, iherr)
END IF
END IF

ELSEIF isub > 1 AND isub < iopt7(3) THEN      'set chi/Q input option

  jair = isub - 1
  IF jexp(1)=1 AND jair=1 THEN
    CALL messag ("Option not allowed with finite plume model.")
    isub = isub + 1
  ELSE
    LOCATE 9,10 : CALL intense (1)
    PRINT cmd7$(iman+1,isub); : CALL intense (0)
    isub = iopt7(3)
    iset = 1

    set j/f flag off if Chi/Qor E/Q value input--
    IF jair=1 THEN CALL params (1, 16, 8, "F", jflag())

    IF icheck = 1 THEN icheck = 0
  END IF

ELSEIF jair = 0 THEN                          'set option first
  CALL messag ("Enter option first.")

ELSE
  Input air parameters--
  iset = 0
  IF jopt(3) = 2 THEN
    IF jopt(2) = 2 THEN

      Chronic population--

      IF jair=1 THEN par$ = "1" ELSE par$ = "0"
      CALL params (1, 175, 8, par$, jflag())

      IF jair = 1 THEN
        CALL params (1, 13, 1, par$, jflag())
```


APPRENTICE

```
ELSEIF jair = 2 THEN
  CALL params (1, 16, 8, "F", jflag())
ELSEIF jair = 3 THEN
  CALL params (1, 16, 8, "T", jflag())
END IF

iman = iman + 1 : isub = 0

ELSEIF jopt(2) = 3 THEN
  Chronic individual--
  par$ = STR$(jair)
  CALL params (1, 175, 8, par$, jflag())

  IF jair = 1 THEN
    CALL params (1, 11, 1, par$, jflag())
  ELSEIF jair = 2 THEN
    CALL params (1, 16, 1, par$, jflag())
  ELSEIF jair = 3 THEN
    GOSUB sector
    CALL params (2, 14, 1, par$, jflag())
  END IF
END IF

IF jair < 1 THEN
  Get stack parameters chronic release--
  CALL params (1, 17, 0, par$, jflag())

  IF par$ = "T" THEN
    CALL params (1, 18, 0, par$, jflag())
  IF par$ = "F" THEN
    CALL params (4, 19, 1, par$, jflag())
  ELSE
    CALL params (1, 19, 1, par$, jflag())
  END IF
END IF

END IF

iman = iman + 1

ELSE
  IF jopt(2) = 2 THEN
    Acute population--
    IF jair = 1 THEN
```

APPRENTICE

```
CALL params (1, 175, 8, "1", jflag())
CALL params (1, 40, 1, par$, jflag())
ELSEIF jair = 2 THEN
CALL params (1, 175, 8, "3", jflag())
GOSUB sector
CALL params (1, 185, 1, par$, jflag())
CALL params (1, 14, 8, par$, jflag())
CALL params (1, 16, 8, "T", jflag())
END IF

ELSEIF jopt(2) = 3 THEN

Acute individual--

IF jair = 1 THEN
CALL params (1, 175, 8, "1", jflag())
CALL params (1, 12, 1, par$, jflag())
ELSEIF jair = 2 THEN
CALL params (1, 175, 8, "3", jflag())
GOSUB sector
CALL params (2, 14, 1, par$, jflag())
CALL params (1, 16, 8, "T", jflag())
END IF

END IF

IF jair < 1 THEN

Get stack parameters acute release--
CALL params (1, 17, 0, par$, jflag())

IF par$ = "T" THEN                                     'elevated release
CALL params (1, 18, 0, par$, jflag())
IF par$ = "T" THEN                                     'effective stack height
CALL params (1, 19, 0, par$, jflag())
CALL params (1, 181, 8, "1", jflag())
ELSE
CALL params (1, 184, 0, par$, jflag())
IF par$ = "T" THEN                                     'use building wake model
CALL params (3, 19, 0, par$, jflag())
CALL params (2, 182, 0, par$, jflag())
CALL params (1, 181, 8, "2", jflag())
ELSE                                                     'use plume rise model
CALL params (4, 19, 1, par$, jflag())
CALL params (1, 181, 8, "1", jflag())
END IF
END IF
ELSE                                                     'ground level release
CALL params (1, 184, 0, par$, jflag())
IF par$ = "T" THEN                                     'use building wake model
```

APPRENTICE

```
        CALL params (1, 20, 0, par$, jflag())
        CALL params (1, 182, 0, par$, jflag())
        CALL params (1, 181, 8, "3", jflag())
    ELSE                                     'ground level, open
        CALL params (1, 181, 8, "0", jflag())
    END IF

    END IF

    END IF
    iman = iman + 1
    END IF

    END IF

ELSEIF iman = 3 THEN                       'surface water transport

    IF iopt7(4) = 0 THEN
        iman = iman + 1 : isub = 2 : GOTO loop7

    ELSEIF isub = 1 THEN
        IF jopt(3) = 2 THEN 'chronic
            CALL helpmenu.1 (-1, 14, ibuf, iur, iul, ilr, ilc, h$, iherr)
            CALL waita
            CALL helpmenu.1 (0, 14, ibuf, iur, iul, ilr, ilc, h$, iherr)
        ELSE 'acute
            CALL helpmenu.1 (-1, 15, ibuf, iur, iul, ilr, ilc, h$, iherr)
            CALL waita
            CALL helpmenu.1 (0, 15, ibuf, iur, iul, ilr, ilc, h$, iherr)
        END IF

    ELSEIF jopt(3) = 3 THEN                 'acute
        CALL params (2, 23, 1, par$, jflag())
        CALL params (1, 26, 0, par$, jflag())

    ELSEIF isub > 1 AND isub < iopt7(4) THEN 'set mixing ratio flag

        jsw = isub - 2
        LOCATE 9,10 : CALL intense (1)
        PRINT cmd7$(iman+1,isub); : CALL intense (0)
        CALL params (1, 178, 8, STR$(jsw), jflag())
        isub = iopt7(4)

    ELSE                                     'input surface water parameters

        IF jsw = 0 THEN CALL params (1, 23, 1, par$, jflag())
        IF jsw = 0 THEN
            CALL params (1, 24, 1, par$, jflag())
        ELSEIF jsw = 1 OR jsw = 2 THEN
            CALL params (1, 25, 1, par$, jflag())
```

APPRENTICE

```
      END IF
      CALL params (1, 26, 0, par$, jflag())
      IF jsw > 0 THEN CALL params (4, 27, 0, par$, jflag())
      IF jsw = 1 THEN CALL params (1, 31, 0, par$, jflag())
      IF jsw = 2 THEN CALL params (1, 32, 0, par$, jflag())
      iman = iman + 1 : isub = 2

    END IF

  END IF
  GOTO loop7

next7:
  GOSUB check
  iold = inew
  EXIT SUB

'---- check options for validity -----
check:

  IF iold > 0 AND icheck = 1 THEN
    CALL messag ("Previous option changes require your attention here.")
    iman = 2 : isub = 1 : GOTO loop7
  END IF

  IF iset = 1 THEN 'air option changed but parameters not input
    CALL messag ("Input air parameters now.")
    iman = 2 : isub = iopt7(3) : GOTO loop7
  END IF

'  Check for finite plume - chi/Q option incompatibility--
  IF jexp(1)=1 AND jair=1 THEN
    CALL messag ("Invalid air transport option for finite plume.")
    iman = 2 : isub = 1 : GOTO loop7
  END IF

  RETURN

'---- sector index display -----
sector:

  LOCATE 3, 3 : PRINT "Wind toward:";
  LOCATE 4, 5 : PRINT "1-S      5-W      9-N      13-E";
  LOCATE 5, 5 : PRINT "2-SSW   6-WNW   10-NNE   14-ESE";
  LOCATE 6, 5 : PRINT "3-SW    7-NW    11-NE    15-SE";
  LOCATE 7, 5 : PRINT "4-WSW   8-NNW   12-ENE   16-SSE";
  RETURN
```

APPRENTICE

'----- general air transport help screens -----

airhlp:

```
CALL helpmenu.1 (-1, 33, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL waita
CALL helpmenu.1 (-1, 34, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL helpmenu.1 (-1, 35, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL waita
CALL helpmenu.1 (0, 35, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL helpmenu.1 (0, 34, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL helpmenu.1 (0, 33, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL helpmenu.1 (-1, 36, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL waita
CALL helpmenu.1 (0, 36, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL helpmenu.1 (-1, 32, ibuf,iur,iul,ilr,ilc,h$,iherr)
CALL waita
CALL helpmenu.1 (0, 32, ibuf,iur,iul,ilr,ilc,h$,iherr)
```

RETURN

END SUB

APPRENTICE

```
SUB MENU8 ( imenu%, jopt%(1), jtrans%(1), z.h$ ) STATIC  
Menu 8 Setup and Control (Waste form availability and  
Biotic transport)  
Subprogram for APPRENTICE of the GEN11 Software Package  
Pacific Northwest Laboratory Environmental Dosimetry System  
Last Modification: 11-Jul-88 RAP  
Reviewed and Approved: 14-Sept-88 BA Napier
```

```
DEFINT i-n
```

```
ifirst = ifirst + 1  
IF ifirst = 1 THEN
```

```
    DIM iopd8%(5), iopt8%(5), cmd8$(4,4), jflag(20)
```

```
    iopd8%(1) = 4  
    iopd8%(2) = 0 : cmd8$(1,1) = "Previous Menu "  
                  cmd8$(1,2) = "Waste Form Availability"  
    iopd8%(3) = 2 : cmd8$(3,1) = "Help.....F1"  
                  cmd8$(3,2) = "Input"  
                  cmd8$(1,3) = "Biotic Transport"  
    iopd8%(4) = 2 : cmd8$(4,1) = "Help.....F1"  
                  cmd8$(4,2) = "Input"  
    iopd8%(5) = 0 : cmd8$(1,4) = "Next"
```

```
    FOR i = 1 TO 5 : iopt8(i) = iopd8(i) : NEXT i
```

```
END IF
```

```
Initialize Menu 8 --
```

```
IF jtrans(4) = 0 THEN iopt8(3) = 0 ELSE iopt8(3) = iopd8(3)  
IF jtrans(3) = 0 THEN iopt8(4) = 0 ELSE iopt8(4) = iopd8(4)  
IF iopt8(3) = 0 THEN iman = 3 ELSE iman = 2  
isub = 2
```

```
CALL strip (cmd8$())
```

```
z.i$ = "i"
```

```
CALL msmenu.1 (z.i$, z.h$, iopt8(), cmd8$(), iman, isub)
```

```
z.i$ = ""
```

```
Menu 8 Control Loop--
```

APPRENTICE

loop8:

```
IF iopt8(iman+1)=0 AND iman < iopt8(1) THEN iman = iman+1 : GOTO loop8
IF isub > 0 AND iopt8(iman+1) = 0 THEN isub = 0
```

```
CALL msmenu.1 (z.i$, z.h$, iopt8(), cmd8$(), iman, isub)
CALL strip (cmd8$())
```

```
IF iman = iopt8(1) THEN
  imenu = imenu + 1
  GOTO next8
```

```
ELSEIF iman = 1 THEN
  imenu = imenu - 1
  GOTO next8
```

```
ELSEIF iman = 0 AND isub = 0 THEN
  imenu = 0
  GOTO next8
```

```
ELSEIF iman = 2 THEN
```

```
  IF iopt8(3) = 0 THEN
    iman = iman + 1 : isub = 2 : GOTO loop8
```

```
  ELSEIF isub = 1 THEN
    CALL helpmenu.1 (-1, 37, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 37, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

```
  ELSEIF isub = 2 THEN
    CALL params (3, 33, 1, par$, jflag())
    iman = iman + 1 : isub = 2
  END IF
```

```
ELSEIF iman = 3 THEN
```

```
  IF iopt8(4) = 0 THEN
    iman = iman + 1 : isub = 2 : GOTO loop8
```

```
  ELSEIF isub = 1 THEN
    CALL helpmenu.1 (-1, 38, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 38, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

```
  ELSEIF isub = 2 THEN
    CALL params (3, 36, 1, par$, jflag())
    isub = 2 : iman = 4
  END IF
```

```
END IF
```

APPRENTICE

GOTO loop8

next8:

EXIT SUB

END SUB

APPRENTICE

```
SUB MENU9 ( imenu%, jopt%(1), jtrans%(1), jinv%(1), _  
           jexp%(1), z.h$ ) STATIC
```

Menu 9 Setup and Control (External exposure and inhalation)

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 11-Jul-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

```
DEFINT i-n
```

```
ifirst = ifirst + 1
```

```
IF ifirst = 1 THEN
```

```
    DIM iopd9%(5), iopt9%(5), cmd9$(4,4), jflag(20)
```

```
    iopd9%(1) = 4
```

```
    iopd9%(2) = 0 : cmd9$(1,1) = "Previous Menu "
```

```
                  cmd9$(1,2) = "External Exposure"
```

```
    iopd9%(3) = 2 : cmd9$(3,1) = "Help.....F1"
```

```
                  cmd9$(3,2) = "Input"
```

```
                  cmd9$(1,3) = "Inhalation"
```

```
    iopd9%(4) = 2 : cmd9$(4,1) = "Help.....F1"
```

```
                  cmd9$(4,2) = "Input"
```

```
    iopd9%(5) = 0 : cmd9$(1,4) = "Next"
```

```
    FOR i = 1 TO 5 : iopt9(i) = iopd9(i) : NEXT i
```

```
END IF
```

```
Initialize Menu 9 --
```

```
IF jexp(1)=0 AND jexp(2)=0 AND jexp(3)=0 AND jexp(4)=0 THEN
```

```
    iopt9(3) = 0
```

```
ELSE
```

```
    iopt9(3) = iopd9(3)
```

```
END IF
```

```
IF jexp(5) = 0 THEN iopt9(4) = 0 ELSE iopt9(4) = iopd9(4)
```

```
isub = 2 : iman = 2 : IF iopt9(3) = 0 THEN iman = 3
```

```
CALL strip (cmd9$())
```

```
z.i$ = "i"
```

```
CALL msmenu.1 (z.i$, z.h$, iopt9(), cmd9$(), iman, isub)
```

```
z.i$ = ""
```

APPRENTICE

' Menu 9 Control Loop--

loop9:

```
IF iopt9(iman+1)=0 AND iman < iopt9(1) THEN iman = iman+1 : GOTO loop9
IF isub > 0 AND iopt9(iman+1) = 0 THEN isub = 0
```

```
CALL msmenu.1 (z.i$, z.h$, iopt9(), cmd9$(), iman, isub)
CALL strip (cmd9$())
```

```
IF iman = iopt9(1) THEN
  imenu = imenu + 1
  GOTO next9
```

```
ELSEIF iman = 1 THEN
  imenu = imenu - 1
  GOTO next9
```

```
ELSEIF iman = 0 AND isub = 0 THEN
  imenu = 0
  GOTO next9
```

```
ELSEIF iman = 2 THEN 'external
```

```
IF iopt9(3) = 0 THEN
  iman = iman + 1 : isub = 0 : GOTO loop9
```

```
ELSEIF isub = 1 THEN
  IF jopt(3)=2 THEN 'chronic
    CALL helpmenu.1 (-1, 21, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
  CALL helpmenu.1 (0, 21, ibuf, iur, iul, ilr, ilc, h$, iherr)
  ELSE 'acute
    CALL helpmenu.1 (-1, 22, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
  CALL helpmenu.1 (0, 22, ibuf, iur, iul, ilr, ilc, h$, iherr)
  END IF
```

```
ELSEIF isub = 2 THEN
```

```
IF jexp(1)=1 OR jexp(2)=1 THEN
  IF jopt(3) = 3 THEN
    Acute release--
    CALL params (1, 54, 0, par$, jflag())
  ELSE
    Chronic release--
    CALL params (1, 42, 0, par$, jflag())
  END IF
END IF
```

APPRENTICE

Ground exposure--

IF jexp(3)=1 THEN

CALL params (1, 44, 1, par\$, jflag())

Irrigation of ground--

IF jinv(2)=1 OR jinv(7)=1 OR jinv(8)=1 THEN

CALL params (1, 50, 0, par\$, jflag())

IF par\$ = "T" THEN

IF jinv(7)=1 THEN

CALL params (1, 51, 8, "1", jflag())

ELSEIF jinv(2)=1 OR jinv(8)=1 THEN

CALL params (1, 51, 8, "2", jflag())

ELSE

CALL params (1, 51, 0, par\$, jflag())

END IF

CALL params (2, 52, 0, par\$, jflag())

END IF

END IF

END IF

Aquatic recreation

IF jexp(4)=1 THEN

IF jopt(3)=2 THEN CALL params (2, 45, 1, par\$, jflag())

CALL params (2, 47, 0, par\$, jflag())

END IF

IF jexp(4)=1 AND jinv(2)=1 THEN

CALL params (1, 49, 0, par\$, jflag())

END IF

iman = iman + 1 : isub = 2

END IF

ELSEIF iman = 3 THEN 'inhalation

IF iopt9(4) = 0 THEN

iman = iman + 1 : isub = 0 : GOTO loop9

ELSEIF isub = 1 THEN

CALL helpmenu.1 (-1, 23, ibuf, iur, iul, ilr, ilc, h\$, iherr)

CALL waita

CALL helpmenu.1 (0, 23, ibuf, iur, iul, ilr, ilc, h\$, iherr)

ELSEIF isub = 2 THEN

CALL params (2, 55, 1, par\$, jflag())

iresp = VAL (par\$)

APPRENTICE

```
IF iresp=1 THEN CALL params (1, 57, 0, par$, jflag())
IF iresp=2 THEN CALL params (1, 58, 0, par$, jflag())
IF jopt(3)=3 AND jexp(2)=0 THEN 'acute, no external; get plume fr.
    CALL params (1, 54, 0, par$, jflag())
END IF
iman = 4 : isub = 0
```

```
END IF
```

```
END IF
GOTO loop9
```

```
next9:
```

```
EXIT SUB
```

```
'-----
END SUB
```

APPRENTICE

```
SUB MENU10 ( imenu%, jopt%(1), jtrans%(1), jinv%(1), _  
             jexp%(1), z.h$ ) STATIC
```

```
Menu 10 Setup and Control (Ingestion population and drinking  
water)
```

```
Subprogram for APPRENTICE of the GENII Software Package  
Pacific Northwest Laboratory Environmental Dosimetry System
```

```
Last Modification: 29-Aug-88 RAP
```

```
Reviewed and Approved: 14-Sept-88 BA Napier
```

```
DEFINT i-n
```

```
ifirst = ifirst + 1
```

```
IF ifirst = 1 THEN
```

```
    DIM iopd10%(5), iopt10%(5), cmd10$(4,4), jflag(20)
```

```
    iopd10%(1) = 4
```

```
    iopd10%(2) = 0 : cmd10$(1,1) = "Previous Menu "  
                   cmd10$(1,2) = "Ingestion Population"
```

```
    iopd10%(3) = 2 : cmd10$(3,1) = "Help.....F1"  
                   cmd10$(3,2) = "Input "
```

```
                   cmd10$(1,3) = "Drinking Water"
```

```
    iopd10%(4) = 2 : cmd10$(4,1) = "Help.....F1"
```

```
                   cmd10$(4,2) = "Input "
```

```
    iopd10%(5) = 0 : cmd10$(1,4) = "Next"
```

```
    FOR i = 1 TO 5 : iopt10(i) = iopd10(i) : NEXT i
```

```
END IF
```

```
Initialize Menu 10 --
```

```
Air ingestion population--
```

```
IF jtrans(1)=0 THEN 'not air case
```

```
    iopt10(3) = 0
```

```
ELSEIF jopt(3)=3 THEN 'acute
```

```
    iopt10(3) = 0
```

```
    CALL params (1, 176, 8, "1", jflag())
```

```
ELSE
```

```
    iopt10(3) = iopd10(3)
```

```
END IF
```

```
Drinking water--
```

APPRENTICE

```
IF jexp(6)=0 THEN iopt10(4) = 0 ELSE iopt10(4) = iopd10(4)
```

```
isub = 2 : iman = 2
```

```
CALL strip (cmd10$())
```

```
z.i$ = "i"
```

```
CALL msmenu.1 (z.i$, z.h$, iopt10(), cmd10$(), iman, isub)
```

```
z.i$ = ""
```

```
Menu 10 Control Loop--
```

```
loop10:
```

```
IF iopt10(iman+1)=0 AND iman < iopt10(1) THEN iman = iman+1 : GOTO loop10  
IF isub > 0 AND iopt10(iman+1) = 0 THEN isub = 0
```

```
CALL msmenu.1 (z.i$, z.h$, iopt10(), cmd10$(), iman, isub)
```

```
CALL strip (cmd10$())
```

```
IF iman = iopt10(1) THEN
```

```
  imenu = imenu + 1
```

```
GOTO next10
```

```
ELSEIF iman = 1 THEN
```

```
  imenu = imenu - 1
```

```
  GOTO next10
```

```
ELSEIF iman = 0 AND isub = 0 THEN
```

```
  imenu = 0
```

```
GOTO next10
```

```
ELSEIF iman = 2 THEN 'ingestion population
```

```
  IF isub = 1 THEN
```

```
    CALL helpmenu.1 (-1, 24, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

```
    CALL waita
```

```
    CALL helpmenu.1 (-1, 25, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

```
    CALL waita
```

```
    CALL helpmenu.1 (-1, 26, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

```
    CALL waita
```

```
  CALL helpmenu.1 (0, 26, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

```
  CALL helpmenu.1 (0, 25, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

```
  CALL helpmenu.1 (0, 24, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

```
    isub = isub + 1
```

```
  ELSEIF isub = 2 THEN
```

```
    IF jinv(1)=1 THEN GOSUB atmprd
```

```
    IF ifoq=0 THEN CALL params (1, 177, 1, par$, jflag())
```

```
    IF jexp(7)=1 THEN CALL params (1, 59, 1, par$, jflag())
```

APPRENTICE

```
IF jexp(6)=1 THEN CALL params (1, 60, 0, par$, jflag())
IF jexp(7)=1 OR jexp(8)=1 OR jexp(9)=1 THEN
  CALL params (1, 61, 1, par$, jflag())
  IF par$ = "F" THEN
    CALL params (1, 67, 0, par$, jflag())
    IF par$ = "F" THEN
      j$ = "It is assumed that food production = food consumption."
      CALL messag2 (j$)
    END IF
  END IF
END IF

END IF
iman = iman + 1 : isub = 2

ELSEIF iman = 3 THEN                                     'drinking water

  IF lopt10(4) = 0 THEN
    iman = iman + 1 : isub = 0 : GOTO loop10

  ELSEIF isub = 1 THEN
    CALL helpmenu.1 (-1, 27, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 27, ibuf, iur, iul, ilr, ilc, h$, iherr)
    isub = isub + 1

  ELSEIF isub = 2 THEN

    IF jinv(11) = 1 THEN                                     'derived concentration
      CALL params (1, 62, 8, "3", jflag())
    ELSEIF jinv(7) AND (jinv(8) OR jinv(2)) THEN
      CALL params (1, 62, 1, par$, jflag())
    ELSEIF jinv(7) = 1 THEN                                     'ground water
      CALL params (1, 62, 8, "1", jflag())
    ELSEIF jinv(8) = 1 OR jinv(2) = 1 THEN                     'surface water
      CALL params (1, 62, 8, "2", jflag())
    END IF

    CALL params (3, 63, 1, par$, jflag())
    iman = 4 : isub = 0

  END IF

END IF

GOTO loop10

next10:

EXIT SUB
```

APPRENTICE

atmprd:

```
CALL tblank (10,1,24,80)
LOCATE 12, 3
PRINT "Atmospheric production definition (select option):";
LOCATE 14,3
PRINT " 0 - Use food-weighted chi/Q value";
LOCATE 15,3
PRINT " 1 - Use chi/Q value entered under Air Transport";
LOCATE 16,3
PRINT " 2 - Use uniform production";
LOCATE 17,3
PRINT " 3 - Use chi/Q grid and food production grid";
LOCATE 19,3
PRINT "Enter selected option:";

isetfq = isetfq + 1
IF isetfq = 1 THEN
  CALL params (1, 176, 6, par$, jflag())
  ifoq = VAL(par$)
END IF

inopt=1
WHILE inopt=1

  in$ = STR$ (ifoq)
  CALL stripper.1 (in$, in$)
  CALL innum (in$,1,rnum,19,27,1arrow)
  IF rnum < 4 THEN inopt = 0 ELSE CALL music

WEND
CALL tblank (10,1,25,80)

ifoq = INT (rnum)
par$ = STR$(ifoq)
CALL params (1, 176, 8, par$, jflag())

RETURN
```

END SUB

APPRENTICE

```
SUB MENU11 ( imenu%, jopt%(1), jtrans%(1), jinv%(1),  
             jexp%(1), jaq%(1), jtf%(1), jan%(1), z.h$ ) STATIC
```

Menu 11 Setup and Control (aquatic foods, terrestrial foods, and animal product input control)

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 30-Aug-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

```
DEFINT i-n
```

```
ifirst = ifirst + 1
```

```
IF ifirst = 1 THEN
```

```
    DIM iopd11%(6), iopt11%(6), cmd11$(5,5), jflag(20)
```

```
    iopd11%(1) = 5
```

```
    iopd11%(2) = 0 : cmd11$(1,1) = "Previous Menu "
```

```
                    cmd11$(1,2) = "Aquatic Foods"
```

```
    iopd11%(3) = 2 : cmd11$(3,1) = "Help.....F1"
```

```
                    cmd11$(3,2) = "Input "
```

```
                    cmd11$(1,3) = "Terrestrial Foods"
```

```
    iopd11%(4) = 2 : cmd11$(4,1) = "Help.....F1"
```

```
                    cmd11$(4,2) = "Input "
```

```
                    cmd11$(1,4) = "Animal Products"
```

```
    iopd11%(5) = 2 : cmd11$(5,1) = "Help.....F1"
```

```
                    cmd11$(5,2) = "Input "
```

```
    iopd11%(6) = 0 : cmd11$(1,5) = "Next"
```

```
    FOR i = 1 TO 6 : iopt11(i) = iopd11(i) : NEXT i
```

```
END IF
```

```
Initialize Menu 11 --
```

```
IF jexp(7)=0 THEN iopt11(3) = 0 ELSE iopt11(3) = iopd11(3)
```

```
IF jexp(8)=0 THEN iopt11(4) = 0 ELSE iopt11(4) = iopd11(4)
```

```
IF jexp(9)=0 THEN iopt11(5) = 0 ELSE iopt11(5) = iopd11(5)
```

```
Get export and import flags--
```

```
iport = 0
```

```
CALL params (1, 61, 6, par$, jflag())
```

```
IF par$="T" THEN
```

APPRENTICE

```
        iport = 1
    ELSE
        CALL params (1, 67, 6, par$, jflag())
        IF par$ = "T" THEN
            iport = 1
        END IF
    END IF

'   Get number of years of intake--
    CALL params (1, 1, 6, par$, jflag())
    ntkend = VAL(par$)

    isub = 2 : iman = 2

    CALL strip (cmd11$())
    z.i$ = "i"
    CALL msmenu.1 (z.i$, z.h$, iopt11(), cmd11$(), iman, isub)
    z.i$ = ""

'   Menu 11 Control Loop--
loop11:

    IF iopt11(iman+1)=0 AND iman < iopt11(1) THEN iman = iman+1 : GOTO loop11
    IF isub > 0 AND iopt11(iman+1) = 0 THEN isub = 0

    CALL msmenu.1 (z.i$, z.h$, iopt11(), cmd11$(), iman, isub)
    CALL strip (cmd11$())

    IF iman = iopt11(1) THEN
        imenu = imenu + 1
        GOTO next11

    ELSEIF iman = 1 THEN
        imenu = imenu - 1
        GOTO next11

    ELSEIF iman = 0 AND isub = 0 THEN
        imenu = 0
        GOTO next11

    ELSEIF iman = 2 THEN                                     'aquatic foods

        IF isub = 1 THEN
            CALL helpmenu.1 (-1, 28, ibuf, iur, iul, ilr, ilc, h$, iherr)
            CALL waita
            CALL helpmenu.1 (0, 28, ibuf, iur, iul, ilr, ilc, h$, iherr)

        ELSEIF isub = 2 THEN
            CALL params (1, 66, 1, par$, jflag())
```

APPRENTICE

```
      save isalt for output
      FOR i = 1 TO 4
        IF jaq(i) > 0 THEN
          ip = 68 + (i-1) * 4
          Transit time--
          CALL params (1, ip, 1, par$, jflag())
          IF iport=1 THEN CALL params (1, ip+1, 0, par$, jflag())
          Holdup and consumption--
          CALL params (2, ip+2, 0, par$, jflag())
        END IF
      NEXT i

      END IF
      iman = iman + 1 : isub = 2

ELSEIF iman = 3 THEN                                     'terrestrial foods

  IF iopt11(4) = 0 THEN
    iman = iman + 1 : isub = 2 : GOTO loop11

  ELSEIF isub = 1 THEN
    CALL helpmenu.1 (-1, 29, ibuf, iur, iul, ilr, ilc, h$, iherr)
    CALL waita
    CALL helpmenu.1 (0, 29, ibuf, iur, iul, ilr, ilc, h$, iherr)

  ELSEIF isub = 2 THEN

    FOR i = 1 TO 4
      IF jtf(i) > 0 THEN
        ip = 84 + (i-1) * 8
        CALL params (1, ip, 1, par$, jflag())
        ip = ip + 1
        GOSUB irrig
        CALL params (1, ip, 0, par$, jflag()) : ip = ip + 1
        IF iport=1 THEN CALL params (1, ip, 0, par$, jflag())
        ip = ip + 1
        CALL params (2, ip, 0, par$, jflag())
      END IF
    NEXT i
    END IF

    iman = iman + 1 : isub = 2

ELSEIF iman = 4 THEN                                     'animal products

  IF iopt11(5) = 0 THEN
    iman = iman + 1 : isub = 2 : GOTO loop11

  ELSEIF isub = 1 THEN
    CALL helpmenu.1 (-1, 30, ibuf, iur, iul, ilr, ilc, h$, iherr)
```

APPRENTICE

```
CALL waita
CALL helpmenu.1 (0, 30, ibuf, iur, iul, ilr, ilc, h$, iherr)

ELSEIF isub = 2 THEN

  FOR i = 1 TO 4
    IF jan(i) > 0 THEN

      IF i = 1 THEN
        ip = 116
      ELSEIF i = 2 THEN
        ip = 134
      ELSEIF i = 3 THEN
        ip = 145
      ELSEIF i = 4 THEN
        ip = 163
      END IF

      Holdup, consumption, and total production--
      CALL params (2, ip, 1, par$, jflag()) : ip = ip + 2
      IF iport=1 THEN CALL params (1, ip, 0, par$, jflag())
      ip = ip + 1

      Contaminated drinking water--
      IF jinv(2) OR jinv(7) OR jinv(8) THEN
        CALL params (1, ip, 0, par$, jflag())
      END IF
      ip = ip + 1

      Fraction of animal diet consisting of contaminated stored feed--

      IF jopt(3)=3 AND ntkend > 1 THEN
        CALL messag ("Diet fraction is for years 2 to "+STR$(ntkend))
      END IF

      IF jopt(3)=2 OR (jopt(3)=3 AND ntkend > 1) THEN
        CALL params (1, ip, 0, par$, jflag())
      END IF
      ip = ip + 1

      Stored feed: growing time, irrigation, yield, and storage--
      IF VAL(par$) > 0.0 OR jopt(3)=3 THEN
        CALL params (1, ip, 0, par$, jflag()) : ip = ip + 1
        GOSUB irrig
        CALL params (1, ip, 0, par$, jflag()) : ip = ip + 1
        IF jopt(3)=2 THEN CALL params (1, ip, 0, par$, jflag())
        ip = ip + 1
      ELSE
        ip = ip + 6
      END IF
```

APPRENTICE

```
IF i=1 OR i=3 THEN
    Fraction of animal diet consisting of contaminated fresh feed--
    IF jopt(3)=3 AND ntkend > 1 THEN
        CALL messag ("Diet fraction is for years 2 to "+STR$(ntkend))
    END IF
    par$ = ""
    IF jopt(3)=2 OR (jopt(3)=3 AND ntkend > 1) THEN
        CALL params (1, ip, 0, par$, jflag())
    END IF
    ip = ip + 1
    Fresh forage: growing time, irrigation, yield, and storage--
    IF VAL(par$) > 0.0 OR jopt(3)=3 THEN
        CALL params (1, ip, 0, par$, jflag()) : ip = ip + 1
        GOSUB irrig
        CALL params (2, ip, 0, par$, jflag()) : ip = ip + 2
    END IF
END IF
END IF
NEXT i
iman = iman + 1 : isub = 2
END IF
END IF
GOTO loop11
next11:
EXIT SUB
'----- Irrigation input -----
irrig:
    irr = 0
    IF (jinv(2)=1 OR jinv(8)=1) AND jinv(7)=1 THEN
        Both surface and ground water--
        CALL params (1, ip, 0, par$, jflag()) : irr = 1
    ELSEIF jinv(7)=1 THEN
        CALL params (1, ip, 8, "1", jflag()) : irr = 1
        'ground water
    ELSEIF jinv(2)=1 OR jinv(8)=1 THEN
        CALL params (1, ip, 8, "2", jflag()) : irr = 1
        'surface water
    ELSE
```

APPRENTICE

CALL params (1, ip, 8, "0", jflag())

END IF

ip = ip + 1

IF irr=1 THEN CALL params (2, ip, 0, par\$, jflag())

ip = ip + 2

RETURN

END SUB

APPRENTICE

COMMON SHARED /errors/ nerr%

```
SUB MENU12 ( imenu%, jopt%(1), jtrans%(1), jinv%(1),  
             jexp%(1), jaq%(1), jtf%(1), jan%(1), jrpt%(1), _  
             jrad%(1), rmd$(1), nirmd%,  
             cmd$(2), cmd2$(2), cmd3$(2), z.h$ ) STATIC
```

Menu 12 Setup and Control (File management)

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 30-Aug-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

DEFINT i-n

```
ifirst = ifirst + 1  
IF ifirst = 1 THEN
```

```
  x = FRE("")  
  DIM dir$(34), idum2(1), tab$(2)
```

```
  DIM iopd12%(5), iopt12%(5), cmd12$(3,5), jflag(20)
```

```
  iopd12%(1) = 4  
  iopd12%(2) = 0 : cmd12$(1,1) = "Previous Menu "  
                  cmd12$(1,2) = "Files "  
  iopd12%(3) = 5 : cmd12$(3,1) = "Help.....F1"  
                  cmd12$(3,2) = "FileNames"  
                  cmd12$(3,3) = "Title"  
                  cmd12$(3,4) = "Write File"  
                  cmd12$(3,5) = "File Management"
```

```
  iopd12%(4) = 0 : cmd12$(1,3) = "Next Scenario"  
  iopd12%(5) = 0 : cmd12$(1,4) = "Quit"
```

```
  FOR i = 1 TO 5 : iopt12(i) = iopd12(i) : NEXT i
```

```
END IF
```

Initialize Menu 12 --

Free up string space--

```
x = FRE (" ")  
j$ = "Free string space: "+STR$(x) : CALL messag(j$)
```

APPRENTICE

```
iman = 2 : isub = 2
```

```
CALL strip (cmd12$())
```

```
z.i$ = "i"
```

```
CALL msmenu.1 (z.i$, z.h$, iopt12(), cmd12$(), iman, isub)
```

```
z.i$ = ""
```

```
' Menu 12 Control Loop--
```

```
loop12:
```

```
' IF isub > 0 AND iopt12(iman) = 0 THEN isub = 0
```

```
CALL msmenu.1 (z.i$, z.h$, iopt12(), cmd12$(), iman, isub)
```

```
CALL strip (cmd12$())
```

```
IF iman = iopt12(1) THEN
```

```
IF irit = 0 THEN
```

```
CALL messag ("You have not saved this scenario.")
```

```
ELSE
```

```
LOCATE 10,10 : PRINT "You have created ";iscen;" input files.";
```

```
LOCATE 12,10
```

```
PRINT "To execute, after quitting, type:";
```

```
i = INSTR (bat$,".")
```

```
LOCATE 14,20 : CALL intense (1) : PRINT MID$(bat$,1,i-1);
```

```
CALL intense (0)
```

```
CALL waita
```

```
END IF
```

```
LOCATE 24,22 : PRINT "Are you sure you wish to quit (N/Y)? ";
```

```
valu$ = "N" : CALL inlog (valu$, 24,70)
```

```
CALL tblank (24,1,24,80)
```

```
IF valu$ = "Y" THEN
```

```
imenu = imenu + 1
```

```
GOTO next12
```

```
END IF
```

```
ELSEIF iman = 1 THEN
```

```
imenu = imenu - 1
```

```
GOTO next12
```

```
ELSEIF iman = 0 AND isub = 0 THEN
```

```
imenu = 0
```

```
GOTO next12
```

```
ELSEIF iman = 2 THEN
```

```
IF isub = 1 THEN
```


APPRENTICE

```
CALL helpmenu.1 (-1, 31, ibuf, iur, iul, ilr, ilc, h$, iherr)
CALL waita
CALL helpmenu.1 (0, 31, ibuf, iur, iul, ilr, ilc, h$, iherr)
isub = isub + 1

ELSEIF isub = 2 THEN 'input filenames

CALL getdir.2 (*.in", dir$(), idir)
IF idir < 0 THEN
    CALL messag ("Too many files to display. Use File Management.")

ELSEIF idir > 0 THEN 'display directory
    GOSUB disdir

END IF

CALL driveget.1 (dr$, idr)
CALL getsub (0, sub$)

getfil:
ir = 24 : LOCATE ir,10
PRINT "Enter filename prefix for this scenario: ";
CALL inchar (prefix$, 2, 8, ir, 60)

Construct complete filename--

CALL stripper.1 (prefix$, prefix$)
pre$ = sub$+"\"+prefix$
filn$ = pre$ + ".in"
chk$ = prefix$+".BAT"

CALL getdir.2 (filn$, dir$(), idir)
IF idir = 0 THEN
    CALL getdir.2 (chk$, dir$(), idir)
END IF

IF idir > 0 THEN
    CALL tblank (ir,1,ir,59)
    CALL messag ("File already exists.")
    GOTO getfil
ELSE
    IF LEN(prefix$) > 0 THEN inam = 1
END IF

CALL tblank (2,1,24,79) : CALL genbox
GOSUB extfil 'see if additional filenames needed

LOCATE 24,10 : PRINT "Do you wish to print output file (N/Y)?";
IF iprnt = 1 THEN valu$ = "Y" ELSE valu$ = "N"
CALL inlog (valu$, 24, 60)
```

APPRENTICE

```
IF valu$ = "F" THEN iprnt = 0 ELSE iprnt = 1
CALL tblank (24,1,24,79)
isub = isub + 1

ELSEIF isub = 3 THEN 'input title

LOCATE 10,10,1 : PRINT "Enter a title to identify this scenario ";
CALL inchar (titl$, 0, 70, 12, 10 )
CALL tblank (10,1,12,79)
isub = isub + 1

ELSEIF isub = 4 THEN 'write input files

' Check for option incompatibilities--
GOSUB chk

iscen = iscen + 1

' Write batch commands--

IF iscen = 1 THEN

    IF inam = 0 THEN
        CALL messag ("Enter filename first.")
        iman = 2 : isub = 2 : iscen = 0 : GOTO loop12
    END IF

    bat$ = prefix$+".BAT"
    nerr = 0 : OPEN "0", #3, bat$
    IF nerr > 0 THEN GOTO getfil
    GOSUB intro
    GOSUB ritbat
    CLOSE (3)

ELSEIF iscen = 2 THEN

getbat:
    ir = 24 : LOCATE ir,10
    PRINT "Enter filename prefix for this batch file: ";
    CALL inchar (in$, 2, 8, ir, 60)
    CALL tblank (24,1,24,79)

' Construct complete batch file name--

CALL stripper.1 (in$, in$)
lin = LEN(in$) : IF lin=0 GOTO getbat
in$ = in$+".BAT"
CALL getdir.2 (in$, dir$(), idir)

IF idir > 0 AND in$ <> bat$ THEN
```

APPRENTICE

```
CALL messag ("File already exists.")
i = INSTR (in$,".") : IF i > 0 THEN in$ = MID$(IN$,1,i-1)
GOTO getbat

ELSEIF idir=0 AND in$ <> bat$ THEN

    nerr = 0: NAME bat$ AS in$
    IF nerr > 0 THEN
        CALL messag ("File not found.")
        GOTO getbat
    END IF

END IF

bat$ = sub$+"\"+in$
nerr = 0 : OPEN "A", #3, bat$
IF nerr > 0 THEN
    CALL messag ("Error with file.")
    GOTO getbat
END IF
GOSUB ritbat
CLOSE (3)

ELSE

    nerr = 0 : OPEN "A", #3, bat$
    IF nerr > 0 THEN
        CALL messag ("Error with file.")
        GOTO getbat
    END IF

    GOSUB ritbat
    CLOSE (3)

END IF

GOSUB ritfil
CALL tblank (24,1,24,80)

iman = 4 : isub = 0

ELSEIF isub = 5 THEN    'directory management

    search$ = sub$+"*.in"
    LOCATE 12,10 : PRINT "Please wait..."
    CALL dirmgr (search$, ier)
    CALL tblank (2,1,25,79) : CALL genbox
    IF ier > 0 THEN j$=STR$(ier) : CALL messag (j$)

END IF
```

APPRENTICE

```
ELSEIF iman = 3 THEN 'create another scenario

    imenu = 1
    CALL tblank (10,1,24,79)
    GOTO next12

END IF
GOTO loop12

next12:

    EXIT SUB

'-----
extfil:

'    Get XOQOPT value from file--
    CALL params (1, 175, 6, par$, jflag())
    jair = VAL (par$)

'    Check population file--
    icheck = 0

    IF jopt(2)=2 THEN 'population case

        IF jtrans(1)=1 THEN
            IF jair > 1 THEN icheck = 1
        ELSE
            CALL params (1, 174, 6, par$, jflag())
            jpop = VAL (par$)
            IF jpop = 1 THEN icheck = 1
        END IF

    ELSE 'individual select location
        IF jtrans(1)=1 AND jair=2 THEN icheck = 1
    END IF

    IF icheck=1 THEN
        x$ = "population" : exfil$ = popfil$ : exnam$ = popnam$
        GOSUB exfil : popfil$ = exfil$ : popnam$ = exnam$
    END IF

'    Check chi/q and joint frequency files--
    IF jtrans(1) = 1 THEN

        IF jair > 1 THEN
            CALL params (1, 16, 6, par$, jflag())
            IF par$="F" THEN
                x$ = "chi/Q" : exfil$ = chifil$ : exnam$ = chinam$
```

APPRENTICE

```
      GOSUB exfil : chfil$ = exfil$ : chinam$ = exnam$
      jfreq = 0
    ELSE
      x$ = "joint frequency" : exfil$ = jffil$ : exnam$ = jfnam$
      GOSUB exfil : jffil$ = exfil$ : jfnam$ = exnam$
      jfreq = 1
    END IF
  END IF
END IF

END IF
RETURN
```

chk:

```
' Make sure that inventory has been entered
  IF nirmd=0 THEN
    j$ = "Inventory must be specified." : CALL messag (j$)
    imenu = 5 : GOTO next12
  END IF
```

```
' Check that exposure has been specified--
  ifound = 0
  FOR i = 1 TO 10
    IF jexp(i) = 1 THEN ifound = 1
  NEXT i
  IF ifound = 0 THEN
    j$ = "Exposure must be specified" : CALL messag (j$)
    imenu = 3 : GOTO next12
  END IF
```

```
' Load flag array--
```

```
jflag(1)=jaq(1)
jflag(2)=jaq(2)
jflag(3)=jaq(3)
jflag(4)=jaq(4)
```

```
jflag(5)=jtf(1)
jflag(6)=jtf(2)
jflag(7)=jtf(3)
jflag(8)=jtf(4)
```

```
jflag(9)=jan(1)
jflag(10)=jan(2)
jflag(11)=jan(3)
jflag(12)=jan(4)
```

```
jflag(13) = jopt(3)
jflag(14) = jopt(2)
jflag(15) = jopt(1)
```

APPRENTICE

RETURN

'---- Write batch file introduction -----

intro:

```
r$ = "rem " : p$ = STRING$(14,32)
PRINT #3, "CLS"
PRINT #3, r$
PRINT #3, r$
PRINT #3, r$
PRINT #3, r$
PRINT #3, r$
PRINT #3, r$; p$; "GENII"
PRINT #3, r$; p$; "Hanford Environmental Dosimetry Software System"
PRINT #3, r$
PRINT #3, r$; p$; "Pacific Northwest Laboratory"
PRINT #3, r$; p$; "Richland WA"
PRINT #3, r$
PRINT #3, r$; p$; "Contact: Bruce Napier (509) 375-3896"
PRINT #3, r$
```

RETURN

'---- Write batch file for this scenario -----

ritbat:

```
i$ = STR$(iscen) : CALL stripper.1 (i$, i$)
e$ = " if errorlevel 1 goto stop"+i$
s$ = ":stop"+i$
d$ = " \genii\"
```

```
CALL stripper.1 (jffil$, jffil$)
CALL stripper.1 (chifil$, chifil$)
CALL stripper.1 (popfil$, popfil$)
CALL stripper.1 (foodprod$, foodprod$)
```

```
PRINT #3, " echo off"
PRINT #3, " erase ";d$;"genii.in"
PRINT #3, " erase ";d$;"pop.in"
PRINT #3, " erase ";d$;"jointfre.in"
PRINT #3, " erase ";d$;"chiq.in"
PRINT #3, " erase ";d$;"foodprod.in"
PRINT #3, " erase ";d$;"env.in"
PRINT #3, " erase ";d$;"genii.out"
PRINT #3, " erase ";d$;"env.out"
PRINT #3, " erase ";d$;"genii2.out"
PRINT #3, " erase ";d$;"dose.out"
```

```
IF jair < 1 THEN
  IF jfreq=1 THEN
```

APPRENTICE

```
    PRINT #3, " copy ";jffil$; d$; "jointfre.in"
ELSE
    PRINT #3, " copy ";chifil$; d$; "chiq.in"
END IF
END IF

IF icheck = 1 THEN PRINT #3, " copy ";popfil$; d$; "pop.in"
IF jfoq=3 THEN PRINT #3, " copy ";foqfil$; d$; "foodprod.in"

PRINT #3, "echo on"
PRINT #3, " copy ";filn$;d$;"genii.in"
PRINT #3, d$;"envin"
PRINT #3, e$
PRINT #3, d$;"env"
PRINT #3, e$
PRINT #3, d$;"dose"
PRINT #3, e$
PRINT #3, r$
PRINT #3, " copy";d$;"genii.out+";d$;"genii2.out+";_
    d$;"dose.out ";pre$;".out"
IF iprnt=1 THEN PRINT #3, " copy ";pre$;".out prn"
PRINT #3, r$
PRINT #3, s$
RETURN
```

'----- Open and write input file -----

ritfil:

```
    LOCATE 24,10 : PRINT "Please wait, writing file...";

    OPEN "I", #1, "\genii\apprenti.dat"
    nerr = 0 : OPEN "O", #2, filn$
    IF nerr > 0 THEN
        CALL messag ("Error with .dat file")
        GOTO getfil
    END IF
    irit = irit + 1 : inam = 0

    LINE INPUT #1, 1$ : PRINT #2, 1$
    LINE INPUT #1, 1$

    PRINT #2, "Title: "; titl$

    LINE INPUT #1, 1$ : PRINT #2, SPACE$(7); filn$; TAB(49);
    PRINT #2, "Created on "; DATE$; " at ";MID$(TIME$,1,5)

    LINE INPUT #1, 1$ : PRINT #2, 1$

    Write options--
    CALL ritin (jopt(), jtrans(), jinv(), jexp(), _
```

APPRENTICE

```
jaq(), jtf(), jan(), jrpt(), cmd$())

' Write inventory--
CALL menu5 (8, imenu, jopt(), jinv(), jexp(), _
            nirmd, jrad(), rmd$(), cmd2$(),
            ir, ic, icur, ib1, ib2, ib3, ib4,
            idum, idum, idum2(), idum2(), z.h$)

' Write parameters--
CALL params (0, 0, 9, par$, jflag())
CLOSE (2)
CLOSE (1)

RETURN

'---- Get extra input file name, check title -----
exfil:
CALL tblank (10,1,24,79)
LOCATE 10,10
PRINT "Have you prepared ";x$;" input file (Y/N)?";
valu$ = "Y" : CALL inlog (valu$, 10, 60)

IF valu$ = "F" THEN

    LOCATE 12,10
    PRINT "Be sure to create file and add file name to batch file.";
    CALL waita

ELSE

    CALL driveget.1 (dr$, idum)
    CALL getsub (0, sub$)
    LOCATE 12,10
    PRINT "Is file located in ";dr$;" ":";sub$;" (Y/N)";
    valu$ = "Y" : CALL inlog (valu$, 12, 60)

    IF valu$ = "F" THEN
        LOCATE 14,10
        PRINT "Enter complete file name including drive and path:";
        CALL inchar (exfil$, 1, 60, 15, 10)
    ELSE
        LOCATE 14,10
        PRINT "Enter ";x$;" file name (e.g., myfile.in):";
        CALL inchar (exnam$, 1, 12, 14, 60)
        CALL stripper.1 (exnam$, exnam$)
        exfil$ = dr$+" ":"+sub$+"\ "+exnam$
    END IF

    CALL getdir.2 (exfil$, tab$(), idir)
```


APPRENTICE

```
IF idir > 0 THEN

    OPEN "I", #1, exfil$ : LINE INPUT #1, extl$ : CLOSE (1)
    LOCATE 16, 10 : CALL reverse (1)
    PRINT MID$(extl$,1,60); : CALL reverse (0)
    LOCATE 17,10 : PRINT "Is this the correct file (Y/N)?";
    valu$ = "Y" : CALL inlog (valu$, 17, 60)
    IF valu$ = "F" THEN GOTO exfil

ELSEIF idir = 0 THEN
    CALL messag ("File not found.")
    GOTO exfil

ELSE
    CALL messag ("Please reenter.")

END IF

END IF
CALL tblank (10,1,24,80)

RETURN

'---- Display list of input files in this subdirectory -----
disdir:

LOCATE 3,10 : PRINT "Input files in current directory:"
nmax = 17
IF idir > nmax THEN nloop = 2 ELSE nloop = 1

FOR iloop = 1 TO nloop

    IF iloop = 1 THEN
        IF idir > nmax THEN imax = nmax ELSE imax = idir
        istart = 1
    ELSE
        istart = nmax + 1
        imax = idir
    END IF

    CALL tblank (5,1,23,60) : ir = 5
    FOR i = istart TO imax
        ipnt = INSTR (dir$(i), " ")
        LOCATE ir, 10 : PRINT MID$(dir$(i),1,ipnt);
        LOCATE ir, 40 : PRINT MID$(dir$(i),ipnt+2);
        ir = ir + 1
    NEXT i
    CALL waita
```

APPRENTICE

```
NEXT iloop  
RETURN
```

```
END SUB
```

APPRENTICE

```
SUB RITIN ( jopt%(1), jtrans%(1), jinv%(1),  
            jexp%(1), jaq%(1), jtf%(1), jan%(1), jrpt%(1),_  
            cmd$(2)) STATIC
```

Write option portion of output file

Subprogram for APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 28-Jan-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

DEFINT i-n

```
LINE INPUT #1, 1$  
IF jopt(1) = 3 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jopt(2) = 2 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jopt(3) = 3 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$ : MID$(1$,6,18) = cmd$(5,jopt(4)) : PRINT #2, 1$  
LINE INPUT #1, 1$ : PRINT #2, 1$  
LINE INPUT #1, 1$ : PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jtrans(1) = 1 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
IF jexp(1) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jtrans(2) = 1 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
IF jexp(2) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jtrans(3) = 1 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
IF jexp(3) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$
```

APPRENTICE

```
IF jtrans(4) = 1 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
IF jexp(4) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jexp(5) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jexp(6) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jrpt(1) = 1 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
IF jexp(7) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jrpt(2) = 1 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
IF jexp(8) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jrpt(3) = 1 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
IF jexp(9) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$  
IF jrpt(4) = 1 THEN MID$(1$,1,1) = "T" ELSE MID$(1$,1,1) = "F"  
IF jexp(10) = 1 THEN MID$(1$,41,1) = "T" ELSE MID$(1$,41,1) = "F"  
PRINT #2, 1$
```

```
LINE INPUT #1, 1$ : PRINT #2, 1$  
LINE INPUT #1, 1$ : PRINT #2, 1$  
LINE INPUT #1, 1$ : PRINT #2, 1$
```

```
EXIT SUB
```

```
-----  
END SUB
```

APPRENTICE

SUB ritpar (new\$(1), rval(1), jflag%(1)) STATIC

Write parameters to GENII input file.

Module of Program APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 1-Sep-88 RAP

Reviewed and Approved: 14-Sept-88 8A Napier

DEFINT i-n

Time--

LINE INPUT #1, 1\$: PRINT #2, 1\$

FOR i = 1 TO 5

LINE INPUT #1, 1\$: MID\$(1\$,1,5) = new\$(i) : PRINT #2, 1\$

NEXT i

FOR i = 1 TO 3 : LINE INPUT #1, 1\$: PRINT #2, 1\$: NEXT i

Far field--

LINE INPUT #1, 1\$: MID\$(1\$,1,10) = new\$(174) : PRINT #2, 1\$

LINE INPUT #1, 1\$: MID\$(1\$,1,10) = new\$(39) : PRINT #2, 1\$

FOR i = 1 TO 4 : LINE INPUT #1, 1\$: PRINT #2, 1\$: NEXT i

Near field--

FOR i = 1 TO 5

LINE INPUT #1, 1\$: MID\$(1\$,1,10) = new\$(5+i) : PRINT #2, 1\$

NEXT i

LINE INPUT #1, 1\$: MID\$(1\$,1,10) = new\$(180) : PRINT #2, 1\$

FOR i = 1 TO 2 : LINE INPUT #1, 1\$: PRINT #2, 1\$: NEXT i

Air transport--

LINE INPUT #1, 1\$: MID\$(1\$,47,10) = new\$(181) : PRINT #2, 1\$

LINE INPUT #1, 1\$: MID\$(1\$,1,10) = new\$(175)

MID\$(1\$,47,10) = new\$(17) : PRINT #2, 1\$

LINE INPUT #1, 1\$: MID\$(1\$,47,10) = new\$(19) : PRINT #2, 1\$

LINE INPUT #1, 1\$: MID\$(1\$,47,10) = new\$(20) : PRINT #2, 1\$

Chi/Q, PM, E/Q--

LINE INPUT #1, 1\$

IF jflag(13)=2 THEN 'chronic

IF jflag(14)=3 THEN

MID\$(1\$,1,10) = new\$(11) 'individual

ELSE

APPRENTICE

```
      MID$(1$,1,10) = new$(12)    'population
    END IF
  ELSE                                'acute
    IF jflag(14)=3 THEN
      MID$(1$,1,10) = new$(12)    'individual
    ELSE
      MID$(1$,1,10) = new$(40)    'population
    END IF
  END IF
END IF

MID$(1$,47,10) = new$(21) : PRINT #2, 1$

LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(14)
MID$(1$,47,10) = new$(22) : PRINT #2, 1$

LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(15)
MID$(1$,47,10) = new$(182) : PRINT #2, 1$
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(16)
MID$(1$,47,10) = new$(183) : PRINT #2, 1$
FOR i = 1 TO 2 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i

' Surface water transport
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(178) : PRINT #2, 1$
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(23) : PRINT #2, 1$
jsw = VAL (new$(178))
IF jsw > 0 and jsw <3 THEN
  LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(25) : PRINT #2, 1$
ELSE
  LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(24) : PRINT #2, 1$
END IF
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(26) : PRINT #2, 1$

LINE INPUT #1, 1$ : PRINT #2, 1$
FOR i = 1 TO 6
  LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(26+i) : PRINT #2, 1$
NEXT i
FOR i = 1 TO 2 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i

' Waste form availability and biotic transport--
FOR i = 1 TO 3
  LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(32+i) : PRINT #2, 1$
NEXT i
FOR i = 1 TO 2 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i
FOR i = 1 TO 3
  LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(35+i) : PRINT #2, 1$
NEXT i
FOR i = 1 TO 6 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i

' External exposure--
```

APPRENTICE

```
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(42)
MID$(1$,43,9) = new$(50) : PRINT #2, 1$

LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(44)
MID$(1$,43,9) = new$(51) : PRINT #2, 1$

LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(45) : PRINT #2, 1$

LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(46)
MID$(1$,43,9) = new$(52) : PRINT #2, 1$

LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(47)
MID$(1$,43,9) = new$(53) : PRINT #2, 1$

LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(48) : PRINT #2, 1$
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(49) : PRINT #2, 1$
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(54) : PRINT #2, 1$
FOR i = 1 TO 2 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i

Inhalation--
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(55) : PRINT #2, 1$
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(56) : PRINT #2, 1$

LINE INPUT #1, 1$
IF rval(56) = 1.0 THEN
    MID$(1$,1,10) = new$(57)
ELSEIF rval(56) = 2.0 THEN
    MID$(1$,1,10) = new$(58)
ELSE
    MID$(1$,1,1) = "0"
END IF
PRINT #2, 1$
FOR i = 1 TO 2 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i

Ingestion population--
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(176) : PRINT #2, 1$
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(177) : PRINT #2, 1$
FOR i = 1 TO 3 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i
FOR i = 1 TO 3
    LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(58+i) : PRINT #2, 1$
NEXT i
FOR i = 1 TO 5 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i

Aquatic foods--
LINE INPUT #1, 1$ : MID$(1$,1,10) = new$(66) : PRINT #2, 1$
FOR i = 1 TO 5 : LINE INPUT #1, 1$ : PRINT #2, 1$ : NEXT i

FOR i = 1 TO 4
    ip = 67 + 4 * (i-1)
    LINE INPUT #1, 1$
```

APPRENTICE

```
IF jflag(i)=1 THEN MID$(l$,12,1) = "T" ELSE MID$(l$,12,1) = "F"
MID$(l$,55,6) = new$(61+i)
PRINT #2, MID$(l$,1,21);
PRINT #2, USING " ###.##"; rval(ip+1);
PRINT #2, USING " ###.#####"; rval(ip+2);
PRINT #2, USING " #####.##"; rval(ip+3);
PRINT #2, USING " #####.##"; rval(ip+4);
PRINT #2, MID$(l$,52,79)
NEXT i
FOR i = 1 TO 7 : LINE INPUT #1, l$ : PRINT #2, l$ : NEXT i
```

Terrestrial foods--

```
FOR i = 1 TO 4
  ip = 83 + 8 * (i-1)
  LINE INPUT #1, l$
  IF jflag(4+i)=1 THEN MID$(l$,12,1) = "T" ELSE MID$(l$,12,1) = "F"
  PRINT #2, MID$(l$,1,21);
  PRINT #2, USING " ###.##"; rval(ip+1);
  irr = INT(rval(ip+2))
  PRINT #2, USING " ##"; irr;
  IF irr > 0 THEN x = rval(ip+3) ELSE x = 0.0
  PRINT #2, USING " ###.##"; x;
  IF irr > 0 THEN x = rval(ip+4) ELSE x = 0.0
  PRINT #2, USING " ###.##"; x;
  PRINT #2, USING " #####.##"; rval(ip+5);
  PRINT #2, USING " ###.#####"; rval(ip+6);
  PRINT #2, USING " #####.##"; rval(ip+7);
  PRINT #2, USING " #####.##"; rval(ip+8)
NEXT i
FOR i = 1 TO 8 : LINE INPUT #1, l$ : PRINT #2, l$ : NEXT i
```

Animal products--

```
FOR i = 1 TO 4

  IF i = 1 THEN
    ip = 115
  ELSEIF i = 2 THEN
    ip = 133
  ELSEIF i = 3 THEN
    ip = 144
  ELSEIF i = 4 THEN
    ip = 162
  END IF

  LINE INPUT #1, l$
  IF jflag(8+i)=1 THEN MID$(l$,1,1) = "T" ELSE MID$(l$,1,1) = "F"
  PRINT #2, MID$(l$,1,10);
  PRINT #2, USING " #####.##"; rval(ip+2);
  PRINT #2, USING " ###.##"; rval(ip+1);
```


APPRENTICE

```
PRINT #2, USING " ###.##"; rval(ip+3);
PRINT #2, USING " ###.##"; rval(ip+4);
```

```
Set diet fraction to zero if acute, one year of intake--
IF jflag(13)=3 AND rval(1) > 1 THEN x = rval(ip+5) ELSE x = 0.0
```

```
PRINT #2, USING " ##.##"; x;
PRINT #2, USING " ###.##"; rval(ip+6);
irr = INT (rval(ip+7))
PRINT #2, USING " #"; irr;
IF irr > 0 THEN x = rval(ip+8) ELSE x = 0.0
PRINT #2, USING " ###.##"; x;
IF irr > 0 THEN x = rval(ip+9) ELSE x = 0.0
PRINT #2, USING " ##.##"; x;
PRINT #2, USING " ###.##"; rval(ip+10);
PRINT #2, USING " ###.##"; rval(ip+11)
```

```
NEXT i
LINE INPUT #1, l$: PRINT #2, l$
```

```
FOR i = 1 TO 2
  IF i = 1 THEN ip = 126 ELSE ip = 155
  LINE INPUT #1, l$
  PRINT #2, MID$(l$,1,38);
```

```
Set diet fraction to zero if acute, one year of intake--
IF jflag(13)=3 AND rval(1) > 1 THEN x = rval(ip+1) ELSE x = 0.0
```

```
PRINT #2, USING " ##.##"; x;
PRINT #2, USING " ###.##"; rval(ip+2);
PRINT #2, USING " #"; rval(ip+3);
PRINT #2, USING " ###.##"; rval(ip+4);
PRINT #2, USING " ##.##"; rval(ip+5);
PRINT #2, USING " ###.##"; rval(ip+6);
PRINT #2, USING " ###.##"; rval(ip+7)
```

```
NEXT i
```

```
LINE INPUT #1, l$: PRINT #2, l$
LINE INPUT #1, l$: PRINT #2, l$
```

```
EXIT SUB
```

```
END SUB
```

APPRENTICE

SUB params (np%, ipstart%, iflag%, par\$, jflag%(1)) STATIC

Parameter input and checking handler.

Module of Program APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 1-Sep-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

Parameter file (each data set consists of the following):

- Record 1 - blank line
- Record 2 - parameter index
 - number of lines of descriptive information (1-2)
 - parameter type flag:
 - 0 - logical
 - 1 - integer
 - 2 - real
- Record 3 - default parameter value (maximum individual)
- Record 4 - default parameter value (population)
- Record 5 - reasonable minimum value
 - reasonable maximum value
- Record 6 - first line of description
- Record 7 - (optional) second line of description

Argument list:

- Np - number of consecutive parameters (by parameter index) to input this call (input)
- Istart - beginning parameter index (input)
- Iflag - Flag set to:
 - 0 - display parameter in next position on screen
 - 1 - if data input area of screen (rows 10 through 24) are to be cleared prior to inputting the current parameter (input)
 - 5 - set idos value; maximum individual or average individual default values
 - 6 - not input, return parameter value in par\$
 - 7 - read parameter file
 - 8 - not parameter input; set parameter to par\$
 - 9 - write output file
- Par\$ - last input parameter returned to calling module
- Jflag() - Flags necessary to write file are in array positions as follows:
 - 1-4 - jaq
 - 5-8 - jtf
 - 9-12 - jan

APPRENTICE

```
'
      13 - jopt(3) acute or chronic
      Idos      - dose type; either 2-average individual or 3-maximum
                  individual
-----
      DEFINIT i-n

      ifirst = ifirst + 1 : nmx = 185
      IF ifirst = 1 THEN
        DIM nld(nmx), ityp(nmx), rmin(nmx), rmax(nmx), rval(nmx), iset(nmx)
        DIM desc$(2,nmx), defmi(nmx), defpop(nmx), new$(nmx)
      END IF

'----- Process requested parameters -----
      Check if valid indices passed--
      icheck = ipstart + np - 1
      IF icheck > nmx THEN
        CALL messag ("Invalid index in PARAMS: "+STR$(icheck))
        EXIT SUB
      END IF

      IF iflag = 5 THEN                                     'set default type
        idos = ipstart
        EXIT SUB

      ELSEIF iflag = 6 THEN                                 'return requested value
        IF ityp(ipstart) > 0 THEN
          IF iset(ipstart) = 0 THEN
            IF idos = 2 THEN                                'population
              new$(ipstart) = STR$(defpop(ipstart))
              iset(ipstart) = idos
            ELSE
              new$(ipstart) = STR$(defmi(ipstart))
              iset(ipstart) = idos
            END IF
          END IF
        END IF
        par$ = new$(ipstart)
        EXIT SUB

      ELSEIF iflag = 7 THEN                                 'read parameter file
        GOSUB redpar
        EXIT SUB

      ELSEIF iflag = 9 THEN                                 'write output file
        CALL ritpar (new$(), rval(), jflag())
        EXIT SUB
```

APPRENTICE

```
ELSEIF iflag = 8 THEN                                'set parameter value and return
    new$(ipstart) = par$
    rval(ipstart) = VAL (par$)
    iset(ipstart) = 1
    EXIT SUB

ELSEIF iflag = 1 THEN                                'clear screen
    ir = 9
    CALL tblank (1,ir+2,1,24,80)
END IF

istop = ipstart + np - 1
FOR ip = ipstart TO istop

    IF ityp(ip) > 0 THEN
        IF iset(ip) <> idos THEN
            IF idos = 2 THEN                            'population
                new$(ip) = STR$(defpop(ip)) : iset(ip) = idos
            ELSE
                new$(ip) = STR$(defmi(ip)) : iset(ip) = idos
            END IF
        END IF
    END IF

ir = ir+2 : IF ir > 22 THEN ir = 11 : CALL tblank (1,ir-2,1,24,80)
IF ir < 11 THEN ir = 11
LOCATE ir, ic1 : PRINT desc$(1,ip);
IF nld(ip) > 1 THEN ir = ir+1 LOCATE ir, ic1+2 : PRINT desc$(2,ip);

IF ityp(ip) > 0 THEN                                    'input number

    nogood = 1
    WHILE nogood = 1                                    'loop until valid number input

        CALL innum (new$(ip), ityp(ip), rnum!, ir, 60, iarrow)
        nogood = 0
        IF ityp(ip) = 1 THEN                            'integer
            IF rnum > 32767.0 THEN
                GOSUB outran : nogood = 1
            ELSE
                inum = INT (rnum)
                IF inum < INT(rmin(ip)) OR inum > INT(rmax(ip)) THEN
                    GOSUB outran : nogood = 1
                END IF
            END IF
        ELSE
            IF rnum < rmin(ip) OR rnum > rmax(ip) THEN    'real
                GOSUB outran : nogood = 1
            END IF
        END IF
    END IF
END IF
```

APPRENTICE

```
END IF

IF nogood = 0 THEN
    rval(ip) = rnum
    par$ = new$(ip)
END IF

WEND

ELSEIF ityp(ip) = 0 THEN                                'logical input

    valu$ = new$(ip)
    CALL inlog (valu$, ir, 60)
    new$(ip) = valu$
    par$ = valu$

END IF

NEXT ip

EXIT SUB

'---- Out of range error handling -----
outtran:
CALL music : LOCATE 24,10
PRINT "Number outside reasonable range of";
PRINT rmin(ip);" to ";rmax(ip);
CALL waita : CALL tblank (24,1,24,80)
RETURN

'---- Read parameter file, dimension arrays, set constants -----
redpar:
ic1 = 10 : ic2 = 60

OPEN "I", #1, "\GENII\PARAMS.DAT"
LINE INPUT #1, dum$
WHILE NOT EOF(1)
    LINE INPUT #1, dum$
    INPUT #1, i, nld(i), ityp(i)
    IF ityp(i) = 0 THEN
        INPUT #1, new$(i)
        iset(i) = 1
    ELSE
        INPUT #1, defmi(i)
        INPUT #1, defpop(i)
        INPUT #1, rmin(i), rmax(i)
        new$(i) = "0"
    END IF
END IF
```

APPRENTICE

```
    FOR j = 1 TO nld(i)
      LINE INPUT #1, desc$(j,i)
    NEXT j
    IF i = nmx THEN GOTO redend
WEND
```

```
redend:
  CLOSE (1)
  RETURN
```

```
END SUB
```

APPRENTICE

```
SUB INNUM (a$, nflag%, buf!, ir%, icl%, iflag%) STATIC
```

```
Input number and check for validity, reprint number as integer  
or in E-format, return valid number
```

```
Module of Program APPRENTICE of the GENII Software Package  
Pacific Northwest Laboratory Environmental Dosimetry System
```

```
Last Modification: 11-Jul-88 RAP  
Reviewed and Approved: 14-Sept-88 BA Napier
```

```
a$      - input number string  
nflag   - flag indicating number type: 0-integer, 1-real on input  
iflag   - flag indicating if up or down arrow indicated on return  
buf     - number returned to calling program
```

```
DEFINT i - n  
num$ = "1234567890-+.Ee " : t$ = CHR$(13) : ilen = 8  
buf$ = SPACE$(ilen)  
iflag = 0  
  
insrt = 0  
LOCATE 9,69 : CALL reverse(1) : PRINT "Insert Off" : CALL reverse(0)  
jlen = LEN(a$) : IF jlen > ilen THEN jlen = ilen  
CALL stripper.1(a$, a$)  
MID$(buf$,1,jlen) = a$
```

start:

```
ic = icl + 1  
LOCATE ir, ic, 1 : CALL reverse(1) : PRINT buf$; : LOCATE ir,ic  
  
istop = 0 : ipnt = 1  
WHILE istop = 0  
    ityp = 1 : CALL inkey.1(ityp, iscan, c$)  
    CALL messag(STR$(ityp)+" "+STR$(iscan)+" "+c$)  
  
    IF ityp = 0 THEN      'insert toggle  
        IF iscan = 82 THEN  
            IF insrt = 0 THEN  
                insrt = 1 : LOCATE 9,69 : PRINT "Insert On "  
            ELSE  
                insrt = 0 : LOCATE 9,69 : PRINT "Insert Off"
```

APPRENTICE

```
END IF
ELSEIF iscan = 83 THEN 'delete
  buf$ = MID$(buf$,1,ipnt-1)+ MID$(buf$,ipnt+1)+" "
  LOCATE ir,ic1+1,1 : PRINT buf$; : LOCATE ir,ic,1
END IF

ELSEIF ityp = -6 THEN 'cursor keys

  IF iscan = 75 THEN 'backwards
    ipnt = ipnt - 1 : IF ipnt = 0 THEN ipnt = 1
  ELSEIF iscan = 77 THEN 'forwards
    ipnt = ipnt + 1 : IF ipnt > ilen THEN ipnt = ilen
  ELSEIF iscan = 72 THEN
    istop = 1 : iflag = -1
  ELSEIF iscan = 80 THEN
    istop = 1 : iflag = 1
  END IF
  ic = ic1 + ipnt : LOCATE ir,ic,1

ELSEIF ityp = -7 THEN

  IF iscan = 8 THEN

    ipnt = ipnt - 1
    IF ipnt > 0 THEN
      MID$(buf$,ipnt,1) = " "
      ic = ic1 + ipnt : LOCATE ir,ic,1 : PRINT " ";
      ic = ic1 + ipnt : LOCATE ir,ic,1
    ELSE
      ipnt = 1
    END IF

  ELSEIF iscan = 13 THEN
    istop = 1

  END IF

ELSEIF ityp > 31 THEN

  ichk = INSTR (num$, c$)
  IF ichk > 0 THEN
    IF insrt=1 THEN
      CALL strins.1 (ipnt, c$, buf$)
      jlen = LEN(buf$)
      IF jlen > ilen THEN buf$ = MID$(buf$,1,ilen)
    ELSE
      MID$(buf$,ipnt,1) = c$
    END IF
    ic = ic1 + ipnt : LOCATE ir,ic,1 : PRINT MID$(buf$,ipnt);
    ipnt = ipnt+1 : IF ipnt > ilen THEN ipnt = ilen
```


APPRENTICE

```
        ic = ic1 + ipnt : LOCATE ir,ic,1
    END IF

    END IF

WEND

Check number for validity--

CALL caseuppr.1 (buf$, buf$)
ilen = LEN (buf$)
CALL cntocr (buf$, "E", ne, ip)
CALL cntocr (buf$, "-", ndash, idash)
CALL cntocr (buf$, "+", nplus, iplus)
CALL cntocr (buf$, ".", ndec, idec)

IF ne > 1 OR ndash > 1 OR nplus > 1 OR ndec > 1 THEN GOTO err1
IF ndash > 0 AND nplus > 0 THEN GOTO err1
IF ne > 0 THEN IF ip=1 OR ip=ilen THEN GOTO err1
IF ndash > 0 THEN IF idash=1 OR idash=ilen THEN GOTO err1
IF nplus > 0 THEN IF iplus=1 OR iplus=ilen THEN GOTO err1
IF ndec > 1 THEN GOTO err1

IF ne = 0 AND (ndash > 0 OR nplus > 0) THEN      'add E for Lahey FORTRAN
    IF ndash > 0 THEN CALL strins.1 (idash, "E", buf$)
    IF nplus > 0 THEN CALL strins.1 (ipus, "E", buf$)
    ne = 1
END IF

Add decimal to real numbers--
IF nflag = 2 AND ndec = 0 THEN
    IF ne = 1 THEN
        ie = INSTR (buf$, "E")
        CALL strins.1 (ie, ".0", buf$)
    ELSE
        CALL stripper.1 (buf$, buf$)
        buf$ = buf$+".0"
    END IF
END IF

Check size of exponent--
IF ne = 1 THEN
    ie = INSTR (buf$, "E")
    IF ndash = 1 THEN ex$ = MID$ (buf$, ie+2) ELSE ex$ = MID$ (buf$, ie+1)
    ex = VAL (ex$)
    IF ex > 30 THEN
        CALL reverse (0)
        CALL messag ("Exponent out of range.")
        GOTO start
    
```

APPRENTICE

```
END IF
END IF
```

```
buf = VAL (buf$) : LOCATE 1r, 1c1+1 : CALL reverse (0)
IF nflag = 2 THEN
  PRINT USING "##.#####"; buf
ELSE
  PRINT USING "#####"; buf
END IF
```

```
a$ = buf$
LOCATE 9,69 : PRINT "      "
CALL reverse (0)
EXIT SUB
```

```
err1:
  CALL reverse (0)
  CALL messag ("Invalid number, reenter.")
  GOTO start
```

```
-----
END SUB
```

```
SUB cntocr (spec$, find$, ncount%, iposit%) STATIC
```

```
DEFINT i-n
ncount = 0
iposit = 0
```

```
ipos = 1
WHILE ipos > 0
  ipos = INSTR (ipos, spec$, find$)
  IF ipos > 0 THEN ncount = ncount + 1 : iposit = ipos : ipos=ipos+1
WEND
```

```
EXIT SUB
```

```
-----
END SUB
```

APPRENTICE

```
SUB INLOG (valu$, ir%, ic1%) STATIC
```

```
Input logical and check for validity, reprint
```

```
Module of Program APPRENTICE of the GENII Software Package  
Pacific Northwest Laboratory Environmental Dosimetry System
```

```
Last Modification: 7-Jan-88 RAP
```

```
Reviewed and Approved: 14-Sept-88 BA Napier
```

```
valu$ - input number string
```

```
DEFINT i - n
```

```
ok$ = "tTfFYyNn" : t$ = CHR$(13) : ilen = 1
```

```
buf$ = SPACE$(ilen)
```

```
CALL stripper.1 (valu$, valu$)
```

```
CALL caseuppr.1 (valu$)
```

```
IF valu$ = "T" THEN valu$ = "Y"
```

```
IF valu$ = "F" THEN valu$ = "N"
```

```
start:
```

```
ic = ic1 + 1
```

```
LOCATE ir, ic, 1 : CALL reverse (1) : PRINT valu$; : LOCATE ir,ic
```

```
istop = 0 : ipnt = 1
```

```
WHILE istop = 0
```

```
ityp = 1 : CALL inkey.1 (ityp, iscan, c$)
```

```
IF iscan = 13 THEN
```

```
istop = 1
```

```
ELSE
```

```
n = INSTR (ok$, c$)
```

```
IF n > 0 THEN istop = 1
```

```
Check character for validity--
```

```
CALL caseuppr.1 (c$)
```

```
valu$ = c$
```

```
END IF
```

APPRENTICE

WEND

LOCATE ir, ic1+1 : CALL reverse (0) : PRINT valu\$;

IF valu\$ = "Y" THEN valu\$ = "T"

IF valu\$ = "N" THEN valu\$ = "F"

EXIT SUB

END SUB

APPRENTICE

SUB inchar (varbl\$, iflag%, ilen%, ir%, icl%) STATIC

Input character string of specified length

Module of Program APPRENTICE of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 23-Mar-88 RAP

Reviewed and Approved: 14-Sept-88 BA Napier

varbl\$ - input string default value, returned string
iflag - flag indicating type of input:
0 - spaces allowed
1 - file name including path and drive
2 - file name prefix

DEFINT i - n

a1\$ = "abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ"

a2\$ = "1234567890-_"

a3\$ = ".\:"

a4\$ = " *!\$?+=@#;/"

t\$ = CHR\$(13)

buf\$ = SPACE\$(ilen)

IF iflag = 0 THEN

a\$ = a1\$ + a2\$ + a3\$ + a4\$

ELSEIF iflag = 1 THEN

a\$ = a1\$ + a2\$ + a3\$

ELSEIF iflag = 2 THEN

a\$ = a1\$ + a2\$

END IF

insrt = 0

LOCATE 9,69 : CALL reverse(1) : PRINT "Insert Off" : CALL reverse(0)

jlen = LEN (varbl\$) : IF jlen > ilen THEN jlen = ilen

MID\$(buf\$,1,jlen) = varbl\$

start:

ic = icl + 1

LOCATE ir, ic, 1 : CALL reverse (1) : PRINT buf\$; : LOCATE ir,ic

istop = 0 : ipnt = 1

WHILE istop = 0

APPRENTICE

```
ityp = 1 : CALL inkey.1 (ityp, iscan, c$)

IF ityp = 0 THEN      'insert toggle
  IF iscan = 82 THEN
    IF insrt = 0 THEN
      insrt = 1 : LOCATE 9,69 : PRINT "Insert On "
    ELSE
      insrt = 0 : LOCATE 9,69 : PRINT "Insert Off"
    END IF
  ELSEIF iscan = 83 THEN 'delete
    buf$ = MID$(buf$,1,ipnt-1)+ MID$(buf$,ipnt+1)+" "
    LOCATE ir,ic1+1,1 : PRINT buf$; : LOCATE ir,ic,1
  END IF

ELSEIF ityp = -6 THEN

  IF iscan = 75 THEN
    ipnt = ipnt - 1 : IF ipnt = 0 THEN ipnt = 1
  ELSEIF iscan = 77 THEN
    ipnt = ipnt + 1 : IF ipnt > ilen THEN ipnt = ilen
  END IF
  ic = ic1 + ipnt : LOCATE ir,ic,1

ELSEIF ityp = -7 THEN

  IF iscan = 8 THEN

    ipnt = ipnt - 1
    IF ipnt > 0 THEN
      MID$(buf$,ipnt,1) = " "
      ic = ic1 + ipnt : LOCATE ir,ic,1 : PRINT " ";
      ic = ic1 + ipnt : LOCATE ir,ic,1
    ELSE
      ipnt = 1
    END IF

  ELSEIF iscan = 13 THEN
    istop = 1

  END IF

ELSEIF ityp > 31 THEN

  ichk = INSTR (a$, c$)
  IF ichk > 0 THEN
    IF insrt=1 THEN
      CALL strins.1 (ipnt, c$, buf$)
      jlen = LEN(buf$)
      IF jlen > ilen THEN buf$ = MID$(buf$,1,ilen)
```

APPRENTICE

```
ELSE
  MID$ (buf$,ipnt,1) = c$
END IF
ic = ic1 + ipnt : LOCATE ir,ic,1 : PRINT MID$(buf$,ipnt);
ipnt = ipnt+1 : IF ipnt > ilen THEN ipnt = ilen
ic = ic1 + ipnt : LOCATE ir,ic,1
ELSE
  CALL music
END IF
```

```
END IF
```

```
WEND
```

```
LOCATE ir, ic1+1 : CALL reverse (0)
PRINT buf$;" ";
varb1$ = buf$
LOCATE 9,69 : PRINT "      "
```

```
EXIT SUB
```

```
-----$-----
END SUB
```

APPRENTICE

'
' SUB intense (iflag%) STATIC
'

' Subprogram for APPRENTICE of the GENII Software Package
' Pacific Northwest Laboratory Environmental Dosimetry System
'

' Last Modification: 31-Jan-88 RAP
' Reviewed and Approved: 14-Sept-88 BA Napier
'

DEFINT i-n

' CALL reverse (iflag%)

IF iflag = 1 THEN

 COLOR 0, 7, 0

ELSE

 COLOR 7, 0, 0

END IF

EXIT SUB

END SUB

APPRENTICE HELP SCREEN TEXT

Screen: Titl.1

APRHELP1: 1

(First title screen - GENII)

Screen: Titl.2

APRHELP1: 2

Napier, B. A., R. A. Peloquin, D. L. Strenge, and J. V. Ramsdell. 1988. HANFORD ENVIRONMENTAL DOSIMETRY UPGRADE PROJECT. GENII -THE HANFORD ENVIRONMENTAL RADIATION DOSIMETRY SOFTWARE SYSTEM. VOL 1: Conceptual Representation, VOL 2: Users Manual, VOL 3: Code Maintenance Manual. PNL-6584. Pacific Northwest Laboratory. Richland. WA.

Screen: Titl.3

APRHELP1: 3

(Third title screen - Hanford Environmental Dosimetry System)

Screen: Intro.1

APRHELP1: 4

Pacific Northwest Laboratory has developed and documented a comprehensive set of codes (i.e., environmental pathway models and associated computer programs for estimating potential radiation doses to humans from radionuclides in the environment. These codes address both routine and accidental releases of radionuclides to air or water as well as other situations, (e.g., residual contamination from spills or decommissioning operations). Internal radiation dose calculations are performed using methods recommended by the International Commission of Radiation Protection (ICRP) as described in ICRP Publications No. 26 (ICRP 1977) and No. 30 (ICRP 1979). The codes are based on existing Hanford models and codes, using updated formulations and transfer coefficients.

Screen: How.1

APRHELP1: 5

How to use APPRENTICE:

- 1 - Use left and right arrows on numeric keypad to move to another menu. There are 12 main menus in APPRENTICE. You will see only those menus that are appropriate for the scenario under construction.
- 2 - Use down arrow on numeric keypad to pull a menu down.
- 3 - Use return key to select an item.
- 4 - Assistance is available throughout APPRENTICE by accessing pop-up help screens. Use the F1 key or select Help from the menu.

APPRENTICE HELP SCREEN TEXT

Screen: How.2

APRHELP1: 6

- 5 - APPRENTICE attempts to assist you with scenario construction in the following way:
 - a) APPRENTICE checks for option incompatibilities and alerts you when these are discovered.
 - b) Only questions pertinent to the current scenario are asked.
 - c) Default values are provided for all variables. You may select between maximum individual and average individual parameters.
 - d) All input variables are checked against reasonable bounds.

Screen: How.3

APRHELP1: 7

- 6 - When you are ready, APPRENTICE will request a filename for storing your scenario. A GENII input file will be created with a file extension of ".IN". An execution file will be created with a ".BAT" extension.
- 7 - Multiple input files can be created in an APPRENTICE execution. Simply select "Next Scenario" after you have selected "Write file" on the final menu. APPRENTICE will return you to the first menu. All variable selections from the previous scenario remain in effect unless changed. A single execution file will be generated for processing the series of scenarios.
- 8 - To exit APPRENTICE quickly, without saving your scenario; press the Esc key several times until the final menu appears.

Screen: Scen.1

APRHELP1: 8

A "scenario" is a conceptual model of patterns of human activity corresponding to actions, events, and processes that result in radiation exposure to individuals or groups.

A "far-field" scenario is one defined to determine the impacts of a particular release of radioactive material into a wide environment, such as doses from releases from a stack in individuals or populations downwind.

In a "near-field" scenario, interest is focused on the doses an individual could receive at a particular location as a result of initial contamination or external sources, i.e., buried waste or contaminated soil.

In a near-field scenario, contamination levels in specific environmental media may be known. A far-field scenario can be characterized as coming in to a receptor. Of course, the two types are not mutually exclusive - some

APPRENTICE HELP SCREEN TEXT

doses to individuals from remote sources can be calculated as either far- or near-field with the same result. Specific examples of common types of far-field and near-field scenarios are given on the following screens.

Screen: Far.1

APREHELP1: 9

Far-Field Scenarios

Screen: Far.2

APRHELP1: 10

CHRONIC ATMOSPHERIC RELEASE: Prospective or retrospective doses to individuals or populations at specified distances and directions from the source, via submersion, inhalation and deposition groundshine and food pathways. This class of scenario is commonly used for showing compliance to regulations for emission sources.

Screen: Far.3

APRHELP1: 11

ACUTE ATMOSPHERIC RELEASES: Prospective or retrospective doses to individuals or populations at specified distances and directions from an acute release via submersion, inhalation, deposition groundshine and food pathways. This class of scenario is often used in Safety Analysis Reports (SARs) or Environmental Impact Statements (EISs).

Screen: Far.4

APRHELP1: 12

CHRONIC SURFACE WATER RELEASES: Prospective or retrospective doses to individuals and populations at specified distances downstream of a release point via swimming, boating, shoreline, drinking water, aquatic foods, irrigated terrestrial foods and animal products, soil contaminated via irrigation, and other pathways associated with liquid releases. This class of calculation is also often encountered in showing compliance with regulations.

Screen: Far.5

APRHELP1: 13

ACUTE SURFACE WATER RELEASES: Prospective or retrospective doses to individuals and populations at specified distances downstream of a release point via swimming, boating, shoreline, drinking water, aquatic foods, irrigated terrestrial foods and animal products, soil contaminated via irrigation, and other pathways associated with acute liquid releases. This class of calculations is also associated with SARs and EISs.

APPRENTICE HELP SCREEN TEXT

Screen: Near.1

APRHELP1: 14

Near-Field Scenarios

Screen: Near.2

APRHELP1: 15

INITIAL SURFACE CONTAMINATION: Individual doses resulting from contact with contaminated soil or surfaces via direct contact, resuspension, or crop uptake. Calculations of this nature can be used to analyze the impacts of spills or remedial actions.

Screen: Near.3

APRHELP1: 16

INITIAL SUBSURFACE CONTAMINATION: Individual doses resulting from contact with contaminated soil or surfaces via direct contact, resuspension, or crop uptake. The surface soil may be contaminated via manual redistribution of the material or through biotic transport. Calculations of this nature can be used to analyze the impacts of waste management options. Often a time delay may be included to account for radioactive decay of the source.

Screen: Near.4

APRHELP1: 17

GROUNDWATER CONTAMINATION: Prospective or retrospective doses to individuals and populations from a given water concentration via irrigation, and other pathways associated with liquid releases. This class of calculations is also often encountered when showing compliance with regulations.

Screen: Near.5

APRHELP1: 18

CUMULATIVE EFFECTS: Prospective calculations combining initial soil contamination with additional contributions from an external atmospheric or liquid source. This type of calculation is representative of how near-field and far-field calculations can conceptually be combined.

Screen: Tran.1

APRHELP1: 19

TRANSPORT. In most calculations, the known quantity is generally the release quantity. This may take the form of activity, or activity per unit time, released into the transport media of air or surface water, or in the case of buried waste, into soil via waste package degradation and biotic transport. These are converted via appropriate models to concentrations in the corresponding media.

APPRENTICE HELP SCREEN TEXT

Screen: Inv.1

APRHELP1: 20

INVENTORY LOCATION. Air --> signifies air transport, Surface Water --> signifies surface water transport. If the basic media concentration is known, it may be input and the transport step omitted. If derived concentrations are known, they may be entered and the earlier processes overridden. See Figure 2.1 in Vol. 1 of the documentation.

Screen: Tran.2 (release terms)

APRHELP1: 21

Screen: Tran.3 (rad in env.)

APRHELP1: 22

Screen: Tran.4 (derived)

APRHELP1: 23

Screen: Exp.1

APRHELP1: 24

EXPOSURE. The potential routes through which people may be exposed to radionuclides or radiation are called "exposure pathways". The general pathways can be thought of as external exposure, inhalation, and ingestion. The pathways are chosen depending on the ways people can be exposed for a given circumstance. In this way, an appropriate collection of defined pathways can also be considered to be a definition of an "exposure scenario". Because a conceptualization of the types of exposure must be made before the pathways can be fully defined, "scenarios" are usually defined before the parameters are selected for the "pathways".

Screen: Rad.1

APRHELP1: 25

Select radionuclides by using the arrow keys on the numeric key pad to move the reverse video box to cover the name and then press the F2 key. The F2 key is a toggle; it can also be used to deselect radionuclides.

There are two pages of radionuclide names; use the F3 key to switch between the two pages.

When you have identified all radionuclides in your inventory, press the F10 key to continue.

After the radionuclides have been selected, you will be asked to enter the quantity for each specified location. After completing entry of the inventory, you may make corrections to the quantities or select additional radionuclides.

APPRENTICE HELP SCREEN TEXT

Screen: Air.1

APRHELP1: 26

Warning: GENII will not include a decay correction when this mode is selected. See Help.

Screen: Air.2

APRHELP1: 27

The user may either input a chi/Q value or request that one be calculated. When a chi/q value is input, no decay correction is made by GENII. The user should calculate a decay correction by made for each radionuclide (if transit time is known) and the input release term reduced accordingly.

Screen: Dose.1

APRHELP1: 28

Scenarios may be constructed to calculate either doses to representative members of critical groups (individuals) or collective doses to regional populations or subpopulations. Note that individual doses may be calculated for either near-field or far-field scenarios, but that population doses are only defined for far-field scenarios (because locally-measured or locally-predicted values cannot be representative over wide areas).

Screen: Rel.1

APRHELP1: 29

For scenarios involving release of radioactive materials into the environment, the input may be either of short duration (a matter of minutes to a few days), or continuous or routine (such that annual average parameters are appropriate). Note that scenarios involving exposure to pre-existing soil, vegetation, or groundwater contamination must be treated as chronic.

Screen: Itype.1

APRHELP1: 30

Two sets of recommended default parameters are provided to ease data entry. The "Average Individual" set is representative of the population average exposure and dietary habits and should be used for most population dose calculations. The "Maximum Individuals" set provides upper bound parameters you may override. All default parameters, however they provide an adequate basis for most generic calculations.

Screen: Itype.2

APRHELP1: 31

If you find that you are regularly resetting particular parameters, it is possible to revise the default parameter file. See the User's Manual for instructions.

APPRENTICE HELP SCREEN TEXT

Screen: Rep.1

APREHELP1: 32

Various levels of detail are available in the output report. The Annual Effective Dose Equivalent (AEDE) is the committed dose from one year of exposure. If this option is not selected, cumulative doses from continued exposure (for the number of years you specify in the TIMES Menu) will also be calculated and reported. Additional information can be requested on AEDE and cumulative dose-by-radionuclide or dose-by-exposure-pathway. Note that all of these options result in an increased number of pages of output.

For users interested in the intermediate workings of the code, selected information can be displayed on the screen during calculations. This information is cryptic, fast-scrolling, and slows the calculations. Interpretation requires use of the code listings provided in Volume 3 of PNL-6584.

Screen: Rad.2

33

GENII requires information on the source of radioactivity in order to continue. You have the option of using either S.I. units or the various multiples of conventional units. Note that if you are entering source term information for more than one environmental medium, the units used must be consistent within a single case.

Screen: Food.1

APRHELP1: 34

Select the aquatic food pathways to be considered. Information on production and consumption of each food type selected will be required in later menus.

Screen: Food.2

APRHELP1: 35

Select terrestrial food crop types to be considered. Information on production and consumption of each food type selected will be required in later menus.

Screen: Food.3

APRHELP1: 36

Select animal products to be considered. Information on the food and water the animals consume and the production and human consumption of each food type will be required in later menus.

APPRENTICE HELP SCREEN TEXT

Screen: Waste.1

APRHELP1: 37

For near-field scenarios involving either "Buried Waste" or "Deep Soil", an estimate of the thickness of the contaminated zone is required for the harvest removal model. Additionally, the depth to the top of this zone is required by the animal portion of soil the animals might move. "Buried Waste" acts as an additional compartment, that feeds "Deep Soil" at a rate determined by the waste decomposition half-life.

Screen: Biot.1

APRHELP1: 38

Biotic transport may result in radionuclides reaching surface soil from "Buried Waste" or "Deep Soil" both during the period following waste disposal and loss of institutional control but before the initial time of human exposure via this scenario (the "Years since LOIC" of a previous input screen), as well as continue during the exposure period. Three possibilities are provided for the conditions existing at the site prior to the start of this scenario's exposure. The parameters that describe these conditions are simplifications of those used in McKenzie et al (1982 and 1983).

Screen: Air.3

APRHELP2: 1

There are three options, of increasing complexity, available to determine the annual average atmospheric dispersion values to be used in the chronic individual calculation.

The simplest (for GENII) is to directly input a precalculated chi/Q , in sec/m .

Screen: Air.4

APRHELP1: 2

The next in complexity is for the user to specify the location of the individual, in terms of distance and direction from the source, and have GENII compute the chi/Q for that location. This option requires that the user also have available one of two data sets: either a grid of precalculated chi/Q values or a set of joint frequency data for the source location. (See the User's Manual for the format of these external data files). If you chose to use the joint frequency data option, you will also be prompted to enter data on the characteristics of the source (including whether or not it is an elevated or ground level release, and whether or not to calculate plume rise. Note that each of these options has specific data requirements).

APPRENTICE HELP SCREEN TEXT

Screen: Air.5

APRHELP2: 3

Finally, if either a chi/Q grid or joint frequency file is available, you may instead direct GENII to search and find (select) the location of the maximally exposed individual via the air pathway. These options require data as described above for the specific MI, plus they require a population grid - so that GENII does not assume an MI location where nobody lives.

Screen: Air.6

APRHELP2: 4

UPON SELECTION OF THE METHOD, HIT "INPUT" TO CONTINUE DATA ENTRY.

Screen: Air.7

APRHELP2: 5

There are three options, of increasing complexity, available to determine the annual average atmospheric dispersion values to be used in the chronic population calculation.

The simplest (for GENII) is for the user to directly input a precalculated population-weighted chi/Q value (in person - sec/m³).

APPRENTICE HELP SCREEN TEXT

Screen: Air.8

APRHELP2: 6

The next in complexity is for the user to provide both a grid of precalculated chi/Q values and a matching grid of population, and allow GENII to cross-multiply the two to create a population-weighted chi/Q.

Screen: Air.9

APRHELP2: 7

The third option requires the user to supply a joint frequency distribution in place of the chi/Q grid, and allow the code to create the chi/Q grid (see the User's Manual for the format of the chi/Q and joint frequency files). If you chose to use the joint frequency input option, you will also be prompted to enter the data on the characteristics of the source (including whether or not it is an elevated or groundlevel release, and whether or not to calculate plume rise).

Screen: Air.10

APRHELP2: 8

Note that each of these options has specific data requirements.

Note that you cannot request the "FINITE PLUME" submersion model without using one of the joint frequency options.

Upon selection of the method desired, hit "INPUT" to continue entering the data required for that option.

Screen: Air.11

APRHELP2: 9

There are two options for determining the time-integrated air concentration for the acute individual exposure.

The first is through input of a precalculated E/Q, in sec/m^3 .

Screen: Air.12

APRHELP2: 10

The second is to specify the distance and direction of the individual from the release point. This option requires that the user provide either a grid of precalculated E/Q values or a set of joint frequency data for the source location. (See the User's Manual for the format of these external files). If you choose to use the joint frequency option, the code will calculate the E/Q which is not exceeded more than 5% of the time for the specified location (i.e., the 95th percentile E/Q). For this option you will also be prompted to enter data on the source characteristics (including whether or not it is an elevated or groundlevel release, whether or not to use the plume rise model, whether or not to use the building wake model).

APPRENTICE HELP SCREEN TEXT

Screen: Air.13

APRHELP2: 11

Note that each of these options has specific data requirements.

Note that you cannot request the "FINITE PLUME" submersion model without using one of the joint frequency options.

Upon selection of the method, hit "INPUT" to continue entering the data required for that option.

Screen: Air.14

APRHELP2: 12

There are two options for determining the population-weighted, time-integrated air concentration for acute population exposures.

The simplest is through user input of a precalculated population-weighted E/Q (in person - sec/m³).

Screen: Air.15

APRHELP2: 13

The second option is to specify the direction from the source for which the calculation is desired. This option requires that the user provide either a grid of precalculated E/Q values or a set of joint frequency data for the source location (see the User's Manual for the format of these external files), as well as a population grid file. If you choose the joint frequency option, the code will calculate the population-weighted E/Q which is not exceeded more than 5% of the time for the specified direction (i.e., the 95th percentile population-weighted E/Q). For this option you will also be prompted to enter data on the source characteristics (including whether or not it is an elevated or groundlevel release, whether or not to use the plume rise model, and whether or not to consider the building wake model).

Screen: Swat.1

APRHELP2: 14

Three options are available to determine the surface water concentrations from chronic releases, a simple dilution volume model and more complex models of river and lake dispersion. The dilution volume model requires only input of the annual average flow of the receiving water body (i.e., river), and allows adjustment by a multiplicative input mixing ratio. The river and lake models generate mixing ratios, and from them water concentrations, as functions of flow velocity, water depth, effluent discharge rate, longshore and offshore distance, and other parameters.

Upon selection of the method, hit "INPUT" to continue entering the data required for that option.

APPRENTICE HELP SCREEN TEXT

Screen: Swat.2

APRHELP2: 15

Because of the nature of the acute model for surface water transport, only one model is available to determine time-integrated water concentrations. Required input is the average flow of the receiving water body and a multiplicative mixing ratio (usually 1.0 unless otherwise known). The entire source is assumed to be carried off by the river/lake flow.

Screen: Time.1

APRHELP2: 16

The time step available for GENII simulations is integer years. Within this constraint, scenarios may be constructed by defining the length of time a person is exposed (intake ends), the period for which the dose commitment is calculated (dose calc. ends), the length of time during which the individual(s) is/are exposed that the active radionuclide release continues, and the length of time prior to the beginning of the exposure that deposition via air or water occurred (for determining soil accumulation).

Screen: Far.6

APRHELP2: 17

To calculate population doses, you will be asked to input consumption/exposure parameters for an average individual in the population. GENII will then use these average parameters times the number of people to calculate collective dose. The code can either figure a total population for you by summing from a grid you must provide, or you can simply enter the total.

If you know the total consumption values (for instance, 100,000 kg of vegetables) and don't really care about how many people it feeds, put in a population of 1 and enter the other values later when asked.

Screen: Near.6

APRHELP1: 18

You will be asked questions pertinent to the development of the near-field scenario under construction. If you have selected "Buried Waste or Deep Soil" as a source, radioactive decay of the source from the quantity initially disposed, and release from waste packages to soil, can be calculated by entering the appropriate decay time. If "Burial Transport" has been requested, the length of time that the biota have had contact with the waste (assumed to start at the time of loss of institutional control) can be entered.

APPRENTICE HELP SCREEN TEXT

Screen: Near.7

APRHELP2: 19

A two-compartment model of plant roots is allowed: vegetation uptake is assumed to be proportional to the fraction of roots contacting 1) the mixed surface soil layer, and 2) the layer of contaminated buried soil. (These two layers can be separated by a third, clean layer). These root fractions are used in the regular plant concentration model, the harvest removal model, and the plant portion of the biotic transport model.

Screen: Near.8

APRHELP2: 20

For scenarios involving physical disruption that mixes deeply buried waste (in Ci/m^3) with surface soil (in Ci/m^2), a "Manual Redistribution" factor₃ is available. (A handy factor to remember is that throughout GENII, $1 \text{ Ci/m}^3 = 0.15 \text{ Ci/m}^2$).

Screen: Ext.1

APRHELP2: 21

The "EXTERNAL EXPOSURE" parameters help define the time during which the individuals or populations are exposed to sources of direct radiation exposure from contaminated air, soil, water, or sediments. GENII uses fairly simple exposure geometries - shielding corrections for buildings, etc. are not included. If desired, simple reductions for shielding may be incorporated by reducing the time assumed for exposure.

Screen: Ext.2

APRHELP2: 22

The "EXTERNAL EXPOSURE" parameters help define the fraction of time the individuals or populations are exposed to source of direct radiation exposure from contaminated air, soil, water, or sediments. For exposure to an acute air concentration, the fraction of the time of plume passage that the person(s) is exposed is input. For exposures to soil and sediment following acute deposition the exposure is modeled as chronic to a decaying source. Note that, if swimming and boating have been selected, certain assumptions have been "hard-wired" into the code (100% exposure for maximum individual, 0% exposure for populations), so no inputs are requested.

Screen: Inh.1

APRHELP2: 23

GENII considers two sources for inhalation exposure: plumes from acute or chronic sources and resuspension from soil contamination. Exposure to plumes may be characterized through the time spent at a location within the plume, in hours/year for chronic exposure or fraction of plume passage time for acute releases. Two models describing resuspension are available if desired. The Mass Loading model relates the local air concentration to the local soil

APPRENTICE HELP SCREEN TEXT

concentration by assuming that dust in the air has the same concentrations as the soil. The Anspaugh model is a time-dependent function relating surface activity to air concentration. GENII uses a fraction of the upper soil compartment to represent the surface activity.

Screen: Ing.1

APRHELP2: 24

A common assumption in the older Hanford environmental codes was that food crops are produced and eaten where the people live. While not a bad assumption for individuals, this can lead to inaccuracies when the people live on one side of a source and the crops are grown on the other, or when not enough food is grown to support the entire population. GENII allows several options, of increasing complexity, to deal with food production.

Screen: Ing.2

APRHELP2: 25

The user may input a precalculated normalized food-production-weighted chi/Q value (option 0), analogous to a population-weighted chi/Q .

You may select to use the same distribution as used for the population, essentially assuming that the field and people are co-located (option 1).

If you know how much food is produced, but not necessarily where, you may assume the crops are grown uniformly throughout the 80-km grid (option 2).

Finally, if you know the actual food production distribution, prepared as a file of values in kg/yr for each of the 10 x 16 grid points for each food type, this may be used with the chi/Q grid input or calculated for the population (option 3).

Screen: Ing.3

APRHELP2: 26

Note that with options 2 and 3, the potential for doses to people outside the region may be considered via crop export, if desired.

Note: Only the option assuming co-location of crops and population (option 1) is currently available for acute releases. Model development for the other options is as yet incomplete.

Screen: Drink.1

APRHELP2: 27

Because GENII allows simultaneous consideration of several sources of contamination (surface water and ground water), you need to indicate which source is to be used for drinking. You will also need to indicate whether the drinking water is treated through a water treatment facility: if so,

APPRENTICE HELP SCREEN TEXT

reductions in concentration for filtration/cleanup will be calculated. The travel time of the water through the distribution system is also input, to allow calculation of decay of short-lived nuclides.

Screen: Aqu.1

APRHELP2: 28

For each of the aquatic food types you have selected, several parameters must be entered. These include travel time of the radionuclides in the water to the point where the fish/etc. is caught, and the time between harvest and consumption. These allow for proper accounting of decay for short-lived nuclides. Individual aquatic food consumption rates are also input here. Suggested default values are provided, but all may be overridden.

Screen: Tfood.1

APRHELP2: 29

For each of the terrestrial food types you have selected, several parameters must be entered. These help define the conditions under which the crops are grown, such as the length of the growing season and the yield of the crop, as well as the conditions of irrigation if you have selected surface water. Individual food consumption rates are also input here. Recommended default values are provided, but all may be overridden.

Note: Growing time is only used for the years after the release in acute cases. If you are only looking at dose commitment from the first year of exposure, whatever value you enter will be ignored.

Screen: Anfood.1

APRHELP2: 30

For each of the animal products you have selected, several parameters must be entered to define the conditions under which the products are produced. This includes not only how much of each product are consumed by humans, but also the conditions for the foods that the animals themselves eat. Some animals are allowed two food sources (fresh forage and stored feed), so information on growing period, yield, irrigation rates, etc. must be provided for these as well.

Suggested default parameters are provided for all values, but these may be overridden if desired.

APPRENTICE HELP SCREEN TEXT

Screen: Files.1

APRHELP2: 31

The GENII package functions as a coupled set of programs that transfer data via input/output files. A normal run consists of one or more input files (created by APPRENTICE) controlled by a batch file (a *.BAT file also created by APPRENTICE). You will be asked to provide a File name for each scenario you create in a run. If you create only one scenario, APPRENTICE will give the batch file the same name as the input file, otherwise, you will also be prompted for a batch file name. The "File Management" option is a handy "window" out of APPRENTICE to your system to look at or manipulate files anywhere on your system. (It is particularly useful if you forget the names of your joint frequency, chi/Q, or population files!) You can search any directory using the "search string" option, copy or delete existing files, and view the first 8 lines of any file to see what's in it. When you are finished with a scenario, you must use the WRITE FILE option to save your input before continuing with another scenario or quitting APPRENTICE.

ENVIN

C-----
C
C Program title: ENVIN - A module of the GENII
C environmental dosimetry software
C package.
C
C Prepared for: U. S. Department of Energy under
C Contract DE-AC06-76RLO 1830
C
C Contact: Bruce Napier
C Pacific Northwest Laboratory
C Richland WA 99352
C (509) 375-3916
C
C Code developers: B. A. Napier, R. A. Peloquin,
C D. L. Strenge, and J. V. Ramsdell
C Pacific Northwest Laboratory
C Richland WA 99352
C
C

C This code was prepared for an agency of the United States
C Government. Neither the United States Government or any agency
C thereof, or any of their employees, make any warranty, expressed
C or implied, or assumes any legal liability or responsibility for
C any third party's use, or the results of such use, of any portion
C of this program or represents that its use by such third party
C would not infringe privately owned rights.
C
C

C--- Program Information -----
C
C Problem description: To perform input checking, data library
C reading, and to prepare atmospheric
C dispersion estimates if required for
C near-field and far-field short-term
C scenarios.
C
C Results format: The output of ENVIN is a data transfer file
C called ENV.IN used as input to the following
C program of the package, ENV. A separate QA
C report is prepared describing the case being
C calculated, and a third file describing the
C results of the atmospheric dispersion
C calculation may be prepared if needed.
C
C Computer: This version is for the IBM PC/AT.
C
C Programming language: FORTRAN compiled using Lahey(tm)
C

ENVIN

C FORTRAN Compiler.
C
C Machine requirements: IBM PC/AT with a minimum of 640 k-bytes
C random access memory and 1 20-Mbyte fixed
C disk drive.
C
C
C Reference: B. A. Napier, R. A. Peloquin, D. L. Streng,
C and J. V. Ramsdell. 1988. "GENII - The
C Hanford Environmental Radiation Dosimetry
C Software System." PNL-6584, Volumes 1, 2,
C and 3. Pacific Northwest Laboratory,
C Richland, WA 99352
C
C
C

C-----
C
C PROGRAM ENVIN
C
C This module controls reading of the input files and data libraries;
C checks input for validity; organizes radionuclides into chains;
C writes input files for ENV and DOSE; and writes a report of input
C parameters.
C
C Module of Program ENVIN of the GENII Software Package
C Pacific Northwest Laboratory Environmental Dosimetry System
C
C Last Modification: 6-Jan-88 RAP
C Reviewed and Approved: 12-Sept-88 BA Napier
C
C

C-----
C INCLUDE 'DPT.CMN'
C INCLUDE 'AIRPAR.CMN'
C
C Get system time and date--
C CALL MAKDA2
C
C Read file names--
C CALL OPNFIL (3,0,1)
C
C Read input file--
C CALL READIN
C
C Read master radionuclide library--
C CALL RLIBIN
C
C Identify and order inventory--
C CALL ORDER

ENVIN

```
C   Identify and order inventory--  
    CALL ORDER  
  
C   Test input parameters for ranges and option logic--  
    CALL CHECK  
  
C   Read environmental libraries--  
    CALL ENVLIB  
  
C   Write input parameter report--  
    CALL RITQA  
  
C   Read and check default parameter file--  
    CALL REDFLT  
  
C   Generate chi/Q values if requested--  
    IF (AIR .AND. XOQOPT .NE. 1 .AND. JFIN) THEN  
      IF (ACUTE) THEN  
        CALL ACCMOD  
      ELSE  
        CALL CRONMOD  
      ENDIF  
    ENDIF  
  
C   Close report file--  
    CLOSE (6)  
  
C   Write input file for ENV--  
    CALL RITENV  
  
    STOP  
C-----  
    END
```

ENVIN

```
C-----
C
C      SUBROUTINE ACCMOD
C
C      This model computes E/Q for accidental releases for a single
C      location. This module computes centerline E/Q using a Gaussian
C      plume model. The code is based of the diffusion model described
C      in Section 4.3 of Volume 1.
C
C      Written by J.V. Ramsdell (December 3, 1986)
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 6-Jul-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      AIRT()    - Average air temperature (C) by season and time of day
C      DOQ()     - Normalized deposition estimates for the 1, 5, 10, 25,
C                  and 50 % probability levels. These values are printed
C                  in the GENII output report.
C      DV        - Deposition velocity
C      EOQR()    - Normalized air exposures for the 1, 5, 10, 25, and 50 %
C                  probability levels. These values are printed in the
C                  GENII output report; the 95% value is stored in
C                  parameter EOQ for use in ENV.
C      JFDHT     - Height for which joint frequency data is
C                  representative, m
C      JFREQ()   - Joint probability distribution wind speed, direction,
C                  and stability by season and time of day
C      MAXC      - The maximum number of E/Q values.
C      MIXLAY()  - Average mixing layer thickness by season and time of
C                  day
C      NC        - The number of E/Q values to be sorted--
C      TEMP      - Intermediate value, tested before call to EXP function
C      UBAR()    - Mid points of the wind speed ranges
C      TS()      - The matrix of E/Q, frequency, and wind speeds; sorted
C                  in descending order by E/Q after sort.
C      TSX()     - The matrix of E/Q, frequency, and wind speeds; sorted
C                  in descending order by E/Q after sort, for six energy
C                  groups for finite plume calculations.
C      Z0        - Surface roughness length in meters
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'OPT.CMN'
```

ENVIN

```
INTEGER MIXLAY(1,1)
REAL JFREQ(1,1,9,7,16), JF, UBAR(9), PM, RHT,
.   DRF(5,6), DRFS(6), EOQR(5), DOQ(5), TTIME(5), EPROB(5),
.   POSIT(2,10), AIRT(1,1), SZ(7), SY(7), TS(3,63), TSX(3,63,6),
.   Z0, JFDHT, OHT

DATA AIRT/ 15.0 /, MIXLAY/ 1000 /, Z0 /0.03/, OHT /0.0/

C   The second dimension of TS must >= NSPD * NSTAB * NTOD * NSEAS--
MAXC = 63

DV = 0.01

C---- Read in joint frequency data -----

      LUN = 23
C   CALL OPNFIL (1,0,LUN)
      CALL OPNFIL (4,0,LUN)
      READ (LUN,'(A8)') DUM
      READ (LUN,*) NSPD, NSTAB, NSEAS, NTOD, JFDHT
      READ (LUN,*) (UBAR(I), I=1, NSPD)

      DO 41 I = 1, NSPD
        DO 31 J = 1, NSTAB
          READ (LUN,*,END=99,ERR=98) (JFREQ(1,1,I,J,K),K=1,NDIR)
          DO 33 K = 1, NDIR
            JFREQ(1,1,I,J,K) = JFREQ(1,1,I,J,K) / 100.0
33      CONTINUE
31      CONTINUE
41      CONTINUE

      CLOSE(LUN)

C---- If population dose, read in population, set no. of locations ----

      IF (POPDOS) THEN
        CALL XQIN (2)
        MPOSIT = NDIST

      ELSEIF (XQOPT .EQ. 2) THEN
C   MI location is to be selected--
        CALL XQIN (4)
        MPOSIT = NDIST

      ELSE
C   MI location is specified--
        MPOSIT = 1
```

ENVIN

ENDIF

C---- Receptor loop, only 1 is used in GENII -----

TPOPS = 0.0

DO 700 M = 1,MPOSIT

C Determine location, transport sector--

IF (POPDOS) THEN

POSIT(2,M) = X(M)

ELSE

POSIT(2,M) = MIDIST

ENDIF

POSIT(1,M) = REAL (MIDIR)

ID = POSIT(1,M)

C Convert to wind direction sector--

ID = ID + 8

IF(ID .GT. 16) ID = ID - 16

C Set XQQ counter to 0--

NC = 0

C Next loop is stability--

DO 400 IST = 1,NSTAB

CALL SIGMA(POSIT(2,M), IST, SZ(IST), SY(IST))

C Loop on wind speed--

DO 300 IU = 1,NSPD

C Compute release height wind--

IF(SHITE .EQ. 0.0 .AND. JFDHT .LE. 15.0) THEN

RSPD = UBAR(IU)

ELSEIF (SHITE .EQ. JFDHT) THEN

RSPD = UBAR(IU)

ELSE

C Compute release height wind using diabatic wind profile;

C See Panofsky and Dutton (1984) Section 6.5--

RSPD = PROFILE (JFDHT, ZO, UBAR(IU), IST, SHITE)

ENDIF

ENVIN

```
C      Loop on seasons, only one in GENII--
      DO 200 ISEAS = 1,NSEAS

C      Loop on time of day, only one in GENII--
      DO 100 IT = 1,NTOD

          JF = JFREQ(IT,ISEAS,IU,IST,ID)

C      Skip computations if joint frequency is zero--
      IF (JF .GT. 0.0 ) THEN

          RHT = SHITE

          IF (IRELES .LT. 2) THEN
C      Point source equations--

          IF( SZ(IST) .GE. 1.32 * MIXLAY(ISEAS,IT) ) THEN

C      Uniform concentration distribution in the vertical--
          GZ = 1.0

C      Compute ground-level exposure--
          EUOQG = 1.0
          +      / ( SQRT(2*P) * SY(IST) * MIXLAY(ISEAS,IT))

          ELSE

C      Non-uniform vertical concentration distribution;
C      compute ground-level exposure--

          EUOQG = 1.0 / ( 2*P * SY(IST) * SZ(IST) )
          PRISE = 0.0
          IF (SHITE .GT. 0.0 .AND. .NOT. EFFSTK)
              .      CALL PLMRIZ (ZO, SRAD, SHITE, SFLOW, ETEMP,
              .      AIRT(ISEAS,IT), RSPD, IST,
              .      MIXLAY(ISEAS,IT), PRISE)

C      Compute effective release height--
          RHT = SHITE + PRISE

C      Compute G(Z)--

          GZ = 0.0
          DO 50 N1 = 1,5

              N = -3 + N1
              TEMP = -0.5 * (( 2.0 * REAL(N) *
                  .      MIXLAY(ISEAS,IT) -RHT) / SZ(IST) )**2
              IF (ABS(TEMP) .LT. 20.0) THEN
```

ENVIN

```

      GZ = GZ + 2.0 * EXP(TEMP)
    ENDIF

50      CONTINUE
    ENDIF

ELSE
C      Building wake model-

      IF (JFDHT .EQ. 10) THEN
        SPD10 = UBAR(IU)
      ELSE
        SPD10 = PROFILE (JFDHT, Z0, UBAR(IU), IST, 10.0)
      ENDIF

      IF (SRAD .GT. 0.0 .AND. SFLOW .GT. 0.0) THEN
        W0 = SFLOW / (P * SRAD**2)
      ELSE
        W0 = 0.0
      ENDIF

      WEOQ = RWAKE (BUILDH, BUILDH, SHITE, W0, SFLOW,
        .      POSIT(2,M), OHT, SPD10, RSPD, IST, SY(IST),
        .      SZ(IST), MIXLAY(ISEAS,IT), P)

    ENDIF

C      Evaluate finite plume dose rate factors--
    IF (FINITE) THEN
      CALL DRFBIV (RHT, SY(IST), SZ(IST), RSPD, DRFS)
    ENDIF

C      Increment class counter--
    NC = NC + 1

C      Save current DRF values for finite plume--
    IF (FINITE) THEN
      DO 60 IE = 1, 6
        TSX(1,NC,IE) = DRFS(IE) / RSPD
        TSX(2,NC,IE) = JF
        TSX(3,NC,IE) = POSIT(2,M) / RSPD
60      CONTINUE
    ENDIF

C      Compute E/Q--
    IF (IRELES .LE. 1) THEN
      TS(1,NC) = EUOQG / RSPD * GZ
    ELSE
      TS(1,NC) = WEOQ
    
```


ENVIN

```
ENDIF

C      Corresponding probability--
      TS(2,NC) = JF

C      And travel time--
      TS(3,NC) = POSIT(2,M) / RSPD

      ENDF
100    CONTINUE
200    CONTINUE
300    CONTINUE
400    CONTINUE

      IF (FINITE) THEN
        DO 450 IE = 1, 6
          CALL BSORT (MAXC, NC, TSX(1,1,IE))
          CALL PROB (MAXC, NC, TSX(1,1,IE), EPROB, DRF(1,IE), TTIME)
          DRFSAV(IE) = DRF(PRCNTI,IE)
450    CONTINUE
      ENDF

C      Travel time for last energy group is used--
      CALL BSORT (MAXC, NC, TS)
      CALL PROB (MAXC, NC, TS, EPROB, EOQR, TTIME)

C      Compute deposition--
      DO 500 IP = 1,5
        DOQ(IP) = DV * EOQR(IP)
500    CONTINUE

C      Calculate population-weighted E/Q, save travel time, sector pop.--
      IF (POPDOS) THEN
        IF (FINITE) THEN
          DO 550 IE = 1, 6
            PWTX(M,IE) = DRF(PRCNTI,IE) * POP(M,MIDIR)
550    CONTINUE
          ENDF

          PWT(M) = EOQR(PRCNTI) * POP(M,MIDIR)

          TTAIR(M) = TTIME(PRCNTI)
          TPOPS = TPOPS + POP(M,MIDIR)
        ELSE
          XOQI = EOQR(PRCNTI)
          TTAIRI = TTIME(PRCNTI)
          TPOPS = 1.0
        ENDF
```

ENVIN

C Write results to GENII output file--

```
LUN = 6
IF (FINITE) THEN
  IF (M .EQ. 1) THEN
    CALL HEADNG (LUN)
    WRITE (LUN,11) INT(POSIT(1,M)), EPROB(PRCNTI)
    WRITE (LUN,10)
  ENDIF
  IF (POPDOS) THEN
    WRITE(LUN,12) POSIT(2,M), TTIME(PRCNTI),
      (PWTX(M,IE), IE=1,6)
  ELSE
    WRITE(LUN,12) POSIT(2,M), TTIME(PRCNTI),
      (DRFSAV(IE), IE=1,6)
  ENDIF
ELSE
  IF (M .EQ. 1) THEN
    CALL HEADNG (LUN)
    WRITE (LUN,5) INT(POSIT(1,M))
  ENDIF
  WRITE (LUN,4) POSIT(2,M)
  DO 600 IP = 1,5
    IF (POPDOS .AND. IP .EQ. PRCNTI) THEN
      WRITE(LUN,6) EPROB(IP),EOQR(IP),DOQ(IP),TTIME(IP), PWT(M)
    ELSE
      WRITE(LUN,6) EPROB(IP),EOQR(IP),DOQ(IP),TTIME(IP)
    ENDIF
600   CONTINUE
  ENDIF

700 CONTINUE
```

C Calculation for population-weighted E/Q--

```
IF (POPDOS) THEN
  IF (FINITE) THEN
    DO 720 IE = 1, 6
      PMX(IE) = 0.0
      DO 715 I =1, NDIST
        PMX(IE) = PMX(IE) + PWTX(I,IE)
715     CONTINUE
720     CONTINUE
      WRITE (LUN,9) (PMX(IE),IE=1,6)
    ENDIF

    PM = 0.0
    DO 216 I = 1, NDIST
```

ENVIN

```
      PM = PM + PWT(I)
216  CONTINUE
      WRITE (LUN,8) PM
```

```
      XOQI = PM
```

```
ENDIF
```

```
CLOSE (LUN)
```

```
RETURN
```

C---- Error Messages -----

```
98 CALL FILERR (2, LUN, 'In ACCMOD')
99 CALL FILERR (3, LUN, 'In ACCMOD')
```

C---- Format Statements -----

```
1  FORMAT (9(F7.5,1X))
2  FORMAT (/7X,10(5X,I2,2X))
3  FORMAT (T20,3X,0PF4.0,10(1X,1PE8.2))
4  FORMAT (' Distance:',F9.1)
5  FORMAT (/T20,'
      . 'Population-'/'
      . T20,' Travel ',
      . ' Weighted'/'
      . T20,' Probability E/Q DOQ Time ',
      . ' E/Q'/'
      . T20,' (sec/m3) (m2) (sec) ',
      . ' (person-sec/m3)'/' Sector index:',I2)
6  FORMAT (T20,4X,F6.4,2(1PE12.1),0PF10.0,1PE12.1)
8  FORMAT (///' Population-weighted E/Q: ',T68,1PE8.1)
9  FORMAT (/ ' Population-weighted DRFs :',/19X, 1P,6(E8.1, 1X))
10 FORMAT (///' Travel Energy Energy Energy ',
      . ' Energy Energy Energy'/' ,
      . ' Distance Time 0.15 0.4 0.75 ',
      . ' 1.25 1.75 2.25'/' ,
      . ' (m) (sec) (MeV) (MeV) (MeV) ',
      . ' (MeV) (MeV) (MeV)'/' )
11 FORMAT (///' Sector Index: ',I2/' Probability: ',1PE8.1)
12 FORMAT (' ',F7.0,2X, F6.0,3X, 1P,6(E8.1,1X))
```

C-----
 END

ENVIN

```
C-----
C
C      SUBROUTINE BSORT (MAXC, NC, TS2)
C
C      Sort E/Q estimates into descending order so that the probability
C      of exceeding the E/Q value can be estimated. The sort is made
C      on E/Q but the frequency and release height wind speed are moved
C      along with the E/Q values.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 15-Dec-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      MAXC      - The maximum number of E/Q values
C      NC        - Number of E/Q values to be sorted
C      TS2       - Matrix of E/Q, frequency and wind speeds on input,
C                  sorted in descending order by E/Q on output
C-----
C
C      DIMENSION TS2(3,MAXC), TEMP(3)
C
C      DO 301 N1 = 1,NC-1
C        DO 201 N2 = N1+1,NC
C
C          IF( TS2(1,N1) .LT. TS2(1,N2) ) THEN
C
C            DO 101 I = 1,3
C              TEMP(I) = TS2(I,N1)
C              TS2(I,N1) = TS2(I,N2)
C              TS2(I,N2) = TEMP(I)
C101      CONTINUE
C
C          ENDIF
C
C201      CONTINUE
C301      CONTINUE
C
C      RETURN
C-----
C
C      END
```

ENVIN

```
C-----
C
C      SUBROUTINE CHECK
C
C      This module checks input parameters for validity. Relationships
C      between dependent parameters are also checked. Flags are also
C      set for improved program control.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C-----
C
C      CHK      - Logical set or cleared to check parameter interactions
C      IPRIOR   - Logical set if any prior years are considered in this
C                scenario
C      ISTOP    - Logical set true if any error conditions are
C                discovered
C      ISTOP2   - Temporary logical variable
C      STORE    - Logical flag set if acute and storage times specified
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'AQUPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'EXTPAR.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'LABELS.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'SWPAR.CMN'
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'TIMES.CMN'
C
C      LOGICAL ISTOP, ISTOP2, ISTOP3, ISTOP4, CHK, STORE, IPRIOR
C      DATA ISTOP /.FALSE./, ISTOP2 /.FALSE./
C
C---- Clear screen and print heading -----
C
C      CALL HEADNG (0)
C
C---- Clear option flags not in use as precaution, alert user if no
```

ENVIN

C selection has been made within a group -----

```

      ISTOP2 = .FALSE.
      ISTOP3 = .FALSE.
      ISTOP4 = .FALSE.
      IMPORT = .FALSE.

      IF (TFOOD) THEN
        CHK = .TRUE.
        DO 151 ITF = 1, NTF
          IF (TFD(ITF)) THEN
            CHK = .FALSE.
            IF (ISALT .AND. IRRST(ITF).EQ.2) ISTOP2 = .TRUE.
            IF (FOQOPT .EQ. 2) THEN
              IF (TPRODT(ITF) .EQ. 0.0) ISTOP3 = .TRUE.
              IF (CONS(ITF) .EQ. 0.0) ISTOP4 = .TRUE.
            ELSEIF (FOQOPT .EQ. 3) THEN
              TPRODT(ITF) = 0.0
            ENDIF
            IF (TPRODT(ITF) .GT. 0.0) IMPORT = .TRUE.
          ENDIF
151    CONTINUE
          IF (CHK) THEN
            WRITE (*,159) 'terrestrial food'
            ISTOP = .TRUE.
          ENDIF
        ELSE
          DO 141 ITF = 1, NTF
            IF (TFD(ITF)) THEN
              WRITE (*,149) 'Terrestrial food', EXPLAB(ITF+3)
              TFD(ITF) = .FALSE.
            ENDIF
141    CONTINUE
          ENDIF

      STORE = .FALSE.
      IF (ANFOOD) THEN
        CHK = .TRUE.
        DO 152 IAN = 1, NAN
          IF (ANF(IAN)) THEN
            CHK = .FALSE.

            IF (ISALT .AND. IRRSA(IAN) .EQ. 2) ISTOP2 = .TRUE.

            IF (FOQOPT .EQ. 2) THEN
              IF (TPRODA(IAN) .EQ. 0.0) ISTOP3 = .TRUE.
              IF (CONS2(IAN) .EQ. 0.0) ISTOP4 = .TRUE.
            ELSEIF (FOQOPT .EQ. 3) THEN

```

ENVIN

```
      TPRODA(IAN) = 0.0
    ENDIF
    IF (TPRODA(IAN) .GT. 0.0) IMPORT = .TRUE.

    IF (ACUTE) THEN
      IF (STORM(IAN) .GT. 0.0) THEN
        STORM(IAN) = 0.0
        STORE = .TRUE.
      ENDIF
      IF (IAN .EQ. 1 .AND. STORM(5) .GT. 0.0) THEN
        STORM(5) = 0.0
        STORE = .TRUE.
      ELSEIF (IAN .EQ. 3 .AND. STORM(6) .GT. 0.0) THEN
        STORM(6) = 0.0
        STORE = .TRUE.
      ENDIF
    ENDIF

    ENDIF
152  CONTINUE
    IF (CHK) THEN
      WRITE (*,159) 'animal food products'
      ISTOP = .TRUE.
    ENDIF
  ELSE
    DO 142 IAN = 1, NAN
      IF (ANF(IAN)) THEN
        WRITE (*,149) 'Animal food product', EXPLAB(IAN+7)
        ANF(IAN) = .FALSE.
      ENDIF
142  CONTINUE
    ENDIF

    IF (STORE) WRITE (*,*) 'Animal food storage times not input to',
      .      ' acute scenario, defaults used.'

    IF (RECRE) THEN
      DO 153 IRC = 1, NRE
        REC(IRC) = .TRUE.
153  CONTINUE
      SWING = .TRUE.
    ELSE
      DO 143 IRC = 1, NRE
        REC(IRC) = .FALSE.
143  CONTINUE
      SWING = .FALSE.
    ENDIF

    IF (AQFOOD) THEN
```

ENVIN

```
CHK = .TRUE.
DO 154 IAQ = 1, NAQ
  IF (AQF(IAQ)) THEN
    CHK = .FALSE.
    IF (FOQOPT .EQ. 3) TPRODQ(IAQ) = 0.0
  ENDIF
  IF (TPRODQ(IAQ) .GT. 0.0) IMPORT = .TRUE.
154 CONTINUE
  IF (CHK) THEN
    WRITE (*,159) 'aquatic foods'
    ISTOP = .TRUE.
  ENDIF
ELSE
  DO 144 IAQ = 1, NAQ
    IF (AQF(IAQ)) THEN
      WRITE (*,149) 'Aquatic foods', EXPLAB(IAQ+17)
      AQF(IAQ) = .FALSE.
    ENDIF
144 CONTINUE
  ENDIF

  IF (ISALT .AND. DRINK .AND. DWSRC .EQ. 1) ISTOP2 = .TRUE.
  IF (ISALT .AND. RESIRR .AND. IRRSR .EQ. 2) ISTOP2 = .TRUE.

  IF (ISTOP2) THEN
    ISTOP = .TRUE.
    WRITE (*,*) 'Cannot drink or irrigate with salt water'
  ENDIF

  IF (ISTOP3) THEN
    ISTOP = .TRUE.
    WRITE (*, '(2A)') 'When uniform production is assumed, total',
    ' production must be input.'
  ENDIF

  IF (ISTOP4) THEN
    ISTOP = .TRUE.
    WRITE (*, '(2A)') 'When uniform production is assumed, ',
    ' consumption must be input.'
  ENDIF

  IF (EXPORT) THEN
    IF (IMPORT) THEN
      IMPORT = .FALSE.
    ELSE
      WRITE (*, '(A)') 'Production not specified for export.'
      ISTOP = .TRUE.
    ENDIF
  ENDIF
```


ENVIN

```
159 FORMAT (' No ',A,' exposure paths have been selected: '/  
      .      ' Please check input file.' )
```

```
149 FORMAT (' ',A,' exposure not selected: '/  
      .      ' ',A,' will not be considered.' )
```

C---- Set dose type and check interactions -----

```
ONEDOS = .TRUE.
```

```
AEDE = .TRUE.
```

```
CUMDOS = .TRUE.
```

```
MAXDOS = .TRUE.
```

```
IF (NEAR) THEN
```

```
  IF (POPDOS) THEN
```

```
    Write (*,'(2A)') 'Cannot calculate population dose for near',  
      .      ' field scenario'
```

```
    ISTOP = .TRUE.
```

```
  ENDIF
```

```
ELSE
```

```
  IF (POPDOS) MAXDOS = .FALSE.
```

```
ENDIF
```

C---- Check for exposure incompatibilities -----

```
IF (FINITE .AND. AIREXT) THEN
```

```
  ISTOP = .TRUE.
```

```
  WRITE (*,*) 'Finite and infinite cloud exposures cannot be ',  
    .      ' considered in one scenario.'
```

```
ENDIF
```

C---- Check if any prior times considered -----

```
IPRIOR = .FALSE.
```

```
IF (BEFAIR .GT. 0.0 .OR. BEFIRR .GT. 0.0) THEN
```

```
  IPRIOR = .TRUE.
```

```
ELSEIF (NEAR) THEN
```

```
  IF (BEFORE .GT. 0.0 .OR. LOIC .GT. 0.0) IPRIOR = .TRUE.
```

```
ENDIF
```

C---- Check and total population -----

```
IF (.NOT. POPDOS) THEN
```

```
  TPOPS = 1
```

```
  POPT = 1
```

```
  DWPOP = 1
```

```
  AQUPOP = 1
```

ENVIN

```
ENDIF

IF (.NOT. NEAR .AND. POPDOS) THEN

  IF (POPOPT .EQ. 1) THEN
C    Open population file, read title and total--
    LUN = 27
    CALL XQIN (2)
    CLOSE (LUN)

  ELSEIF (POPOPT .EQ. 2) THEN
    POPT = POPIN

  ELSE
    WRITE (*,*) 'Invalid population definition option: ',POPOPT
    ISTOP = .TRUE.
  ENDIF

  IF (DWPOP .EQ. 0) DWPOP = POPT
  IF (AQUPOP .EQ. 0) AQUPOP = POPT

ENDIF

C---- Check air transport parameter interactions -----

IF (AIR) THEN

  IF (POPDOS) THEN
C    Population--

    IF (XOQOPT .EQ. 1) THEN
C    Value should be input--

      IF (XOQI .EQ. 0.0) THEN
        WRITE (*, '(2A)')
        .    ' Population-weighted chi/Q value must be ',
        .    ' entered when air transport option = 1.'
        ISTOP = .TRUE.
      ENDIF

    ELSEIF (ACUTE) THEN
C    Select direction only valid option--
      IF (XOQOPT .NE. 3) THEN
        WRITE (*,*) 'Invalid E/Q input option for acute release'
        ISTOP = .TRUE.
      ENDIF

    ELSEIF (XOQOPT .EQ. 0) THEN
C    Chi/Q will be calculated--
```

ENVIN

```
      IF (POPOPT .EQ. 2) THEN
        WRITE (*, '(2A)') ' Population grid must be used with ',
          ' air transport option = 0.'
        ISTOP = .TRUE.
      ENDIF

      ELSE
        WRITE (*,*)
        'Air transport option cannot be 2 or 3 for population.'
        ISTOP = .TRUE.
      ENDIF

      ELSE
C      Individual--

        IF (XOQOPT .EQ. 1) THEN
C      Value will be input--
          IF (XOQI .EQ. 0.0) THEN
            WRITE (*, '(2A)') ' Chi/Q value must be entered when ',
              ' air transport option = 1.'
            ISTOP = .TRUE.
          ENDIF

          ELSEIF (ACUTE) THEN
C      Select direction only valid option--
            IF (XOQOPT .NE. 3) THEN
              WRITE (*,*) 'Invalid E/Q input option for acute release'
              ISTOP = .TRUE.
            ENDIF

            ELSEIF (XOQOPT .EQ. 2) THEN
              IF (POPOPT .EQ. 2) THEN
                WRITE (*, '(2A)') ' Population grid must be used with ',
                  ' air transport option = 2.'
                ISTOP = .TRUE.
              ENDIF

              ELSEIF (XOQOPT .EQ. 3) THEN
                IF (MIDIST .EQ. 0.0 .OR. MIDIR .EQ. 0) THEN
                  WRITE (*, 37) MIDIST, MIDIR
                  ISTOP = .TRUE.
                ENDIF

                ELSE
                  WRITE (*,*) 'Invalid air transport option for individual.'
                  ISTOP = .TRUE.
                ENDIF
              ENDIF
            ENDIF
```

ENVIN

```
IF (TFOOD .OR. ANFOOD) THEN
  IF (FOQOPT .GT. 3) THEN
    WRITE (*,'(2A)') ' Invalid atmospheric production ',
      ' definition for ingestion population'
    ISTOP = .TRUE.
  ENDIF
ENDIF
ENDIF

IF (XOQOPT .EQ. 1 .AND. FINITE) THEN
  WRITE (*,'(2A)') ' Finite plume cannot be considered ',
    ' when chi/Q value entered.'
  ISTOP = .TRUE.
ENDIF

IF (.NOT. STACK) THEN
  IF (SHITE .NE. 0.0) THEN
    SHITE = 0.0
    IF (AIR) WRITE (*,*)
      'Not stack release, stack height set to 0.0'
  ENDIF
  IF (SFLOW .NE. 0.0) THEN
    SFLOW = 0.0
    IF (AIR) WRITE (*,*)
      'Not stack release, stack flow rate set to 0.0'
  ENDIF
  IF (SRAD .NE. 0.0) THEN
    SRAD = 0.0
    IF (AIR) WRITE (*,*)
      'Not stack release, stack radius set to 0.0'
  ENDIF
  IF (ETEMP .NE. 0.0) THEN
    ETEMP = 0.0
    IF (AIR) WRITE (*,*)
      'Not stack release, effluent temp. set to 0.0'
  ENDIF
  EFFSTK = .FALSE.
ELSE
  IF (SFLOW.EQ.0.0 .AND. SRAD.EQ.0.0 .AND. ETEMP.EQ.0.0) THEN
    EFFSTK = .TRUE.
  ELSE
    EFFSTK = .FALSE.
    IF (SRAD .EQ. 0.0) THEN
      WRITE (*,*) 'Stack radius cannot be zero.'
      ISTOP = .TRUE.
    ENDIF
    IF (.NOT. JFIN) THEN
      DO 115 IS = 1, 16
        IF (AVEU(IS) .EQ. 0.0) THEN
```

ENVIN

```
        WRITE (*,*) 'Average wind speed cannot be zero, sector',  
        IS  
        ISTOP = .TRUE.  
    ENDIF  
115    CONTINUE  
    ENDIF  
    ENDIF  
    ENDIF
```

```
37 FORMAT (/ ' Maximum individual distance and direction must be ',  
    ' entered when air transport option = 3.'//  
    '    MI distance: ',1PE8.2,0P,/ ,  
    '    MI direction index (where 1 is S->N):',I8)
```

C---- Set inventory flags -----

```
RELTRM = .FALSE.  
BASIC = .FALSE.  
DERIVE = .FALSE.  
AIRCN = .FALSE.
```

C Set release term flag, check inventory against transport selection--
DO 12 J = 1, 3

```
    CHK = .FALSE.  
    DO 10 IN = 1, NUCTOT  
        IF (CASQ(J,IN) .GT. 0.0) THEN  
            RELTRM = .TRUE.  
            CHK = .TRUE.  
        ENDIF  
10    CONTINUE  
  
    IF (J .EQ. 1) THEN  
        IF (CHK .AND. .NOT. AIR) THEN  
            WRITE (*,19) 'Air'  
            ISTOP = .TRUE.  
        ELSEIF (.NOT. CHK .AND. AIR) THEN  
            WRITE (*,119) 'Air'  
            ISTOP = .TRUE.  
        ENDIF  
  
    ELSEIF (J .EQ. 2) THEN  
        IF (CHK .AND. .NOT. SWAT) THEN  
            WRITE (*,19) 'Surface water'  
            ISTOP = .TRUE.  
        ELSEIF (.NOT. CHK .AND. SWAT) THEN  
            WRITE (*,119) 'Surface water'  
            ISTOP = .TRUE.
```

ENVIN

```
ENDIF

ELSEIF (J .EQ. 3) THEN
  IF (CHK .AND. .NOT. BURWAS) THEN
    WRITE (*,19) 'Buried waste'
    ISTOP = .TRUE.
  ELSEIF (.NOT. CHK .AND. BURWAS) THEN
    WRITE (*,119) 'Buried waste'
    ISTOP = .TRUE.
  ENDIF
ENDIF

12 CONTINUE

C   Set basic concentration flag, check inventory against transport
C   selection--

DO 14 J = 1, 5
  BAS(J) = .FALSE.
  DO 15 IN = 1, NUCTOT
    IF (CASCON(J,IN) .GT. 0.0) THEN
      BASIC = .TRUE.
      BAS(J) = .TRUE.
    ENDIF
  15 CONTINUE

  IF (J .EQ. 1) THEN
    C   Set air concentration flag--
    IF (BAS(J)) AIRCN = .TRUE.
    IF (BAS(J) .AND. AIR) THEN
      WRITE (*,20) J, 'Air'
      ISTOP = .TRUE.
    ENDIF
  ELSEIF (J .EQ. 5) THEN
    IF (BAS(J) .AND. SWAT) THEN
      WRITE (*,20) J, 'Surface water'
      ISTOP = .TRUE.
    ENDIF
  ENDIF

  IF (BAS(J) .AND. AIR) THEN
    WRITE (*,'(2A)') ' Air transport cannot be considered with ',
      ' basic concentrations.'
    ISTOP = .TRUE.
  ENDIF

14 CONTINUE

IF (AIRCN .AND. FINITE) THEN
```

ENVIN

```
      WRITE (*,*)  
      .      'Cannot consider finite plume with input air concentration.'  
      ISTOP = .TRUE.  
      ENDIF  
  
C      Set derived concentration flag, check against basic concentration  
C      input and transport flags--  
  
      DO 16 J = 6, 9  
  
        CHK = .FALSE.  
        DO 17 IN = 1, NUCTOT  
          IF (CASCON(J,IN) .GT. 0.0) THEN  
            DERIVE = .TRUE.  
            CHK = .TRUE.  
          ENDIF  
17      CONTINUE  
  
        IF (J .LT. 8) THEN  
          IF (CHK .AND. (BASIC .DR. RELTRM)) THEN  
            WRITE (*,21) J  
            ISTOP = .TRUE.  
          ENDIF  
  
          IF (CHK .AND. J .EQ. 6) THEN  
C            Terrestrial foods--  
            DO 301 ITF = 1, NTF  
              GRWP(ITF) = 0.0  
              IRRST(ITF) = 0.0  
              RIRR(ITF) = 0.0  
              IRTIMT(ITF) = 0.0  
              YELD(ITF) = 0.0  
              HLDUP(ITF) = 0.0  
301          CONTINUE  
  
          ELSEIF (CHK .AND. J .EQ. 7) THEN  
C            Animal products--  
            DO 302 IAN = 1, NAN+2  
              GRWPA(IAN) = 0.0  
              IRRSA(IAN) = 0.0  
              RIRRA(IAN) = 0.0  
              IRTIMA(IAN) = 0.0  
              YELDA(IAN) = 0.0  
              DWFACA(IAN) = 0.0  
              DIETFR(IAN) = 0.0  
              STORM(IAN) = 0.0  
302          CONTINUE  
            DO 303 IAN = 1, NAN  
              HLDUPA(IAN) = 0.0
```

ENVIN

```
303      CONTINUE

      ENDIF

      ELSEIF (J. EQ. 8) THEN
        IF (CHK .AND. .NOT. DRINK) THEN
          WRITE (*,*) ' Drinking water exposure flag should be set.'
          ISTOP = .TRUE.
        ENDIF
        IF (CHK .AND. (DWSRC .NE. 3)) THEN
          WRITE (*,*) ' Drinking water source flag incorrect.'
          ISTOP = .TRUE.
        ENDIF

        IF (CHK) HOLDDW = 0.0

      ELSEIF (J .EQ. 9) THEN
        IF (CHK .AND. (SWAT .OR. BAS(4))) THEN
          WRITE (*,21) J
          ISTOP = .TRUE.
        ENDIF

        IF (CHK) THEN
          DO 304 IAQ = 1, NAQ
            AQUIT(IAQ) = 0.0
            HLDUP2(IAQ) = 0.0
304      CONTINUE
          ENDIF

        ENDIF

      ENDIF

16 CONTINUE

      IF (DRINK .AND. DWSRC .EQ. 3 .AND. .NOT. DERIVE) THEN
        ISTOP = .TRUE.
        WRITE (*,*) 'Drinking water is from water system;'
        WRITE (*,*) ' however, no derived conc. has been entered'.
      ENDIF

19 FORMAT (/ ' ,A,' tranport has not been selected: '/
.         '   Inventory has been entered, please check input file. ')

119 FORMAT (/ ' ,A,' tranport has been selected: '/
.         '   No inventory entered, please check input file. ')

20 FORMAT (/ ' Basic concentration may not be input for path ',I1,/
.         '   when ',A,' transport selected. ')
```


ENVIN

```
21 FORMAT (' Derived concentration may not be input for path ', I1,  
          /' when transport or basic concentrations are input.')
```

C---- Check for near/far field scenario incompatibilities -----

```
NONAG = .FALSE.  
IF (NEAR .AND. BIOT .AND. (BTDSET .LT. 3)) NONAG = .TRUE.  
IF (NONAG .AND. (BEFAIR .GT. 0 .OR. BEFIRR .GT. 0)) THEN  
  WRITE (*, '(2A)') ' Cannot consider irrigation or air ',  
    'deposition during a non-agricultural scenario.'  
  ISTOP = .TRUE.  
ENDIF
```

```
DEEP = .FALSE.  
IF (NEAR) THEN
```

```
  IF (BURWAS) DEEP = .TRUE.  
  IF (BIOT) DEEP = .TRUE.  
  IF (MANULR .GT. 0.0) DEEP = .TRUE.  
  IF (RF2 .GT. 0.0) DEEP = .TRUE.  
  IF (BAS(3)) DEEP = .TRUE.
```

```
  IF (DEEP) THEN
```

```
    WRITE (*,*) 'Deep soil is considered.'  
    IF (BURWAS .AND. WASDEP .EQ. 0.0) THEN  
      ISTOP = .TRUE.  
      WRITE (*,*) 'Waste depth cannot be zero.'  
    ENDIF
```

C Set exposure flags for external dose--

```
  IF (GROUND) PATH(22) = .TRUE.  
  IF (GROUND .AND. BURWAS) PATH(23) = .TRUE.
```

```
ENDIF
```

ELSE

C Far-field scenario--

```
  IF (BURWAS) THEN  
    ISTOP = .TRUE.  
    WRITE (*,*)  
    'Waste degradation incompatible with far-field scenario.'  
  ENDIF
```

```
ENDIF
```

C---- Check time incompatibilities -----

ENVIN

```
IF (NEAR .AND. (LOIC .GT. BEFORE)) THEN
  WRITE (*,*) 'Loss of institutional control occurred before',
    ' waste was stored. Invalid.'
  ISTOP = .TRUE.
ENDIF
```

C---- Distances check -----

```
IF (NDIST .GT. 10) THEN
  WRITE (*,*)
  'Maximum number of distances that can be considered is 10'
  WRITE (*,*) 'Input value for NDIST is ',NDIST
  ISTOP = .TRUE.
ENDIF
```

```
IF (X(1) .LT. MINDIS) THEN
  WRITE (*,*) 'Minimum distance cannot be less than ',MINDIS
  ISTOP = .TRUE.
ENDIF
```

C---- Divide-by-zero checks -----

```
IF (BURWAS .AND. WASDEP .EQ. 0.0) THEN
  WRITE (*,*) 'Waste thickness cannot be set to 0.0'
  ISTOP = .TRUE.
ENDIF
```

```
IF (SWAT) THEN
  IF (MIXFLG .EQ. 0) THEN

    ISTOP2 = .FALSE.
    DO 28 IN = 1, NONUC
      IF (SWCON(IN) .EQ. 0.0) ISTOP2 = .TRUE.
28    CONTINUE
    IF (ISTOP2 .AND. SWFLOW .EQ. 0.0) THEN
      WRITE (*,*) 'Surface water flow rate cannot = 0.0'
      ISTOP = .TRUE.
    ENDIF

  ELSEIF (MIXFLG .EQ. 2) THEN
    IF (SWDPTH .EQ. 0 .OR. SWFLOW .EQ. 0) THEN
      WRITE (*,*) 'Surface water depth and flow rate cannot = 0.0'
      ISTOP = .TRUE.
    ENDIF

  ELSE
    IF (SWDPTH .EQ. 0 .OR. SWIDTH .EQ. 0 .OR. SWFLOW .EQ. 0) THEN
      WRITE (*, '(2A)') 'Surface water width, depth, or flow rate',
        ' cannot = 0.0'
    
```

ENVIN

```
        ISTOP = .TRUE.
      ENDIF
    ENDIF

  ENDIF

C---- Inhalation -----
      IF (INHAL) THEN
        IF (HRINH .LE. 0.0) WRITE (*,*)
        . ' Zero hours of inhalation exposure will equal zero dose'
        IF (RINH .LE. 0.0) WRITE (*,*)
        . ' Zero inhalation rate will equal zero dose'
      ENDIF

C---- Check parameter limits, divide by zero -----
      IF (GROUND) THEN
        IF (IRRSR .LT. 0 .OR. IRRSR .GT. 2) THEN
          WRITE (*,*) 'Invalid residential irrigation source index'
          ISTOP = .TRUE.
        ENDIF
      ENDIF

      IF (TFOOD) THEN
        DO 101 ITF = 1, NTF
          IF (TFD(ITF)) THEN

            IF (IRrst(ITF).LT.0 .OR. IRrst(ITF).GT.2) THEN
              WRITE (*,*) 'Invalid terrestrial food no: ',ITF,
              . ' irrigation source index'
              ISTOP = .TRUE.
            ENDIF

            IF (YELD(ITF) .EQ. 0.0) THEN
              WRITE (*,*) 'Yield cannot be 0.0 for food pathway',
              . ITF
              ISTOP = .TRUE.
            ENDIF

          ENDIF
        101 CONTINUE
      ENDIF

      IF (ANFOOD) THEN
        DO 102 IAN = 1, NAN
          IF (ANF(IAN)) THEN
```

ENVIN

```
IF (IRRSA(IAN).LT.0 .OR. IRRSA(IAN).GT.2) THEN
  WRITE (*,*) 'Invalid animal product no: ',IAN,
    ' irrigation source index'
  ISTOP = .TRUE.
ENDIF

IF (DIETFR(IAN) .GT. 0.0 .AND. YELDA(IAN) .EQ. 0.0) THEN
  WRITE (*,213) IAN
  ISTOP = .TRUE.
ENDIF

IF (IAN .EQ. 1) THEN
  IF (DIETFR(5) .GT. 0.0 .AND. YELDA(5) .EQ. 0.0) THEN
    WRITE (*,213) IAN
    ISTOP = .TRUE.
  ENDIF
ENDIF

IF (IAN .EQ. 3) THEN
  IF (DIETFR(6) .GT. 0.0 .AND. YELDA(6) .EQ. 0.0) THEN
    WRITE (*,213) IAN
    ISTOP = .TRUE.
  ENDIF
ENDIF

ENDIF
102 CONTINUE
ENDIF

213 FORMAT ('Yield should not be 0.0 for animal product no. ',I2)

C---- Read library titles for modules processed after RITQA call -----
C   Open default parameter file to store title--
CALL OPNFIL (4,0,22)
CLOSE (22)

C   Dose factor titles for QA--
CALL OPNFIL (4, 0, 37)
CLOSE (37)
CALL OPNFIL (4, 0, 10)
CLOSE (10)

IF ((POPDOS .AND. POPOPT .EQ. 1) .OR.
  (.NOT. POPDOS .AND. AIR .AND. XOQOPT .EQ. 2)) THEN
  CALL OPNFIL (4,0,27)
  CLOSE (27)
ENDIF
```

ENVIN

```
      IF (AIR) THEN
        IF (JFIN .AND. XOQOPT .NE. 1) THEN
C         Open joint frequency data file and read title--
          CALL OPNFIL (4,0,23)
          CLOSE (23)
        ELSE
C         IF (POPDOS .AND. .NOT. ACUTE .AND. XOQOPT .EQ. 2) THEN
          Open Chi/Q input files and read title--
          CALL OPNFIL (4,0,24)
          CLOSE (24)
        ENDIF
      ENDIF

C     Open food production grid input file and read title--
      IF ((TFOOD .OR. ANFOOD) .AND. FOQOPT .EQ. 3) THEN
        CALL OPNFIL (4,0,24)
        CLOSE (24)
        CALL OPNFIL (4,0,29)
        CLOSE (29)
      ENDIF

    ENDIF

C---- Stop if necessary -----
      IF (ISTOP) THEN
        WRITE (*,114)
114      FORMAT (// ' ENV input file not written. ' /
        .          ' Correct mistakes and rerun ENVIN ' //)

C     Set system errorlevel flag--
        CALL EXIT (1)

      ENDIF

      RETURN

C-----
      END
```

ENVIN

SUBROUTINE CRONMOD

This model computes long-term average X/Q using a sector-averaged Gaussian plume model. The code is based of the diffusion model described in Section 4.3.

Written by J.V. Ramsdell (December 3, 1986)
Module of Program ENVIN of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 23-Mar-88 RAP
Reviewed and Approved: 12-Sept-88 BA Napier

AIRT() - Average air temperature (C) by season and time of day
DOQ() - Normalized deposition by direction and distance
DV - Deposition velocity
EUFF() - Effective wind speed by direction, read into program
ENV as parameter UBAR()
IDIR() - wind direction sectors; 1 = NNE, etc.
JFDHT - Height for which joint frequency data is
representative, m
JFREQ() - Joint probability distribution wind speed, direction,
and stability by season and time of day
MIXLAY() - Average mixing layer thickness by season and time of
day
NDIST2 - Number of distances to use in this subroutine
STAB - Stability class index
SZTEMP - SZ(IST,IX)
TEMP - Intermediate value, tested before call to EXP function
WSECTOR - Descriptive sector label
UBAR() - Mid points of the wind speed ranges
XOQ() - Normalized average air concentration by direction
and distance
ZO - Surface roughness length, m

INCLUDE 'AFPPAR.CMN'
INCLUDE 'AIRPAR.CMN'
INCLUDE 'OPT.CMN'

INTEGER STAB, MIXLAY(1,1), NDIST2

REAL DOQ(16,10), DRFS(6),
+ UBAR(9), AIRT(1,1),

ENVIN

```
+      SZ(7,10), SY(7,10),  
+      UEFF(16), PDIR(16),  
+      JFREQ(1,1,9,7,16), JFQ, TEMP, RMIX, Z0, JFDHT
```

```
DATA AIRT/ 15.0 /, MIXLAY/ 1000 /, Z0 /0.03/  
DV = 0.01
```

C---- Read in joint frequency data -----

```
      LUN = 23  
C      CALL OPNFIL (1,0,LUN)  
      CALL OPNFIL (4,0,LUN)  
      READ (LUN,'(A8)') DUM  
      READ (LUN,*) NSPD, NSTAB, NSEAS, NTOD, JFDHT  
      READ (LUN,*) (UBAR(I), I=1, NSPD)  
  
      DO 41 I = 1, NSPD  
        DO 31 J = 1, NSTAB  
          READ (LUN,*,END=99,ERR=98) (JFREQ(1,1,I,J,K),K=1,NDIR)  
          DO 33 K = 1, NDIR  
            JFREQ(1,1,I,J,K) = JFREQ(1,1,I,J,K) / 100.0  
33      CONTINUE  
31      CONTINUE  
41      CONTINUE  
  
      CLOSE(LUN)
```

C---- Set up for individual case -----

```
      IF (POPDOS) THEN  
        ISTART = 1  
        ISTOP = NOIR  
        NDIST2 = NDIST  
  
      ELSEIF (XOQOPT .EQ. 2) THEN  
C      MI location is to be selected--  
        CALL XQIN (4)  
        ISTART = 1  
        ISTOP = NDIR  
        NDIST2 = NDIST  
  
      ELSE  
C      MI location is specified--  
        NDIST2 = 1  
        X(1) = MIDIST  
        ISTART = MIDIR  
        ISTOP = MIDIR  
  
      ENDIF
```

ENVIN

```
C---- Compute sigmas for fixed distances -----
      DO 20 ID = 1,NDIST2
        DO 10 STAB = 1,NSTAB
          CALL SIGMA(X(ID), STAB,SZ(STAB,ID), SY(STAB,ID))
        10 CONTINUE
      20 CONTINUE

C---- Compute XOQ, outer loop is distance -----
      DO 500 IX = 1,NDIST2

C      For each stability--
      DO 400 IST = 1,NSTAB

        SZTEMP = SZ(IST,IX)

C      And each wind speed--
      DO 300 IU = 1,NSPD

C      Compute release height wind--
      IF( SHITE .EQ. 0.0 .AND. JFDHT .LE. 15.0) THEN
        RSPD = UBAR(IU)

      ELSEIF (JFDHT .EQ. SHITE) THEN
        RSPD = UBAR(IU)

      ELSE

C      Compute release height wind using diabatic wind profile,
C      see Panofsky and Dutton (1984) Section 6.5
        RSPD = PROFILE( JFDHT, Z0, UBAR(IU), IST, SHITE)

      ENDIF

C      For each season--
      DO 200 ISEAS = 1,NSEAS

C      And time of day--
      DO 100 IT = 1,NTOD

        RMIX = REAL (MIXLAY(ISEAS,IT))

        IF (SZTEMP .GE. 1.32 * RMIX) THEN
C      Uniform concentration distribution in the vertical--
          GZ = 1.0

C      Compute ground-level XU/Q--
```


ENVIN

```
XUOQG = 2.5465 / ( X(IX) * RMIX )

ELSE
C   Non-uniform vertical concentration distribution--
C   Compute ground-level concentration--
XUOQG = 1.0159 / ( X(IX) * SZTEMP )

PRISE = 0.0
IF(SHITE .GT. 0.0 .AND. .NOT. EFFSTK) THEN
    CALL PLMRIZ (Z0, SRAD, SHITE, SFLOW, ETEMP,
                AIRT(ISEAS,IT), RSPD, IST, RMIX, PRISE)
ENDIF

C   Compute effective release height--
RHT = SHITE + PRISE

C   Compute G(Z)--
GZ = 0.0
DO 50 N1 = 1,5
    N = -3 + N1
    TEMP = -0.5 * ( (2.0 * REAL(N) * RMIX - RHT)
                  / SZTEMP )**2
    IF (ABS(TEMP) .LT. 20.0) GZ = GZ + 2.0 * DEXP (TEMP)
50 CONTINUE

ENDIF

IF (FINITE) CALL FNTDRF (RHT, X(IX), SZTEMP, DRFS)

C   Compute X/Q--
DO 60 ID = ISTART, ISTOP

    JFQ = JFREQ(IT,ISEAS,IU,IST,ID)

C   Skip if JFREQ = 0.0--
IF(JFQ .GT. 0.0 ) THEN

    XOQ(IX,ID) = XOQ(IX,ID) + XUOQG / RSPD * GZ * JFQ

    IF (FINITE) THEN

        DO 55 IE = 1, 6
            DRFOQ(ID,IX,IE) = DRFOQ(ID,IX,IE) +
                              DRFS(IE) * JFQ / RSPD
55 CONTINUE
        CONTINUE
    ENDIF

ENDIF
```

ENVIN

C Compute sums to permit determination of effective speed--

```
      IF( IX .EQ. 1 ) THEN
        UEFF(ID) = UEFF(ID) + JFQ * RSPD
        PDIR(ID) = PDIR(ID) + JFQ
      ENDIF
    ENDIF
```

60 CONTINUE

100 CONTINUE

200 CONTINUE

300 CONTINUE

400 CONTINUE

500 CONTINUE

C---- Save MI finite DRF factors -----

```
      IF (.NOT. POPDOS .AND. XOQOPT .NE. 2) THEN
        DO 502 IE = 1, 6
          DRFSAV(IE) = DRFOQ (MIDIR, 1, IE)
502       CONTINUE
      ENDIF
```

C---- Compute deposition (Note: this is not used in GENII)-----

```
      DO 551 ID = ISTART, ISTOP
        DO 550 IX = 1, NDIST2
          DOQ(ID, IX) = DV * XOQ(IX, ID)
550       CONTINUE
551 CONTINUE
```

C---- Compute effective wind speed for each direction -----

```
      DO 600 ID = ISTART, ISTOP
        UEFF(ID) = UEFF(ID) / PDIR(ID)
600 CONTINUE
```

C---- Write XOQ data set for first eight directions, followed by 9-16----

```
      IF (POPDOS .OR. XOQOPT .EQ. 2) THEN
        LUN = 24
        CALL OPNFIL (2,3,LUN)
        IEND = (NDIR + 1) / 2
```

C Write direction index, average wind speed--

```
      WRITE (LUN,2) (IDIR(ID), ID=1,IEND)
      WRITE (LUN,5) (UEFF(ID), ID=1,IEND)
```

ENVIN

```
C      Write distance, XOQ--
      DO 610 IX = 1,NDIST
        WRITE(LUN,3) X(IX), (XOQ(IX,ID), ID = 1,IEND)
610    CONTINUE

C      Repeat--
      WRITE (LUN,2) (IDIR(ID), ID=IEND+1,NDIR)
      WRITE (LUN,5) (UEFF(ID), ID=IEND+1,NDIR)
      DO 620 IX = 1,NDIST
        WRITE (LUN,3) X(IX), (XOQ(IX,ID), ID = IEND+1,NDIR)
620    CONTINUE

C----- WRITE DRFOQ data set if finite cloud -----
      IF (FINITE) THEN
        DO 632 IE = 1, 6

          WRITE (LUN,6) IE, (IDIR(ID), ID=1,IEND)
          DO 634 IX = 1,NDIST
            WRITE(LUN,3) X(IX), (DRFOQ(ID,IX,IE), ID = 1,IEND)
634          CONTINUE

C          Repeat--
          WRITE (LUN,6) IE, (IDIR(ID), ID=IEND+1,NDIR)
          DO 636 IX = 1,NDIST
            WRITE (LUN,3) X(IX), (DRFOQ(ID,IX,IE), ID = IEND+1,NDIR)
636          CONTINUE

632        CONTINUE
      ENDIF

C----- Write DOQ data set for first eight directions, followed by 9-16 -----
      WRITE(LUN,2) (IDIR(ID), ID=1,IEND)
      DO 630 IX = 1,NDIST
        WRITE (LUN,3) X(IX), (DOQ(ID,IX), ID=1,IEND)
630      CONTINUE
      WRITE (LUN,2) (IDIR(ID), ID=IEND+1,NDIR)
      DO 640 IX = 1,NDIST
        WRITE (LUN,3) X(IX), (DOQ(ID,IX), ID=IEND+1,NDIR)
640      CONTINUE

C----- MI location specified -----
      ELSE
        XOQI = XOQ(NDIST2, MIDIR)
        MIUBAR = UEFF(MIDIR)
      ENDIF
```

ENVIN

```
CLOSE(LUN)
RETURN
```

C---- Error Messages -----

```
98 CALL FILERR (2, LUN, 'In CRONMOD')
99 CALL FILERR (3, LUN, 'In CRONMOD')
```

C---- Format Statements -----

```
1 FORMAT (9(F7.5,1X))
2 FORMAT (/7X,10(5X,I2,2X))
3 FORMAT (1X,OPF6.0,10(1X,1PE8.2))
4 FORMAT (1X,I2,3X,7F10.1)
5 FORMAT (1X,'EFF SPD',10(F8.1,1X))
6 FORMAT (/I2,5X,10(5X,I2,2X))
```

C-----
END

ENVIN

```
C-----
C
C      SUBROUTINE DRFBIV (H, SY, SZ, U, DRF)
C
C      This subroutine evaluates the bivariate plume external dose rate
C      factors.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 7-Dec-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----

      INCLUDE 'OPT.CMN'

      DIMENSION DRF(6),FK(6),DRFS(6)
      DIMENSION A1(6),A2(6),B1(6),B2(6),C(6),D(6),E(6),F(6)

      DATA FK/0.506,0.508,0.508,0.508,0.507,0.505/
      DATA TWO/2./

      DATA A1/.007062, .007915, .008279, .007696, .006964, .005852/
      DATA A2/0.1651, 0.1514, 0.08769, 0.07532, 0.06136, 0.04238/
      DATA B1/0.9623, 0.9222, 0.8839, 0.8854, 0.8941, 0.9038 /
      DATA B2/0.2779, 0.2813, 0.3713, 0.3900, 0.4215, 0.4740 /
      DATA C/-.1964417,-.1885449,-.1861016,-.1860144,-.1866018,-.18710/
      DATA D/0.3163679,0.2904088,0.2840850,0.2840079,0.284138,0.28418/
      DATA E/0.3857797,0.4192123,0.4252199,0.4253229,0.4257164,0.42610/
      DATA F/2.8172996,2.8136234,2.805253,2.804869,2.8039112,2.803050/

      TWOPI = TWO * P

C      Evaluate median standard deviation--

      SYZ = SQRT (SY * SZ)

C      Loop over energy groups (6)
      DO 100 IE = 1,6

C      If median sigma is greater than 600, use semi-infinite form--

      DRFS(IE) = FK(IE) / (TWOPI*SY*SZ*U)
      IF (SYZ .GE. 600.) THEN
        DRF(IE) = DRFS(IE)
        GO TO 90
      ELSE
```

ENVIN

C Finite plume form--

```
IF (SYZ .LE. 100.) THEN
  RZ = A1(IE) * SYZ**B1(IE)
ELSE
  RZ = A2(IE) * SYZ**B2(IE)
  IF(RZ.GT.1.) RZ = 1.
ENDIF
```

```
DRF(IE) = FK(IE) * RZ / (TWOPI * SY * SZ * U)
IF (H .LE. 1.) GO TO 90
YZ = SY / SZ
HZ = H / SZ
```

```
IF(HZ.LE.10.) THEN
  HST = 1. - D(IE) * HZ**E(IE)
ELSE
  HST = F(IE) / HZ
ENDIF
```

```
PO = C(IE) * EXP(-0.015 * SZ)
HE = H * HST * YZ**PO
IF (HE.LE.0.) HE = 0.
DRF(IE) = DRF(IE) * EXP(-HE * HE / (TWO * SZ * SZ))
```

```
ENDIF
90  CONTINUE
100 CONTINUE
```

RETURN

C-----
END

ENVIN

```
C-----
C
C      SUBROUTINE DRFSEC(XIN,IH,SZIN,DRFS)
C
C      This subroutine evaluates finite-plume sector-averaged external
C      dose rate factors, for one distance, release height, Sz value,
C      and for six energy groups.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Nov-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      DIMENSION DRFS(6)
C      REAL AK(6),X1(6),X2(6),X3(6),X4(6),X5(6)
C      REAL AA(6,5),HX1(6,5),HX2(6,5),HX3(6,5),HX4(6,5),HX5(6,5),
C      .      HX6(6,5),HX7(6,5),HX8(6,5),HX9(6,5),DX(6,5)
C      REAL SZMIN(5),SZMAX(5),SZTST(5),SZXX(5)
C      DIMENSION FKINF(6)
C
C      Data statements for ground level releases.
C
C      DATA FKINF/.506,.508,.508,.508,.507,.505/
C      DATA AK/.00400,.00380,.00380,.00360,.00342,.00342/
C      DATA X1/.2154,.2056,.1763,.1763,.1745,.1500 /
C      DATA X2/1.232,1.328,1.246,1.246,1.207,1.0385 /
C      DATA X3/-.1732,-.2005,-.1961,-.1961,-.1888,-.1609 /
C      DATA X4/-.1374,.0005606,.1066,.1066,.07537,.05711/
C      DATA X5/.191,.199,.182,.182,.182,.182 /
C
C      Data statements for elevated releases.
C
C      DATA AA/
C      .      0.1909, 0.1995, 0.1930, 0.1897, 0.1888, 0.1916,
C      .      0.1904, 0.1947, 0.1947, 0.1908, 0.1908, 0.1927,
C      .      0.1909, 0.1974, 0.1905, 0.1875, 0.1897, 0.1914,
C      .      0.1900, 0.1971, 0.1902, 0.1873, 0.1893, 0.1914,
C      .      0.1897, 0.1968, 0.1899, 0.1870, 0.1890, 0.1911/
C      DATA HX1/
C      .      -.0079836, -.0068464, -.0052439, -.0051147, -.0048566, -.0043104,
C      .      -.002566, -.002611, -.002612, -.002612, -.0025281, -.001543,
C      .      -.0003225, -.0004380, -.0003760, -.0003687, -.0003970, -.0004192,
C      .      -.0000072393, -.0000218405, -.0000287361,
C      .      -.0000315728, -.000055851, -.000055851,
C      .      -2.7815702E-7, -2.179202E-6, -5.79535E-6,
C      .      -7.382326E-6, -1.12916E-5, -1.99375E-5/
```

ENVIN

DATA HX2/

. .0020302, .0017336, .0013365, .0012986, .0012306, .0010886,
. .0006260, .0006320, .0006176, .0006642, .00060655, .0003799,
. .00007903, .0001071, .000091789, .0000901, .00009696, .00010234,
. .0000017612, .000005309, .0000069799, .0000076741, .0000135817,
. .0000135817,
. 6.71701113E-8, 5.25722E-7, 1.39556E-6, 1.78079E-6, 2.72453E-6,
. 4.815094E-6/

DATA HX3/

. 1.10853, 1.12874, 1.16066, 1.15024, 1.14787, 1.14342,
. 1.2196, 1.200, 1.200, 1.200, 1.1124, 1.167,
. 1.51233, 1.43132, 1.42964, 1.41711, 1.3893, 1.35022,
. 2.193499, 1.95538, 1.86565, 1.832157, 1.679025, 1.679025,
. 2.76218724, 2.337204, 2.109784, 2.045505, 1.950043, 1.811961/

DATA HX4/

. 1.06496, 1.05508, 1.03420, 1.0384, 1.03637, 1.036195,
. 1.243, 1.244, 1.244, 1.244, 1.3268, 1.3207,
. 1.36939, 1.37817, 1.3972, 1.3934, 1.38817, 1.37466,
. 1.48126, 1.45935, 1.48287, 1.457285, 1.416737, 1.416737,
. 1.50715482, 1.462071, 1.4591397, 1.430768, 1.410792, 1.376726/

DATA HX5/

. -.00014497, -.000120429, -.000107396, -.000102495, -.000089844,
. -.0000729814,
. -.0001404, -.00009759, -.00009817, -1.E-8, -.0000285,
. -.00008758,
. -.000060141, .000016914, .00006756, .000113459, .00015535,
. .00023030,
. -.0000100728, .000094251, .000178964, .000241717, .000401386,
. .000401386,
. 2.31697304E-5, 1.41925E-4, 2.52501E-4, 3.34745E-4, 4.020886E-4,
. 5.244587E-4/

DATA HX6/

. -2.2101, -2.2101, -2.2827, -2.33404, -2.411, -2.411,
. -2.51, -2.51, -2.622, -2.622, -2.622, -2.6173,
. -2.83872, -2.83001, -2.86357, -2.87222, -2.88118, -2.90774,
. -3.20158, -3.19662, -3.17113, -3.12888, -2.819186, -2.819186,
. -4.11710167, -4.002866, -3.882893, -3.809661, -3.688744, -3.434422/

DATA HX7/

. -.6205, -.6205, -.6205, -.6205, -.6205, -.6205,
. -.568, -.568, -.568, -.568, -.568, -.5843,
. -.53759, -.53616, -.54130, -.54504, -.54449, -.54523,
. -.49928, -.49664, -.51172, -.52408, -.58410, -.58410,
. -.3576202, -.37317, -.40363, -.42112, -.44262, -.49152/

DATA HX8/

. 0.1525, 0.10602, 0.10084, 0.08425, 0.07891, 0.0587,
. 6*0., 0.950, 5*0., 6*0., 6*0./

DATA HX9/

. 0.2761, 0.3231, 0.32880, 0.3470, 0.3607, 0.3877,
. 24*0./

ENVIN

```
DATA DX/  
. 900., 1000., 950., 1200., 1150., 1500.,  
. 6*0., 250., 17*0./  
DATA SZMIN/5., 15., 30., 53., 60./  
DATA SZMAX/400., 300., 400., 500., 500./  
DATA SZTST/80., 100., 150., 150., 150./  
DATA SZXX/20., 30., 30., 40., 40./
```

C---- Start of calculations -----

```
W = 0.392699*XIN  
X=XIN  
SZ=SZIN  
IF(IH.EQ.0) THEN
```

C Evaluate DRF values for ground level releases (<10 meters)--

```
IF(SZ.GT.200.) THEN  
DO 10 IE=1,6  
DRFS(IE)=X5(IE)/(SZ*W)  
10 CONTINUE  
ELSE  
ALZ=ALOG(SZ)  
ALX=ALOG(X)  
DO 20 IE=1,6  
IF(X.LT.900.) THEN  
CW=X4(IE) + X1(IE) * ALX + X3(IE) * ALZ  
ELSE  
IF(SZ.LT.8.05) THEN  
CW=1.  
ELSE  
CW= X2(IE) + X3(IE) * ALZ  
ENDIF  
ENDIF  
IF(CW.GT.1.0) CW = 1.0  
IF(CW.LT.0.) CW = 0.1  
DRFS(IE) = CW * AK(IE) / W  
20 CONTINUE  
ENDIF  
ELSE
```

C Evaluate DRF values for elevated releases, loop on energy group--

```
DO 30 IE=1,6  
IF(SZ.LT.SZMIN(IH)) SZ=SZMIN(IH)  
DRFN= FKINF(IE)*.398942/(W*SZ)  
XXX=X  
IF(SZ.LT.SZTST(IH)) THEN  
IF(XXX.GT.2000.) XXX = 2000.
```

ENVIN

```
      EF=HX1(IE,IH)+HX2(IE,IH)*ALOG(XXX)
      IF(SZ.GE.SZXX(IH).AND.XXX.GT.400.)EF=EF*(HX4(IE,IH)+
        HX5(IE,IH)*XXX)
      DRFS(IE)=DRFN*SZ**HX3(IE,IH)*EF
    ELSE
      IF(SZ.LT.SZMAX(IH)) THEN
        IF(XXX.GT.DX(IE,IH)) THEN
          EG=EXP(HX6(IE,IH)+HX7(IE,IH)*ALOG(SZ))
        ELSE
          EG=HX8(IE,IH)*(XXX**HX9(IE,IH))*EXP(HX6(IE,IH)+
            HX7(IE,IH)*ALOG(SZ))
        ENDIF
        DRFS(IE)=DRFN*SZ*EG
      ELSE
        DRFS(IE)=AA(IE,IH)/(W*SZ)
      ENDIF
    ENDIF
30  CONTINUE
    ENDIF

    RETURN
C-----
    END
```

ENVIN

```
C-----
C
C      SUBROUTINE ENVLIB
C
C      This subroutine handles reading of environmental data libraries and
C      storing of parameter values for radionuclides considered in this
C      case.
C
C      Module of ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Version of 4-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      A      - Input mass number
C      BIOAC1() - Input bioaccumulation factor
C      DUM      - Character input dummy variable
C      DWIN     - Input drinking water cleanup factor
C      E      - Input element symbol
C      FTRC()  - Input food transfer factor
C      GAMMA() - Input energy per disintegration
C      IOFF     - Column offset to select fresh or salt water
C                bioaccumulation factors
C      LECHIN  - Input leaching rate
C      NC      - Index of the current radionuclide considered for this
C                case
C-----
C
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'ENVPAR.CMN'
C      INCLUDE 'OPT.CMN'
C
C      REAL BIOAC1(8), FTRC(8), DWIN, LECHIN, GAMMA(6)
C      INTEGER IOFF, NC
C      CHARACTER E*2, A*6, DUM*8
C      DATA IOFF /0/
C-----
C----- Read food transfer coefficients-----
C
C      NC=1
C      IFLG1=0
C
C      120 CONTINUE
C      LUN = 8
```

ENVIN

```
CLOSE (LUN)
CALL OPNFIL (4,0,LUN)

READ (LUN,1000,ERR=98,END=99) DUM
READ (LUN,1000,ERR=98,END=99) DUM

121 CONTINUE

      READ (LUN,1000,ERR=98,END=I23) E, DVEL, (FTRC(I),I=1,8),
      .                                LECHIN

      IF (E .EQ. ELTT(NC)) THEN
        DPVLT(NC) = DVEL
        LEACHT(NC) = LECHIN
        DO I27 ITF = 1, NTF
          BVIT(ITF,NC) = FTRC(ITF)
127    CONTINUE
          FMIT(1,NC) = FTRC(5)
          FMIT(2,NC) = FTRC(6)
          FMIT(3,NC) = FTRC(7)
          FMIT(4,NC) = FTRC(8)
          FMIT(5,NC) = FTRC(5)
          FMIT(6,NC) = FTRC(7)
          NC = NC+1
          IFLG1 = 0
          IF (NC .GT. NUCTOT) GOTO 125
        ENDIF
        GOTO 121

123    CONTINUE
        IF (IFLG1 .EQ. 0) THEN
          IFLG1 = 1
        ELSE
C      No information this radionuclide
          IFLG1 = 0
          NC = NC + 1
        ENDIF
C
C      IF (NC .LE. NUCTOT) GOTO 120
125 CLOSE (LUN)
C
C
C---- Read bioaccumulation factor library-----
C

      IF (ISALT) THEN
        IOFF = 0
      ELSE
        IOFF = 4
```

ENVIN

```
ENDIF

NC=1
IFLG1=0

140 CONTINUE
  LUN = 9
  CLOSE (LUN)
  CALL OPNFIL (4,0,LUN)
  READ (LUN,1000,ERR=98,END=99) DUM

141 CONTINUE
  READ (LUN,1010,ERR=98,END=143) E, (BIOAC1(I),I=1,8), DWIN
  IF (E .EQ. ELTT(NC)) THEN
    DO 144 IAQ = 1, NAQ
      BIOACT(IAQ,NC) = BIOAC1(IAQ+IOFF)
144  CONTINUE
      DWCLET(NC) = DWIN
      NC = NC+1
      IFLG1 = 0
      IF (NC .GT. NUCTOT) GOTO 145
    ENDIF
    GOTO 141

143  CONTINUE
      IF (IFLG1 .EQ. 0) THEN
        IFLG1 = 1
      ELSE
C      No information this radionuclide
        IFLG1 = 0
        NC = NC + 1
      ENDIF

      IF (NC .LE. NUCTOT) GOTO 140
145 CLOSE (LUN)

C---- Read gamma energies by group -----

NC=1
IFLG1=0

160 CONTINUE
  LUN = 38
  CLOSE (LUN)
  CALL OPNFIL (4,0,LUN)

161 CONTINUE
```

ENVIN

```
      READ (LUN,1020,ERR=98,END=163) E, A, (GAMMA(I),I=1,6)

      IF (E .EQ. ELTT(NC) .AND. A .EQ. AWT(NC)) THEN
        DO 167 I = 1, 6
          GAMMAT(I,NC) = GAMMA(I)
167      CONTINUE

        NC = NC+1
        IFLG1 = 0
        IF (NC .GT. NUCTOT) GOTO 165
      ENDIF
      GOTO 161

163    CONTINUE
      IF (IFLG1 .EQ. 0) THEN
        IFLG1 = 1
      ELSE
C        No information this radionuclide
        IFLG1 = 0
        NC = NC + 1
      ENDIF
C
      IF (NC .LE. NUCTOT) GOTO 160
165    CLOSE (LUN)
C

      RETURN

C---- Error Messages -----
      98 CALL FILERR (2, LUN, 'In ENVLIB')
      99 CALL FILERR (3, LUN, 'In ENVLIB')

C---- Format Statements -----
      1000 FORMAT (A2,1X, 10E8.0)
      1010 FORMAT (A2,8F9.1,F6.1)
      1020 FORMAT (1X, A2, A6, 2X, 6F8.0)

C-----
      END
```

ENVIN

```
C-----
C
C      SUBROUTINE FNTDRF(HT,X,SZ,DRFS)
C
C      This subroutine controls calculation and interpolation of DRF
C      values for sector averaged dispersion.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Nov-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----

      DIMENSION DRFS(6)
      DIMENSION HTAB(6),HTLOG(6),DRF1(6),DRF2(6)

      DATA HTAB/10.,50.,100.,150.,200.,250./
      DATA HTLOG/2.30258509,3.91202301,4.60517019,5.010635294,
      .          5.29831737,5.52146092/

C----- If release height is <= 10 meters, then use ground level equation.

      IF(HT.LE.HTAB(1)) THEN
        IH=0
        CALL DRFSEC(X,IH,SZ,DRFS)
      ELSE

C---- Release height is elevated; determine if interpolation is needed.

        DO 50 JH=2,6
          IF(HT.EQ.HTAB(JH)) THEN

C            Interpolation is not needed, calculate DRFS and return.

            IH=JH-1
            CALL DRFSEC(X,IH,SZ,DRFS)
            GO TO 100
          ENDIF
50      CONTINUE

C      Interpolation is needed.
C
C      DO 70 JH=2,6
        IF(HT.LT.HTAB(JH)) THEN
          IH1 = JH-2
          IH2 = JH-1
          CALL DRFSEC(X,IH1,SZ,DRF1)
```

ENVIN

```
      CALL DRFSEC(X,IH2,SZ,DRF2)
      HLOG = ALOG(HT)
      DO 60 IE=1,6
        ALD1 = ALOG(DRF1(IE))
        ALD2 = ALOG(DRF2(IE))
        DR = ALD1 + (HLOG-HTLOG(JH-1))*
              (ALD2-ALD1)/(HTLOG(JH)-HTLOG(JH-1))
        DRFS(IE)=EXP(DR)
60      CONTINUE
      GO TO 100
    ENDIF
70    CONTINUE

C---- HT is greater than 250 m, reset to 250 meters.
      IH=5
      CALL DRFSEC(X,IH,SZ,DRFS)
    ENDIF

100  RETURN
C-----
      END
```


ENVIN

```
C-----
C
C      REAL FUNCTION INVMOL (IST, Z0)
C
C      Function to compute the inverse of the Monin-Obukhov length. The
C      Monin-Obukhov length is a scale length in the atmospheric
C      boundary layer. Golder (boundary layer meteorology 3:47-58)
C      has related 1/Monin-Obukhov length to the surface roughness
C      length and stability class. This function estimates 1/L on the
C      basis of Golder's paper.
C
C      Written by J. V. Ramsdell from program by J.G. Droppo
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 10-Feb-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      IST      - Atmospheric stability class
C      Z0       - Surface roughness length, m
C-----
C
C      DIMENSION SLOPE(7), CONST(7)
C
C      DATA SLOPE/.0130,.0109,.00869,.00174,-.00239,-.00673,-.0130/
C      DATA CONST/-.131,-.0831,-.0450,-.00741,.0138,.0368,.0781/
C
C      INVMOL = SLOPE(IST) * ALOG( Z0*100.) + CONST(IST)
C
C      RETURN
C-----
C
C      END
```

ENVIN

```
C-----
C
C      SUBROUTINE ORDER
C
C      This module reorders the input inventory to follow order of the
C      master radionuclide library.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      IL      - Loop index of the master radionuclide library
C      IN      - Loop index of the list of radionuclides to be considered
C                for this case
C-----
C
C      INCLUDE 'RMD.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'INVIN.CMN'
C      INCLUDE 'OPT.CMN'
C
C      Check input radionuclide list for validity.
C      CALL IDNUC
C
C      IN=0
C      ICHN=0
C
C      DO 20 IC=1,NCH
C
C      If this chain is not used, skip--
C      IF (NFLAGC(IC) .EQ.1) THEN
C
C          ICHN = ICHN+1
C          NCN = NOFNUC(IC)
C          IOFNUC(ICHN) = NCN
C          N1 = NCHST(IC)
C          N2 = N1+NCN-1
C          IONE = 0
C          I = 0
C
C      Loop on all nuclides in active chain (IM = IMEM)--
C
C      IM = 0
```

ENVIN

DO 15 IL=N1,N2

```
IM = IM + 1
IF (IONE .EQ. 0) THEN
  IF (NFLAG(IL) .EQ. 0) THEN
    I = IM
  ELSE
    IONE = 1
  ENDIF
ENDIF
```

```
IF (IONE .EQ. 1) THEN
  IN=IN+1
```

C Include nuclide IL in array position IN--

```
ELTT(IN) = ELTM(IL)
AWT(IN) = AWM(IL)
HLT(IN) = TR(IL) * YRDA
ALT(IN) = 0.693 / HLT(IN)
IFRT(1,IN) = MAX (0,IFR(1,IL)-I)
IFRT(2,IN) = MAX (0,IFR(2,IL)-I)
IF (IFRT(1,IN) .GT. 0) DKT(1,IN) = DKF(1,IL)
IF (IFRT(2,IN) .GT. 0) DKT(2,IN) = DKF(2,IL)
BONET(IN) = BONED(IL)
CLASST(IN) = TCLASS(IL)
```

```
IF (CLASST(IN) .EQ. 'D') THEN
  ICLASS(IN) = 1
ELSEIF (CLASST(IN) .EQ. 'W') THEN
  ICLASS(IN) = 2
ELSE
  ICLASS(IN) = 3
ENDIF
```

```
IF (NFLAG(IL) .NE. 0) THEN
```

C Correct units on source term and transfer--

```
  K = NFLAG(IL)
  DO 110 J = 1, 9
    CASCON(J,IN) = CONCIN(J,K)
    IF (J .EQ. 2) CASCON(J,IN) = CASCON(J,IN)*SVU(SOLUNT)
110  CONTINUE
    DO 111 J = 1,3
      CASQ(J,IN) = QIN(J,K)
111  CONTINUE
```

```
  ENDIF
ENDIF
```

ENVIN

```
15      CONTINUE
      IOFNUC(ICHN) = NCN-I
C
      ENDIF
20 CONTINUE
C
      NUCTOT = IN
      ICH = ICHN

C---- Error Messages -----

      IF (NUCTOT .LE. 0) THEN
        WRITE (*,300)
300    FORMAT (' ORDER: No inventory.')
        CALL EXIT (1)

      ELSEIF (NUCTOT .GT. NMAX) THEN
        WRITE (*,301) NUCTOT,NMAX
301    FORMAT (' No. of radionuclides (including daughters) = ',I3/
        .      ' Maximum allowed = ',I4)
        CALL EXIT (1)
      ENDIF
C
C-----

      RETURN
      END
```

ENVIN

C-----
C
C SUBROUTINE PLMRIZ (ZO, SRAD, SHGHT, SFLOW, ETEMP, ATEMP, RSPD,
C STAB, LAYER, PRISE)
C
C Subroutine to calculate final plume rise given atmospheric and
C effluent release conditions. Subroutine should be called only if
C the release is from a defined stack. Plume rise computations
C are made on the basis of information in Briggs (1984).
C
C Written by Athey, G.F., J.V. Ramsdell, C.S. Glantz (Created: June
C 1983 for MESOI, revised: December 1986 for GENII)
C Module of Program ENVIN of the GENII Software Package
C Pacific Northwest Laboratory Environmental Dosimetry System
C
C Last Modification: 10-Feb-88 RAP
C Reviewed and Approved: 12-Sept-88 BA Napier
C-----

C
C ATEMP - Air temperature (C)
C SPEED - Surface wind ppeed (m/s)
C RSPD - Release height wind speed
C STAB - Stability class
C LAYER - Mixing layer thickness (m)
C PRISE - Calculated plume rise, (m)
C FM - Momentum flux
C FB - Bouyancy flux
C ATEMPK - ATEMP in degrees Kelvin
C ETEMPK - ETEMP in degrees Kelvin
C RM - Momentum rise
C RB1 - Bouyancy rise
C-----

C
C INTEGER STAB
C REAL LAYER

C REAL C(3)
C DATA C/ 0.049, 0.27, 0.49 /
C PI = 3.14159

C PRMAX = (LAYER - SHGHT) / 2.

C IF (SHGHT .GE. LAYER .OR. SFLOW .LE. 0.0) THEN
C If stack height greater than of equal to mixed depth, no plume rise--

ENVIN

```
      PRISE = 0.0

      ELSE
C      Compute momentum and buoyancy fluxes--

      WO = SFLOW / ( PI * SRAD**2 )
      ETEMPK = ETEMP + 273.16
      ATEMPK = ATEMP + 273.16

C      Momentum flux--
      FM = (ATEMPK / ETEMPK) * WO * SFLOW / PI

C      Buoyancy flux--
      FB = 9.8 * (1 - ATEMPK/ETEMPK) * WO * SRAD**2
      IF(FB .LT. 0.0) FB = 0.0

C      Obtain USTAR
      USTR = USTAR (SHGHT, ZO, RSPD, STAB)

C      Compute momentum rise ... rise limited by turbulence--
      RM = 0.9 * SQRT( ( RSPD / USTR ) * FM ) /
+      ( RSPD * ( 0.4 + 1.2 / (WO/RSPD) ) )

C      Compute buoyancy rise for near neutral conditions--
      RB1 = 1.54 * ( FB / ( RSPD * USTR**2 ) )**(2./3.) *
+      SHGHT**(1./3.)

      IF(STAB .LE. 4) THEN

        RB = RB1

      ELSE

C      Stable atmospheric conditions (P-G classes E-G)--
      IS = STAB-4
      S = C(IS) / ATEMPK

C      Compute buoyancy rise for stable conditions--
      IF( RSPD .GE. 1.0 ) THEN
        RB2 = 2.6 * ( FB / (RSPD * S) )**(1./3.)
      ELSE
        RB2 = 5.3 * ( FB / S**1.5 )**0.25 - 6.0 * SRAD
      ENDIF

      RB = AMIN1(RB1,RB2)

    ENDIF
```

ENVIN

```
C      Compute plume rise--  
      PRISE = RM + RB  
      IF( PRISE .GT. PRMAX) PRISE = PRMAX
```

```
      ENDIF  
      RETURN
```

```
C-----  
      END
```

ENVIN

```
C-----
C
C      SUBROUTINE PROB (MAXC, NC, TS2, EPROB, EQQ, TTIME)
C
C      This module estimates probability of exceeding E/Q. The subroutine
C      takes the probabilities associated with the sorted (largest first)
C      E/Q values and generates a cumulative distribution of the
C      probability that E/Q will be less than the given value. It is
C      assumed that each E/Q represents the mid point of a range with
C      50% probability of being exceeded for the set of atmospheric
C      conditions. The cumulative distribution is then used to estimate
C      the values of E/Q that have 1, 5, 10, 25, and 50% probability of
C      being exceeded assuming that the transport is in the direction
C      to take material from the source to the receptor. E/Q values
C      are determined by linear interpolation. The travel time for each
C      E/Q is the lower value of travel times associated with the E/Q
C      values used for interpolation.
C
C      Written by J. V. Ramsdell (December 11, 1986)
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 15-Dec-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      MAXC      - The maximum number of E/Q values
C      NC        - Number of classes with frequency = 0
C      TS2       - Matrix of sorted E/Qs, frequencies, and travel times
C      EQQR()    - E/Q values for the five probability levels (output)
C      TTIME()   - Travel time for each E/Q (output)
C-----
C
C      DIMENSION TS2(3,MAXC), EPROB(5), EQQ(5), TTIME(5), PR(5)
C
C      DATA PR/ 0.01, 0.05, 0.10, 0.25, 0.50 /
C
C      Generate cumulative distribution--
C
C      P1 = TS2(2,1) / 2.0
C      TS2(2,1) = P1
C
C      DO 100 N = 2,NC
C        P2 = TS2(2,N) / 2.0
C        TS2(2,N) = TS2(2,N-1) + P1 + P2
```


ENVIN

```
      P1 = P2
100  CONTINUE

      TOTAL = TS2(2,NC) + P1

C      Normalize for wind direction frequency--
      DO 200  N = 1,NC
        TS2(2,N) = TS2(2,N) / TOTAL
200  CONTINUE

C      Determine E/Q values--

C      Initial check for frequency < 0.01--
      IF( TS2(2,1) .LT. 0.01 ) THEN

C      Normal search--

      I = 1
      DO 400  N = 1,NC-1
        N1 = N + 1

300    CONTINUE

        IF( TS2(2,N) .LE. PR(I) .AND. TS2(2,N1) .GT. PR(I) ) THEN

C          Compute E/Q and select travel time

          EPROB(I) = PR(I)
          EQQ(I) = TS2(1,N1) + ( TS2(1,N) - TS2(1,N1) )
            + * ( PR(I) - TS2(2,N1) ) / ( TS2(2,N) - TS2(2,N1) )
          TTIME(I) = AMIN1( TS2(3,N), TS2(3,N1) )

C          Increment i (select next probability level)--
          I = I + 1
          IF( I .GT. 5 ) THEN
            RETURN
          ELSE
            GOTO 300
          ENDIF

        ENDIF
400    CONTINUE
      ELSE

C      The largest E/Q value has a frequency > 0.01--
      I = 1

500  CONTINUE
```

ENVIN

```
      IF( TS2(2,1) .GT. PR(I) ) THEN
        EQQ(I) = TS2(1,1)
        EPROB(I) = TS2(2,1)
        TTIME(I) = TS2(3,1)
        I = I + 1
        GOTO 500
      ENDIF

C      Resume normal search--

      DO 700 N = 1,NC-1
        N1 = N + 1

600      CONTINUE

        IF( TS2(2,N) .LE. PR(I) .AND. TS2(2,N1) .GT. PR(I) ) THEN

C          Compute E/Q and select travel time

          EPROB(I) = PR(I)
          EQQ(I) = TS2(1,N1) + ( TS2(1,N) - TS2(1,N1) )
+          * ( PR(I) - TS2(2,N1) ) / ( TS2(2,N) - TS2(2,N1) )
          TTIME(I) = AMIN1( TS2(3,N), TS2(3,N1) )

C          Increment i (select next probability level)
          I = I + 1
          IF( I .GT. 5 ) THEN
            RETURN
          ELSE
            GOTO 600
          ENDIF

        ENDIF
700      CONTINUE
      ENDIF

      RETURN

C-----
      END
```

ENVIN

```
C-----
C
C      FUNCTION PROFILE (HT, ZO, SPD, IST, HGHT)
C
C      This module computes release height winds from 10 m winds using
C      diabatic wind profile, see Panofsky and Dutton (1984), Section 6.5,
C      from a surface wind measurement. The profile used is determined
C      by the atmospheric stability class. The profile uses the height
C      of measurement of the surface wind, which is assumed to be 10 m,
C      and a surface roughness length, which is assumed to be 0.03 m.
C      Revised to compute wind speed directly using similarity relation-
C      ships to estimate USTAR first.
C
C      Written by J. V. RAMSDELL (December 12, 1986), Revised on
C      February 5, 1988.
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 10-Feb-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      HGHT      - Release height, m
C      HT        - Wind measurement height, m
C      INVMOL    - 1/Monin-Obukhov length used in diabatic wind profiles
C      IST       - Atmospheric stability class
C      SPD       - Surface wind speed, m/sec
C      ZO        - Surface roughness length, m
C-----
C
C      REAL INVMOL, MOLINV
C
C      PI = 3.14159
C      X = 0.0
C      USTAR1 = USTAR (HT, ZO, SPD, IST)
C      MOLINV = INVMOL (IST, ZO)
C
C      IF (IST .LE. 3) THEN
C
C          Unstable conditons--
C
C          X = (1.0 - 16.0 * HGHT * MOLINV ) **0.25
C          PSI = ALOG( (0.5+X*X/2) * (0.5+X/2)**2 ) - 2*ATAN(X) + PI/2
C
C      ELSEIF (IST .GE. 5) THEN
```

ENVIN

C Stable conditions--
 $PSI = -5.0 * HGHT * MOLINV$

ELSE

C Neutral conditions--
 $PSI = 0.0$

ENDIF

$WIND = USTAR1 / 0.4 * (ALOG (HGHT / ZO) - PSI)$
PROFILE = WIND

RETURN

C-----
 END

ENVIN

```
C-----
C
C      SUBROUTINE READIN
C
C      Read primary input file.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 8-Jul-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C
C-----
C
C      CTEMP() - Temporary character array for input
C      E      - Input element symbol
C      A      - Input mass number
C      I      - Radionuclide loop index
C      J      - Input concentration loop index
C      LTEMP  - Temporary LOGICAL input parameter
C      LUN    - Logical unit device index
C      RTEMP() - Temporary REAL input parameter
C
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'AUPAR.CMN'
C      INCLUDE 'EXTPAR.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'FILES.CMN'
C      INCLUDE 'INVIN.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'SWPAR.CMN'
C      INCLUDE 'TIMES.CMN'
C      INCLUDE 'TITL.CMN'
C
C      CHARACTER DUM*8, E*2, A*6, CTEMP(4)*8, CTEMP2(4)*10
C      REAL RTEMP(5)
C      LOGICAL LTEMP
C
C      Open file for workspace--
C      CALL OPNFIL (2,0,7)
C
C      LUN = 5
C      CALL OPNFIL (1,0,LUN)
```

ENVIN

```
READ (LUN,1,ERR=98,END=99) DUM
READ (LUN,'(7X,A73)') TITLS(5)
READ (LUN,'(7X,A30)') INFILN
READ (LUN,1) DUM
```

C---- Read input options -----

```
READ (LUN,2) NEAR
READ (LUN,2) POPDOS
READ (LUN,2) ACUTE
READ (LUN,111) DUM, DUM, DUM
```

```
READ (LUN,3) AIR, FINITE
READ (LUN,3) SWAT, AIREXT
READ (LUN,3) BIOT, GROUND
READ (LUN,3) BURWAS, RECRE
READ (LUN,*) INHAL
READ (LUN,5) DRINK
READ (LUN,3) OUTEDE, AQFOOD
READ (LUN,3) OUTRAD, TFOOD
READ (LUN,3) OUTPTH, ANFOOD
READ (LUN,3) DEBUG, SLING
READ (LUN,111) DUM, DUM, DUM
```

C---- Read inventory -----

```
READ (LUN,*) IUNIT
READ (LUN,*) SOLUNT
IF (SOLUNT .LT. 1) SOLUNT = 1
CALL DUMRED (LUN,9)
```

C Read first set of inventories--

```
I = 1
100 CONTINUE
  READ (LUN,20) ELTI(I)
  IF (ELTI(I) .EQ. ' ' .OR. ELTI(I) .EQ. '--') GOTO 101
  BACKSPACE (LUN)
  READ (LUN,20) ELTI(I), AWI(I), (QIN(J,I),J=1,3),
    (CONCIN(J,I), J=1,5)
  I = I + 1
  GOTO 100
```

C Read second set of inventories--

```
101 CONTINUE
  IF (ELTI(I) .EQ. ' ') CALL DUMRED (LUN,7)
  IF (ELTI(I) .EQ. '--') CALL DUMRED (LUN,6)
  NIN = I - 1
102 CONTINUE
```

ENVIN

```
I = 0

C      Check if this radionuclide has already been entered--

      READ (LUN,20) E
      IF (E .EQ. ' ' .OR. E .EQ. '##') GOTO 103
      BACKSPACE (LUN)
      READ (LUN,20) E, A, (RTEMP(J),J=1,4)

      DO 104 IN = 1, NIN
        IF (E .EQ. ELTI(IN) .AND. A .EQ. AWI(IN)) I = IN
104    CONTINUE

C      This is a new radionuclide--
      IF (I .EQ. 0) THEN
        NIN = NIN + 1
        I = NIN
        ELTI(I) = E
        AWI(I) = A
      ENDIF

C      Transfer input concentrations into proper arrays--

      DO 105 J = 1, 4
        CONCIN(J+5,I) = RTEMP(J)
105    CONTINUE

      GOTO 102
103 CONTINUE

      IF (E .EQ. ' ') THEN
        READ (LUN,11) DUM, DUM
      ELSE
        READ (LUN,1) DUM
      ENDIF

C---- Read times -----
      READ (LUN,*) NTKEND
      READ (LUN,*) DCEND
      READ (LUN,*) RELEND
      READ (LUN,*) BEFAIR
      READ (LUN,*) BEFIRR
      READ (LUN,111) DUM,DUM,DUM

C---- Read population options -----
      READ (LUN,*) POPOPT
      READ (LUN,*) POPIN
```

ENVIN

READ (LUN,1111) DUM,DUM,DUM,DUM

C---- Read near-field parameters -----

```
READ (LUN,*) BEFORE
READ (LUN,*) LOIC
READ (LUN,*) RF1
READ (LUN,*) RF2
READ (LUN,*) MANULR
READ (LUN,'(A8)') DUM
IF (DUM.EQ. ' ') DUM = '0'
WRITE (7,*) DUM
BACKSPACE 7
READ (7,*) FRSIZ
READ (LUN,11) DUM, DUM
```

C---- Read air transport parameters -----

```
READ (LUN,4) DUM
IF (DUM.EQ. ' ') DUM = '0'
WRITE (7,'(A8)') DUM
BACKSPACE 7
READ (7,*) IRELES
```

```
READ (LUN,6) DUM, STACK
WRITE (7,'(A8)') DUM
BACKSPACE 7
READ (7,*) XOQOPT
```

```
READ (LUN,7) SHITE
READ (LUN,7) SFLOW
```

```
READ (LUN,9) DUM, SRAD
WRITE (7,'(A8)') DUM
BACKSPACE 7
READ (7,*) XOQI
```

```
READ (LUN,9) DUM, ETEMP
WRITE (7,'(A8)') DUM
BACKSPACE 7
READ (7,*) MIDIR -
```

```
READ (LUN,10) MIDIST, BUILDX
```

```
READ (LUN,12) JFIN, DUM
IF (DUM.EQ. ' chi/Q g') THEN
  BUILDH = 0.0
ELSE
  WRITE (7,*) DUM
```


ENVIN

```
BACKSPACE 7  
READ (7,*) BUILDH  
ENDIF
```

```
READ (LUN,11) DUM, DUM
```

C---- Read surface water transport values -----

```
IF (SWAT) THEN  
  READ (LUN,*) MIXFLG  
  READ (LUN,*) MIXR  
  READ (LUN,*) SWFLOW  
  READ (LUN,*) SWTT  
  IF (MIXFLG .GT. 0) THEN  
    READ (LUN,1) DUM  
    READ (LUN,*) SWQB  
    READ (LUN,*) SWLSX  
    READ (LUN,*) SWOSY  
    READ (LUN,*) SWDPTH  
    READ (LUN,*) SWIDTH  
    READ (LUN,*) SWDZ  
    READ (LUN,11) DUM, DUM  
  ELSE  
    CALL DUMRED (LUN,9)  
  ENDIF  
ELSE  
  CALL DUMRED (LUN,13)  
ENDIF
```

C---- Read waste form availability values -----

```
READ (LUN,*) PACKHL  
READ (LUN,*) WASDEP  
READ (LUN,*) OVRBRD  
READ (LUN,11) DUM,DUM
```

C---- Read biotic transport values -----

```
IF (BIOT) THEN  
  READ (LUN,*) BTPRE  
  READ (LUN,*) BTNTK  
  READ (LUN,*) BTDSET  
  CALL DUMRED (LUN,6)  
ELSE  
  CALL DUMRED (LUN,9)  
ENDIF
```

C---- Read external exposure values -----

ENVIN

```
READ (LUN,25) RTEMP(1), CTEMP2(1)
READ (LUN,25) RTEMP(2), CTEMP2(2)
READ (LUN,*) HRSWIM
READ (LUN,25) RTEMP(3), CTEMP2(3)
READ (LUN,25) RTEMP(4), CTEMP2(4)
READ (LUN,*) SHRTYP
READ (LUN,*) RECTT
READ (LUN,*) FRCLD
```

```
WRITE (7,*) RTEMP(1)
BACKSPACE 7
READ (7,*) HRPLUM
WRITE (7,*) RTEMP(2)
BACKSPACE 7
READ (7,*) HRGRD
WRITE (7,*) RTEMP(3)
BACKSPACE 7
READ (7,*) HRBOAT
WRITE (7,*) RTEMP(4)
BACKSPACE 7
READ (7,*) HRSHOR
```

```
WRITE (7,'(A)') CTEMP2(1)
BACKSPACE 7
READ (7,*) RESIRR
```

```
IF (RESIRR) THEN
  WRITE (7,'(A)') CTEMP2(2)
  BACKSPACE 7
  READ (7,*) IRRSR
  WRITE (7,'(A)') CTEMP2(3)
  BACKSPACE 7
  READ (7,*) RIRRR
  WRITE (7,'(A)') CTEMP2(4)
  BACKSPACE 7
  READ (7,*) IRTIMR
ELSE
  IRRSR = 0
ENDIF
```

```
READ (LUN,11) DUM, DUM
```

C---- Read inhalation values -----

```
IF (INHAL) THEN
  READ (LUN,*) HRINH
  READ (LUN,*) IRES
  READ (LUN,*) RTEMP(1)
  IF (IRES .EQ. 1) THEN
```

ENVIN

```
      XMLF = RTEMP(1)
    ELSEIF (IRES .EQ. 2) THEN
      AVALSL = RTEMP(1)
    ENDIF
    READ (LUN,11) DUM, DUM
  ELSE
    CALL DUMRED (LUN, 5)
  ENDIF
```

C---- Read ingestion population values -----

```
    READ (LUN,*) FOQOPT
    IF (FOQOPT .EQ. 0) THEN
      READ (LUN,*) FOQ
    ELSE
      READ (LUN,1) DUM
    ENDIF
    READ (LUN,111) DUM, DUM, DUM
    READ (LUN,*) AQUPOP
    READ (LUN,*) OWPOP
    READ (LUN,*) EXPORT
    CALL DUMRED (LUN,5)
```

C---- Read aquatic foods / drinking water values -----

```
    IF (AQFOOD .OR. DRINK) THEN

      READ (LUN,*) ISALT
      CALL DUMRED (LUN,5)

      DO 110 IAQ = 1, NAQ
        READ (LUN,21) AQF(IAQ), AQUIT(IAQ), TPRODQ(IAQ), HLDUP2(IAQ),
                     USAG(IAQ), CTEMP(IAQ)
110    CONTINUE

      IF (DRINK) THEN

        WRITE (7,'(A8)') CTEMP(1)
        BACKSPACE 7
        READ (7,*) DWSRC

        WRITE (7,'(A8)') CTEMP(2)
        BACKSPACE 7
        READ (7,*) DWTRET

        WRITE (7,'(A8)') CTEMP(3)
        BACKSPACE 7
        READ (7,*) HDLDDW
```

ENVIN

```
      WRITE (7, '(A8)') CTEMP(4)
      BACKSPACE 7
      READ (7,*) DWUSAG

      ENDIF

      CALL DUMRED (LUN,7)

      ELSE
      CALL DUMRED (LUN, 17)
      ENDIF

C---- Read terrestrial food values -----
      IF (TFOOD) THEN
      DO 120 ITF = 1, NTF
      READ (LUN,22) TFD(ITF), GRWP(ITF),
      .           IRRST(ITF), RIRR(ITF), DUM,
      .           YELD(ITF), TPROD(ITF), HLDUP(ITF), CONS(ITF)

      IF (IRRSST(ITF) .GT. 0) THEN
      IF (DUM .EQ. ' ') THEN
      IRTIMT(ITF) = 0
      ELSE
      WRITE (7, '(A7)') DUM
      BACKSPACE 7
      READ (7,*) IRTIMT(ITF)
      ENDIF
      ENDIF

120  CONTINUE
      CALL DUMRED (LUN,8)
      ELSE
      CALL DUMRED (LUN,12)
      ENDIF

C---- Read animal product values -----
      IF (ANFOOD) THEN
      DO 130 IAN = 1, NAN
      READ (LUN,23) ANF(IAN), CONS2(IAN), HLDUPA(IAN), TPROOA(IAN),
      .           DWFACA(IAN), DIETFR(IAN),
      .           GRWPA(IAN), IRRSA(IAN), RIRRA(IAN),
      .           IRTIMA(IAN), YELDA(IAN), STORMT(IAN)
130  CONTINUE

      READ (LUN,1) DUM
```

ENVIN

```
      DO 132 I = 5,6
        READ (LUN,24) DIETFR(I), GRWPA(I), IRRSA(I), RIRRA(I),
132      .      IRTIMA(I), YELDA(I), STORTM(I)
      CONTINUE
    ENDIF

    CLOSE (7)
    CLOSE (LUN)
    RETURN
```

C---- Error Messages -----

```
98 CALL FILERR (3, LUN, 'In READIN')
99 CALL FILERR (2, LUN, 'In READIN')
```

C---- Format Statements -----

```
1  FORMAT (A8)
11  FORMAT (A10/A10)
111  FORMAT (A10/A10/A10)
1111  FORMAT (A10/A10/A10/A10)
11111  FORMAT (A10/A10/A10/A10/A10)

2  FORMAT (L5)
3  FORMAT (BN, L5, T39, L5)
4  FORMAT (BN, T47, A8)
5  FORMAT (8N, T39, L5)
6  FORMAT (BN, A8, T47, L8)
7  FORMAT (BN, T47, F8.0)
8  FORMAT (8N, T53, A8)
9  FORMAT (BN, A8, T47, F8.0)
10  FORMAT (BN, F10.3, T47, F8.0)
12  FORMAT (8N, L10, T47, A8)
20  FORMAT (5X, A2, A6, 8E8.1)

21  FORMAT (11X, L3, 8X, F5.1, E9.1, F8.1, F7.1, 2X, A8)

22  FORMAT (11X, L3, 7X, F6.1, 2X, I1, F6.1, A7, 1X, F7.1, 2X, E8.2,
.      2X, F6.1, 3X, F6.1)

23  FORMAT (L3, 8X, E6.1, F6.2, E7.2, F8.1, F6.2, F6.2, I3, F6.2,
.      F6.2, F7.2, F6.2)

24  FORMAT (38X, F6.2, F6.2, I3, F6.2, F6.2, F7.2, F6.2)
25  FORMAT (E10.2, 31X, A10)
```

C-----

ENVIN

END

ENVIN

```
C-----
C
C      SUBROUTINE REDFLT
C
C      Read default parameter file and check values.  If different from
C      value specified in BLOCK DATA, write message to output file and
C      update parameter value.  REDFLT reads from LUN2 and writes to the
C      output file specified by parameter LUN in common block GENRL which
C      should be set by the calling module.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 4-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      LUN2   - Logical unit number of the input file
C      LTEMP  - Temporary LOGICAL input parameter
C      TEMP() - Temporary REAL input parameter array
C      RTEMP  - Temporary REAL input parameter
C-----
C
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'EXTPAR.CMN'
C      INCLUDE 'FILES.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'SWPAR.CMN'
C      INCLUDE 'TITL.CMN'
C
C      CHARACTER*8 DUM
C      REAL RTEMP, TEMP(10)
C      INTEGER LUN2, ITEMP
C      LOGICAL LTEMP
C
C      LUN2 = 22
C      OPEN (LUN2, FILE=FILN(LUN2), STATUS='OLD', IOSTAT=IOS)
C      IF (IOS .NE. 0) GOTO 97
C
C      READ (LUN2,1,ERR=98,ENO=99) DUM
C      READ (LUN2,11,ERR=98,END=99) DUM, DUM
C----- Read inventory parameters -----
```

ENVIN

```
READ (LUN2,*,ERR=98,END=99) (TEMP(I), I=1,5)
DO 100 I = 1, 5
  IF (TEMP(I) .NE. NVU(I)) THEN
    WRITE (LUN,10) NVU(I), TEMP(I), 'NVU(n)'
    NVU(I) = TEMP(I)
  ENDIF
100 CONTINUE
```

```
READ (LUN2,*) (TEMP(I), I=1,3)
DO 110 I = 1, 3
  IF (TEMP(I) .NE. SVU(I)) THEN
    WRITE (LUN,10) SVU(I), TEMP(I), 'SVU(n)'
    SVU(I) = TEMP(I)
  ENDIF
110 CONTINUE
```

C---- Read environmental parameters -----

```
READ (LUN2,11) DUM, DUM
READ (LUN2,*) ITEMP
IF (ITEMP .NE. PRCNTI) THEN
  WRITE (LUN,30) PRCNTI, ITEMP, 'PRCNTI'
  PRCNTI = ITEMP
ENDIF
```

```
READ (LUN2,*) RTEMP
IF (RTEMP .NE. DVPRES) THEN
  WRITE (LUN,10) DVPRES, RTEMP, 'DVPRES'
  DVPRES = RTEMP
ENDIF
```

```
READ (LUN2,*) RTEMP
IF (RTEMP .NE. LEAFRS) THEN
  WRITE (LUN,10) LEAFRS, RTEMP, 'LEAFRS'
  LEAFRS = RTEMP
ENDIF
```

```
READ (LUN2,*) TEMP
DO 134 I = 1, 4
  IF (TEMP(I) .NE. BIOMAS(I)) THEN
    WRITE (LUN,10) BIOMAS(I), TEMP(I), 'BIOMAS(n)'
    BIOMAS(I) = TEMP(I)
  ENDIF
134 CONTINUE
DO 135 I = 1, 6
  IF (TEMP(I+4) .NE. BIOMA2(I)) THEN
    WRITE (LUN,10) BIOMA2(I), TEMP(I+4), 'BIOMA2(n)'
    BIOMA2(I) = TEMP(I+4)
```


ENVIN

ENDIF
135 CONTINUE

READ (LUN2,*) RTEMP
IF (RTEMP .NE. DEPFR2) THEN
WRITE (LUN,10) DEPFR2, RTEMP, 'DEPFR2'
DEPFR2 = RTEMP
ENDIF

READ (LUN2,*) RTEMP
IF (RTEMP .NE. SURCM) THEN
WRITE (LUN,10) SURCM, RTEMP, 'SURCM'
SURCM = RTEMP
ENDIF

READ (LUN2,*) RTEMP
IF (RTEMP .NE. SLDN) THEN
WRITE (LUN,10) SLDN, RTEMP, 'SLDN'
SLDN = RTEMP
ENDIF

READ (LUN2,*) RTEMP
IF (RTEMP .NE. SSLDN) THEN
WRITE (LUN,10) SSLDN, RTEMP, 'SSLDN'
SSLDN = RTEMP
ENDIF

READ (LUN2,*) LTEMP
IF ((LTEMP .AND. .NOT. HARVST) .OR.
(.NOT. LTEMP .AND. HARVST)) THEN
WRITE (LUN,20) HARVST, LTEMP, 'HARVST'
HARVST = LTEMP
ENDIF

READ (LUN2,*) RTEMP
IF (RTEMP .NE. SOLING) THEN
WRITE (LUN,10) SSLDN, RTEMP, 'SOLING'
SOLING = RTEMP
ENDIF

READ (LUN2,*) RTEMP
IF (RTEMP .NE. WTIM) THEN
WRITE (LUN,10) WTIM, RTEMP, 'WTIM'
WTIM = RTEMP
ENDIF

READ (LUN2,*) (TEMP(I), I=1,4)
DO 131 I = 1, 4
IF (TEMP(I) .NE. TRANS(I)) THEN

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```
        WRITE (LUN,10) TRANS(I), TEMP(I), 'TRANS(n)'
        TRANS(I) = TEMP(I)
    ENDIF
131 CONTINUE

    READ (LUN2,*) (TEMP(I), I=1,6)
    DO 121 I = 1, 6
        IF (TEMP(I) .NE. TRANSA(I)) THEN
            WRITE (LUN,10) TRANSA(I), TEMP(I), 'TRANSA(n)'
            TRANSA(I) = TEMP(I)
        ENDIF
121 CONTINUE

    READ (LUN2,*) (TEMP(I), I=1,6)
    DO 120 I = 1, 6
        IF (TEMP(I) .NE. CONSUM(I)) THEN
            WRITE (LUN,10) CONSUM(I), TEMP(I), 'CONSUM(n)'
            CONSUM(I) = TEMP(I)
        ENDIF
120 CONTINUE

    READ (LUN2,*) (TEMP(I), I=1,4)
    DO 130 I = 1, 4
        IF (TEMP(I) .NE. DWATER(I)) THEN
            WRITE (LUN,10) DWATER(I), TEMP(I), 'DWATER(n)'
            DWATER(I) = TEMP(I)
        ENDIF
130 CONTINUE

    READ (LUN2,*) (TEMP(I), I=1,4)
    DO 132 I = 1, 4
        IF (TEMP(I) .NE. FRACUT(I)) THEN
            WRITE (LUN,10) FRACUT(I), TEMP(I), 'FRACUT(n)'
            FRACUT(I) = TEMP(I)
        ENDIF
132 CONTINUE

    READ (LUN2,*) (TEMP(I), I=1,4)
    DO 140 I = 1, 4
        IF (TEMP(I) .NE. SHORWI(I)) THEN
            WRITE (LUN,10) SHORWI(I), TEMP(I), 'SHORWI(n)'
            SHORWI(I) = TEMP(I)
        ENDIF
140 CONTINUE

    READ (LUN2,*) RTEMP
    IF (RTEMP .NE. INGWAT) THEN
        WRITE (LUN,10) INGWAT, RTEMP, 'INGWAT'
        INGWAT = RTEMP
```

ENVIN

```
ENDIF

READ (LUN2,*) RTEMP
IF (RTEMP .NE. TCWS) THEN
  WRITE (LUN,10) TCWS, RTEMP, 'TCWS'
  TCWS = RTEMP
ENDIF

READ (LUN2,*) (TEMP(I), I=1,3)
DO 150 I = 1, 3
  IF (TEMP(I) .NE. YELDBT(I)) THEN
    WRITE (LUN,10) YELDBT(I), TEMP(I), 'YELDBT(n)'
    YELDBT(I) = TEMP(I)
  ENDIF
150 CONTINUE

READ (LUN2,*) (TEMP(I), I=1,3)
DO 160 I = 1, 3
  IF (TEMP(I) .NE. TOTEXC(I)) THEN
    WRITE (LUN,10) TOTEXC(I), TEMP(I), 'TOTEXC(n)'
    TOTEXC(I) = TEMP(I)
  ENDIF
160 CONTINUE

DO 170 J = 1,3
  READ (LUN2,*) (TEMP(I), I=1,6)
  DO 172 I = 1, 6
    IF (TEMP(I) .NE. EXCAV(I,J)) THEN
      WRITE (LUN,10) EXCAV(I,J), TEMP(I), 'EXCAV(n)'
      EXCAV(I,J) = TEMP(I)
    ENDIF
  172 CONTINUE
170 CONTINUE

READ (LUN2,*) RTEMP
IF (RTEMP .NE. RINH) THEN
  WRITE (LUN,10) RINH, RTEMP, 'RINH'
  RINH = RTEMP
ENDIF

READ (LUN2,*) RTEMP
IF (RTEMP .NE. RINHA) THEN
  WRITE (LUN,10) RINHA, RTEMP, 'RINHA'
  RINHA = RTEMP
ENDIF

READ (LUN2,*) ITEMP
IF (ITEMP .NE. NDIST) THEN
  WRITE (LUN,30) NDIST, ITEMP, 'NDIST'
```

ENVIN

```
NDIST = ITEMP
ENDIF

READ (LUN2,*) (TEMP(I), I=1,10)
DO 180 I = 1, 10
  IF (TEMP(I) .NE. X(I)) THEN
    WRITE (LUN,40) X(I), TEMP(I), 'Distance ', I
    X(I) = TEMP(I)
  ENDIF
180 CONTINUE

READ (LUN2,*) (TEMP(I), I=1,10)
DO 182 I = 1, 4
  IF (TEMP(I) .NE. DRYFAC(I)) THEN
    WRITE (LUN,40) X(I), TEMP(I), 'DRYFAC ', I
    DRYFAC(I) = TEMP(I)
  ENDIF
182 CONTINUE

DO 184 I = 1, 6
  IF (TEMP(I+4) .NE. DRYFA2(I)) THEN
    WRITE (LUN,40) X(I), TEMP(I+4), 'DRYFA2 ', I
    DRYFA2(I) = TEMP(I+4)
  ENDIF
184 CONTINUE

RETURN
```

C---- Error Messages -----

```
97 CALL FILERR (1, LUN2, 'In REDFLT')
98 CALL FILERR (3, LUN2, 'In REDFLT')
99 CALL FILERR (2, LUN2, 'In REDFLT')
```

C---- Format Statements -----

```
1 FORMAT (A8)
10 FORMAT (' Default value changed from ',1P,E9.1,' to ',E9.1,
.         ' for parameter ',A10)
20 FORMAT (' Default value changed from ',L8,' to ',L8,
.         ' for parameter ',A10)
30 FORMAT (' Default value changed from ',I8,' to ',I8,
.         ' for parameter ',A10)
40 FORMAT (' Default value changed from ',1P,E9.1,' to ',E9.1,
.         ' for ',A10,I2)
11 FORMAT (A10/A10)
111 FORMAT (A10/A10/A10)
1111 FORMAT (A10/A10/A10/A10)
```

ENVIN

11111 FORMAT (A10/A10/A10/A10/A10)

C-----

END

ENVIN

```
C-----
C
C      SUBROUTINE RITENV
C
C      Write ENV and DOSE programs input file.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 3-Aug-88  BAN
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      I      - Radionuclide loop index
C      J      - Input concentration loop index
C-----

      INCLUDE 'AFPPAR.CMN'
      INCLUDE 'AIRPAR.CMN'
      INCLUDE 'ANMPAR.CMN'
      INCLUDE 'AUPAR.CMN'
      INCLUDE 'DECAY.CMN'
      INCLUDE 'ENVPAR.CMN'
      INCLUDE 'EXTPAR.CMN'
      INCLUDE 'FODPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'LABELS.CMN'
      INCLUDE 'RADIN.CMN'
      INCLUDE 'SOLPAR.CMN'
      INCLUDE 'SWPAR.CMN'
      INCLUDE 'TIMES.CMN'

      LUN = 11
      CALL OPNFIL (2,3,LUN)

C---- Write input options and general parameters -----

      WRITE (LUN,11) OUTEDE, OUTRAD, OUTPTH, DEBUG,
      .              NEAR, POPDOS, ACUTE, ONEDOS, AEDE, MAXDOS, CUMDOS,
      .              DOSTYP, RELTRM, BASIC, DERIVE, AIRCN, DEEP,
      .              FINITE
11  FORMAT (11L3,I3,6L3,T60,'Reports, options...')

      WRITE (LUN,74) ICH, IUNIT, SOLUNT, NUCTOT, POPOPT, POPT
74  FORMAT (5I3,1PE10.3,T60,'No of chains...')
      WRITE (LUN,83) (IOFNUC(I),I=1,ICH)
```

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```
83 FORMAT (25I3)
   WRITE (LUN,72) (ELTT(IN), AWT(IN),IN=1,NUCTOT)
72 FORMAT (9(A2,A6)/)
   WRITE (LUN,10) AIR, SWAT, BIOT, BURWAS
10 FORMAT (4L3,T60, 'Transport modes')

   WRITE (LUN,12) PATH, RECRE, AQFOOD, TFOOD, ANFOOD
12 FORMAT (28L2,T60, 'Exposure paths')

   WRITE (LUN,13) NTKEND, DCEND, RELEND, BEFAIR, BEFIRR
13 FORMAT(1P,3E9.2,0P,2I9,T60, 'Time periods')

   IF (NEAR) WRITE (LUN,14) BEFORE, LOIC, RF1, RF2, MANULR, FRSIZ
14 FORMAT (1P,E9.2,0P,I9,1P,4E9.2, T60, 'Near field')

   WRITE (LUN,114) NDIST, (X(I),I=1,NDIST)
114 FORMAT (I9,1P,5E9.2,T60, 'Distances'/5E9.2)
```

C---- Write air transport parameters -----

```
IF (AIR) THEN
  WRITE (LUN,15) STACK, XOQOPT, SHITE, SFLOW, XOQI, SRAD,
  .             ETEMP, MIDIST, MIDIR, EFFSTK, JFIN, TTAIRI,
  .             MIUBAR, IRELES, BUILDX, BUILDH
  WRITE (LUN, 16) TPOPS, (TTAIR(I),I=1,NDIST)
```

```
IF (.NOT. POPDOS) THEN
  IF (FINITE) WRITE (LUN,16) (DRFSAV(J), J=1,6)
```

```
ELSEIF (XOQOPT .GT. 1) THEN
  IF (FINITE) THEN
    WRITE (LUN,16) ((PWTX(I,J),J=1,6), I=1,NDIST)
  ENDIF
  WRITE (LUN,16) (PWT(I),I=1,NDIST)
ENDIF
```

ENDIF

```
15 FORMAT (L9,I9,1P,4E9.2,T60, 'Air transport'/2E9.2,0P,I9,2L9,1PE9.2,
  .       /E9.2,0P,I9,1P,2E9.2)
16 FORMAT (6E9.2)
```

C---- Write surface water transport values -----

```
IF (SWAT) THEN
  WRITE (LUN,18) MIXFLG, MIXR, SWFLDW, SWTT
  IF (MIXFLG .GT. 0) WRITE (LUN,17)
  .             SWQB, SWLSX, SWOSY, SWDPTH, SWIDTH, SWDZ
ENDIF
```

ENVIN

```
18 FORMAT (I9,1P,3E9.2,T60,'Surface water')
17 FORMAT (1P,6E9.2)
```

C---- Write waste form availability parameters -----

```
IF (BURWAS .OR. BIOT .OR. DEEP)
. WRITE (LUN,19) PACKHL, WASDEP, OVRBRD
19 FORMAT (1P,3E9.2,T60,'Waste availability')
```

C---- Write biotic transport values -----

```
IF (BIOT) WRITE (LUN,20) BTPRE, BTNTK, BTDSET, NONAG
20 FORMAT (2L9,I9,L9,T60,'Biotic transport')
```

C---- Write external exposure values -----

```
WRITE (LUN,30) HRPLUM, FRCLD
30 FORMAT (1P,2E9.2,T60,'External')
IF (GROUND) WRITE (LUN,31) HRGRD, RESIRR, IRRSR, RIRRR, IRTIMR
31 FORMAT (1P,E9.2,OP,L9,I9,1P,2E9.2,T60,'Ground External')
IF (RECRE) WRITE (LUN,32) HRSWIM, HRBOAT, HRSHOR, SHRTYP, RECTT
32 FORMAT (1P,3E9.2,OP,I9,1P,E9.2, T60,'Recreation')
```

C---- Write inhalation values -----

```
IF (INHAL) THEN
WRITE (LUN,24) HRINH, IRES, AVALSL, XMLF
24 FORMAT (1PE9.2,OP,I9,1P,2E9.2,T60,'Inhalation')
ENDIF
```

C---- Write ingestion population values -----

```
WRITE (LUN,23) FOQOPT, FOQ, AQUPOP, DWPOP, EXPORT
23 FORMAT (I9,1P,3E9.2,L9,T60,'Ingestion population')
```

C---- Write drinking water values -----

```
IF (DRINK) WRITE (LUN,22) DWUSAG, DWSRC, DWTRET, HOLDDW
22 FORMAT (1P,E9.2,OP,I9,L9,1P,E9.2,T60,'Drinking water')
```

C---- Write aquatic foods values -----

```
IF (AQFOOD) THEN
WRITE (LUN,60) (AQF(IAQ),IAQ=1,NAQ), ISALT
60 FORMAT (5L3,T60,'Aquatic foods')
DO 110 IAQ = 1, NAQ
IF (AQF(IAQ)) WRITE (LUN,61)
AQUQT(IAQ), TPRODQ(IAQ),
```


ENVIN

```

                                HLDUP2(IAQ), USAG(IAQ), AQFLAB(IAQ)
110  CONTINUE
    ENDIF
    61  FORMAT (1P, 4E9.2, T60, A8)

C---- Write terrestrial food values -----

    IF (TFOOD) THEN
        WRITE (LUN,64) (TFD(ITF),ITF=1,NTF)
    64  FORMAT (4L3,T60,'Terrestrial food')
        DO 120 ITF = 1, NTF
            IF (TFD(ITF)) WRITE (LUN,65) GRWP(ITF),
                .           IRRST(ITF), RIRR(ITF), IRTIMT(ITF),
                .           YELD(ITF), TPRODT(ITF), HLDUP(ITF), CONS(ITF),
                .           PLTLAB(ITF)
120  CONTINUE
    ENDIF
    65  FORMAT (F6.1, 2X, I1, F6.1, F7.1, 1X, F7.1, 2X, E8.2,
        .       2X, F6.1, 1X, 1P, E8.2, T60, A8)

C---- Write animal product values -----

    IF (ANFOOD) THEN
        WRITE (LUN,70) (ANF(IAN),IAN=1,NAN)
    70  FORMAT (4L3,T60,'Animal Products')
        DO 130 IAN = 1, NAN
            IF (ANF(IAN)) THEN
                WRITE (LUN,71) CONS2(IAN), HLDUPA(IAN), TPRODA(IAN),
                .           DWFACA(IAN), ANMLAB(IAN)
                WRITE (LUN,73)
                .           DIETFR(IAN), GRWPA(IAN), IRRSA(IAN), RIRRA(IAN),
                .           IRTIMA(IAN), YELDA(IAN), STORTM(IAN), ANMLAB(IAN)
            ENDIF
130  CONTINUE
            IF (ANF(1)) WRITE (LUN,73)
            .           DIETFR(5), GRWPA(5), IRRSA(5), RIRRA(5),
            .           IRTIMA(5), YELDA(5), STORTM(5), ANMLAB(1)
            IF (ANF(3)) WRITE (LUN,73)
            .           DIETFR(6), GRWPA(6), IRRSA(6), RIRRA(6),
            .           IRTIMA(6), YELDA(6), STORTM(6), ANMLAB(3)
        ENDIF

    71  FORMAT (1P4E9.2, T70, A8)
    73  FORMAT (1P2E9.2, OPI9, 1P4E9.2, T70, A8)

C---- Write default parameter values -----

    WRITE (LUN, 67) PRCNTI, HARVST,
    .           NVU, SVU, DPVRES, LEAFRS, DEPFR1, DEPFR2, SURCM,
```

ENVIN

```
.      SLDN, SSLDN, SOLING, WTIM, TRANS, TRANSA, CONSUM,  
.      DWATER, FRACUT, SHORWI, INGWT, TCWS, YELDBT,  
.      TOTEXC, EXCAV, RINH, RINHA, BIOMAS, BIOMA2,  
.      DRYFAC, DRYFA2
```

```
67 FORMAT (I9,L9,1P,4E9.2 / 50(6E9.2/))
```

C---- Write inventory parameters -----

```
      I = 0  
      DO 101 K1 = 1, ICH  
        WRITE (LUN,82) K1  
82     FORMAT (T60,'Chain No.:',I3)  
        DO 100 K2 = 1, IOFNUC(K1)  
          I = I + 1  
          WRITE (LUN,75) ELTT(I), AWT(I), BONET(I), CLASST(I),  
            ICLASS(I)  
  
          IF (RELTRM) WRITE (LUN,41) (CASQ(J,I),J=1,3)  
          IF (BASIC) WRITE (LUN,42) (CASCON(J,I), J=1,5)  
          IF (DERIVE) WRITE (LUN,43) (CASCON(J,I), J=6,9)  
  
          WRITE (LUN,76) HLT(I), ALT(I), IFRT(1,I), IFRT(2,I), DKT(1,I),  
            DKT(2,I)  
          WRITE (LUN,77) DPVLT(I), LEACHT(I), (BVIT(J,I),J=1,NTF)  
          WRITE (LUN,78) (FMIT(J,I), J=1,6), 'FMIT'  
          WRITE (LUN,79) (BIOACT(J,I),J=1,NAN), DWCLET(I)  
          IF (FINITE) WRITE (LUN,7B) (GAMMAT(J,I), J=1,6), 'EDIS'  
100    CONTINUE  
101    CONTINUE  
  
41     FORMAT (3E9.2, T60, 'Release terms')  
42     FORMAT (5E9.2, T60, 'Basic concentration')  
43     FORMAT (4E9.2, T60, 'Derived concentration')  
  
75     FORMAT (' ',A2, A6, 2A3, I3)  
76     FORMAT (1P,2E9.2,0P, 2I9, 1P,2E9.2,T60,'HLT, ALT, IFRT, DKT')  
77     FORMAT (1P,6E9.2,T60,'DPVLT, LEACHT, BVIT')  
78     FORMAT (1P,6E9.2,T60,A4)  
79     FORMAT (1P,5E9.2,T60,'BIOACT, DWCLET')
```

RETURN

C---- Error Messages -----

```
98 CALL FILERR (2, LUN, 'In RITENV')
```

C-----

END

ENVIN

```
C-----
C
C      SUBROUTINE RITQA
C
C      Write input parameters report.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 18-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      I          - Radionuclide loop index
C      J          - Input concentration loop index
C      LUN        - Logical unit device number
C      FOQLAB()   - Descriptions of each FOQ input option
C      FILDAT     - Character string containing date of file generation
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'AQUPAR.CMN'
C      INCLUDE 'ENVPAR.CMN'
C      INCLUDE 'EXTPAR.CMN'
C      INCLUDE 'FILES.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'INVIN.CMN'
C      INCLUDE 'LABELS.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'SWPAR.CMN'
C      INCLUDE 'TIMES.CMN'
C      INCLUDE 'TITL.CMN'
C
C      CHARACTER FOQLAB(4)*35, ADIR(16)*3, FILDAT*8
C      DATA FOQLAB /'0 - Use food-weighted chi/Q',
C      .             '1 - Use population-weighted chi/Q',
C      .             '2 - Use uniform distribution',
C      .             '3 - Use chi/Q and production grids'/
C      DATA ADIR /'S ', 'SSW', 'SW ', 'WSW', 'W ', 'WNW', 'NW ', 'NNW',
C      .           'N ', 'NNE', 'NE ', 'ENE', 'E ', 'ESE', 'SE ', 'SSE'/
C
C      LUN = 6
C      CALL OPNFIL (2,0,LUN)
```

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CALL HEADNG (LUN)

C---- Write input options -----

WRITE (LUN,*,ERR=98) ' '

IF (NEAR) THEN
 WRITE (LUN,2)
ELSE
 WRITE (LUN,3)
ENDIF

IF (ACUTE) THEN
 WRITE (LUN,'(T12,A)') 'Release is acute'
ELSE
 WRITE (LUN,'(T12,A)') 'Release is chronic'
ENDIF

IF (POPDOS) THEN
 IF (INHAL .OR. GROUND .OR. RECRE .OR. AIREXT .OR. FINITE
 .OR. SLING) THEN
 WRITE (LUN,5) POPT
 ELSE
 WRITE (LUN,'(T12,A)') 'Population dose'
 ENDIF
ELSE
 WRITE (LUN,'(T12,A)') 'Individual dose'
ENDIF

IF (AIR .OR. SWAT .OR. BIOT .OR. BURWAS) THEN
 WRITE (LUN,4) 'TRANSPORT MODES ARE CONSIDERED'
 IF (AIR) WRITE (LUN,1) 'Air'
 IF (SWAT) WRITE (LUN,1) 'Surface Water'
 IF (BIOT) WRITE (LUN,1) 'Biotic Transport'
 IF (BURWAS) WRITE (LUN,1) 'Waste Form Degradation'
ENDIF

WRITE (LUN,4) 'EXPOSURE PATHS ARE CONSIDERED:'

IF (FINITE) THEN
 WRITE (LUN,1) 'Finite plume, external'
ENDIF
IF (AIREXT) THEN
 WRITE (LUN,1) 'Infinite plume, external'
ENDIF

IF (GROUND) WRITE (LUN,1) 'Ground, external'
IF (RECRE) WRITE (LUN,1) 'Recreation, external'
IF (INHAL) WRITE (LUN,1) 'Inhalation uptake'

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```
IF (DRINK) WRITE (LUN,1) 'Drinking water ingestion'
IF (AQFOOD) WRITE (LUN,1) 'Aquatic foods ingestion'
IF (TFOOD) WRITE (LUN,1) 'Terrestrial foods ingestion'
IF (ANFOOD) WRITE (LUN,1) 'Animal product ingestion'
IF (SLING) WRITE (LUN,1) 'Inadvertent soil ingestion'

WRITE (LUN,4) 'TIMES ARE USED:'
WRITE (LUN,322) NTKEND
WRITE (LUN,22) DCEND
IF (RELTRM .AND. .NOT. ACUTE .AND. (AIR .OR. SWAT))
.  WRITE (LUN,122) RELEND
  IF (BEFAIR .GT. 0.0) WRITE (LUN,23) BEFAIR
  IF (BEFIRR .GT. 0.0) WRITE (LUN,24) BEFIRR
322 FORMAT (T17,'Intake ends after (yr): ',F7.1)
  22 FORMAT (T17,'Dose calculations ends after (yr): ',F7.1)
122 FORMAT (T17,'Release ends after (yr): ',F7.1/)
  23 FORMAT (T12,I7,' years of air deposition prior ',
. 'to the intake period')
  24 FORMAT (T12,I7,' years of irrigation water ',
. 'deposition prior to the intake period')

  1 FORMAT (' ',T17, A)
  2 FORMAT (T12,'This is a near field (narrowly-focused, ',
. 'single site) scenario.')
  3 FORMAT (T12,'This is a far-field (wide-scale release, ',
. 'multiple site) scenario.')
  4 FORMAT (/T12,'THE FOLLOWING ',A)
  5 FORMAT (T12,'Dose to exposed population of ',1PE10.3)
```

C---- Write titles of files used for this case -----

```
WRITE (LUN,16)
CALL GETDAT (5, FILDAT)
WRITE (LUN,117) INFILN, FILDAT
CALL GETDAT (22, FILDAT)
WRITE (LUN,117) TITLS(22) (1:68), FILDAT
CALL GETDAT (2, FILDAT)
WRITE (LUN,117) TITLS(2) (1:68), FILDAT

IF (TFOOD .OR. ANFOOD) THEN
  CALL GETDAT (8, FILDAT)
  WRITE (LUN,117) TITLS(8) (1:68), FILDAT
ENDIF
IF (AQFOOD .OR. DRINK) THEN
  CALL GETDAT (9, FILDAT)
  WRITE (LUN,117) TITLS(9) (1:68), FILDAT
ENDIF
CALL GETDAT (10, FILDAT)
WRITE (LUN,117) TITLS(10) (1:68), FILDAT
```

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```
CALL GETDAT (37, FILDAT)
WRITE (LUN,117) TITLS(37) (1:68), FILDAT

IF (POPDOS .AND. POPOPT .EQ. 1) THEN
  WRITE (LUN,17) TITLS(27)
ELSEIF (.NOT. POPDOS .AND. AIR .AND. XOQOPT .EQ. 2) THEN
  WRITE (LUN,17) TITLS(27)
ENDIF
IF (AIR .AND. XOQOPT .NE. 1 .AND. JFIN) WRITE (LUN,17) TITLS(23)
IF (AIR .AND.
. ((XOQOPT .NE. 1 .AND. .NOT. JFIN) .OR. FOQOPT .EQ. 3))
. WRITE (LUN,17) TITLS(24)
IF ((TFOOD .OR. ANFOOD) .AND. FOQOPT .EQ. 3)
. WRITE (LUN,17) TITLS(29)

16 FORMAT (/10('='),' FILENAMES AND TITLES OF FILES/LIBRARIES USED ',
.      23('='))
17 FORMAT (' ',A78)
117 FORMAT (' ',A68,' ',A8)
18 FORMAT (' Input file name: ',A30)
```

C---- Write inventory report -----

```
WRITE (LUN,85)
IF (BASIC) WRITE (LUN,19) SOLUNT

IF (RELTRM) THEN
  WRITE (LUN,13) UNIT1(IUNIT), UNIT1(IUNIT), UNIT1(IUNIT)
  DO 100 I = 1, NIN
    WRITE (LUN,12) ELTI(I), AWI(I), (QIN(J,I),J=1,3)
100  CONTINUE
  ENDIF

IF (BASIC) THEN
  WRITE (LUN,14) UNIT1(IUNIT), UNIT1(IUNIT), UNIT3(SOLUNT),
.      UNIT1(IUNIT), UNIT1(IUNIT), UNIT1(IUNIT)
  DO 101 I = 1, NIN
    WRITE (LUN,12) ELTI(I), AWI(I), (CONCIN(J,I), J=1,5)
101  CONTINUE
  ENDIF

IF (DERIVE) THEN
  WRITE (LUN,15) UNIT1(IUNIT), UNIT1(IUNIT), UNIT1(IUNIT),
.      UNIT1(IUNIT)
  DO 102 I = 1, NIN
    WRITE (LUN,12) ELTI(I), AWI(I), (CONCIN(J,I), J=6,9)
102  CONTINUE
  ENDIF
```

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19 FORMAT(' ',I2,T12,'Surface soil input unit: (1-m2, 2-m3, 3-kg)')

12 FORMAT (' ',T12,A2, A6, 1P, 9E8.1)

13 FORMAT (/,
.T12,'----- ----Release Terms-----'/
.T12,'Release Surface Buried'/
.T12,'Radio- Air Water Source'/
.T12,'nuclide ',A3,'/yr ',A3,'/yr ',A3,'/m3'/
.T12,'-----')
)

14 FORMAT (/,
.T12,'----- ----Basic Concentrations-----'/
.T12,'Release Surface Deep Ground Surface'/
.T12,'Radio- Air Soil Soil Water Water '/
.T12,'nuclide ',A3,'/L ',A3,'/',A2,' ',A3,'/m3 ',A3,'/L ',
. A3,'/L '/
.T12,'-----')
)

15 FORMAT (/,
.T12,'----- ----Derived Concentrations-----'/
.T12,'Release Terres. Animal Drink Aquatic'/
.T12,'Radio- Plant Product Water Food '/
.T12,'nuclide ',A3,'/kg ',A3,'/kg ',A3,'/L ',A3,'/kg '/
.T12,'-----')
)

C---- Write near-field parameters -----

```
IF (NEAR) WRITE (LUN,20) BEFORE, LOIC, RF1, RF2, MANULR
IF (NEAR .AND. GROUND .AND. FRSIZ .GT. 0.0)
.  WRITE (LUN,201) FRSIZ
```

20 FORMAT (/10('='),' NEAR-FIELD PARAMETERS ',46('='))/,
.F7.1,T12,'Inventory disposed n years prior to beginning of ',
. 'intake period'/
.I7,T12,'LOIC occurred n years prior to beginning of intake ',
. 'period',1P,
.E7.1,T12,'Fraction of roots in upper soil (top 15 cm)'/
.E7.1,T12,'Fraction of roots in deep soil'/
.E7.1,T12,'Manual redistribution: deep soil/surface soil ',
. 'dilution factor')

201 FDRMAT (F7.1,T12,
. 'Source area for external dose modification factor (m2)')

C---- Write air transport values -----

```
IF (AIR) THEN
```

ENVIN

```
WRITE (LUN,211)
IF (XOQOPT .NE. 1) THEN
  IF (JFIN) THEN
    WRITE (LUN,220)
  ELSE
    WRITE (LUN,221)
  ENDIF
ENDIF

IF (ACUTE) THEN
  IF (XOQOPT .EQ. 1) THEN
    IF (POPDOS) THEN
      WRITE (LUN,222) XOQI
    ELSE
      WRITE (LUN,223) XOQI
    ENDIF
  ELSEIF (XOQOPT .EQ. 3) THEN
    IF (POPDOS) THEN
      WRITE (LUN,224) MIDIR, ADIR(MIDIR)
    ELSE
      WRITE (LUN,219) MIDIST, MIDIR, ADIR(MIDIR)
    ENDIF
  ENDIF
ENDIF

ELSE
  Chronic--
  IF (XOQOPT .EQ. 1) THEN
    IF (POPDOS) THEN
      WRITE (LUN,217) XOQI
    ELSE
      WRITE (LUN,216) XOQI
    ENDIF
  ELSEIF (XOQOPT .EQ. 2) THEN
    WRITE (LUN,215)
  ELSEIF (XOQOPT .EQ. 3) THEN
    WRITE (LUN,219) MIDIST, MIDIR, ADIR(MIDIR)
  ENDIF
ENDIF

IF (XOQOPT .NE. 1) THEN
  IF (EFFSTK) THEN
    WRITE (LUN,212) SHITE
  ELSEIF (SHITE .EQ. 0.0) THEN
    WRITE (LUN,213)
  ELSE
    WRITE (LUN,214) SHITE, SFLOW, SRAD, ETEMP
  ENDIF
ENDIF
```


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ENDIF

```
IF (IRELES .GT. 1) THEN
  WRITE (LUN,225)
  IF (IRELES .EQ. 2) THEN
    WRITE (LUN,226)
  ELSE
    WRITE (LUN,227)
  ENDIF
  WRITE (LUN,228) BUILDX, BUILDH
ENDIF
```

```
211 FORMAT (/10('='), ' AIR TRANSPORT ',54('='))
212 FORMAT (1PE7.1,T12,'Effective stack height (m)')
213 FORMAT (T12,'Ground level release.')
214 FORMAT (1PE7.1,T12,'Stack height (m)'/
.      E7.1,T12,'Stack flow (m3/s)'/
.      E7.1,T12,'Stack radius (m)'/
.      E7.1,T12,'Effluent temperaure (degrees C)')
215 FORMAT (T12,'MI distance, direction, and chi/Q will be selected ',
.      'by the program.')
216 FORMAT (1PE7.1,T12,'Input chi/Q value (s/m3)')
217 FORMAT (1PE7.1,T12,
.      'Input population-weighted chi/Q value (s/m3)')
219 FORMAT (1PE7.1,T12,'Maximum individual distance from release ',
.      'point (m)'/
.      E7.1,T12,'Maximum individual sector index (Wind Toward ',
.      A3,')')
220 FORMAT (T12,'Joint frequency data input.')
221 FORMAT (T12,'Chi/Q data input.')
222 FORMAT (1PE7.1,T12,
.      'Input population-weighted E/Q value (s/m3)')
223 FORMAT (1PE7.1,T12,'Input E/Q value (s/m3)')
224 FORMAT (1PE7.1,T12,'Sector index (Wind Toward ',A3,')')
225 FORMAT (T12,'Building Wake Model used.')
226 FORMAT (T12,'Release from vent or short stack on building roof')
227 FORMAT (T12,'Release from Building Below Roof')
228 FORMAT (1PE7.1,T12,'Building cross-sectional area (m2)'/
.      E7.1,T12,'Building height (m)')
```

C---- Write surface water transport values -----

```
IF (SWAT) THEN
  WRITE (LUN,40) MIXFLG, SWTT
  WRITE (LUN,43) SWFLOW
  IF (MIXFLG .EQ. 0) THEN
    WRITE (LUN,41) MIXR
  ELSE
```

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```
      WRITE (LUN,42) SWQB, SWLSX, SWOSY, SWDPTH
    ENDIF
    IF (MIXFLG .EQ. 1) WRITE (LUN,44) SWIDTH
    IF (MIXFLG .EQ. 2) WRITE (LUN,45) SWDZ
  ENDIF
```

```
40 FORMAT (/10('='),' SURFACE WATER TRANSPORT ',44('='))/,
. ' ',I7,T12,'Mixing ratio model:',
. ' 0-use value, 1-river, 2-lake, 3-river flow',1P,
. ' ',E7.1,T12,'Transit time to irrigation withdrawal ',
. 'location (h)')
41 FORMAT (' ',1PE7.1,T12,'Mixing ratio, dimensionless')
42 FORMAT (' ',E7.1,T12,'Rate of effluent discharge to receiving ',
. 'water body (m3/s)'/
. ' ',E7.1,T12,'Longshore distance from release point to ',
. 'usage location (m)'/
. ' ',E7.1,T12,'Offshore distance to the water intake (m)'/
. ' ',E7.1,T12,'Average water depth in surface water body (m)')
43 FORMAT (' ',1PE7.1,T12,'Average water flow rate for: MIXFLG=1,2 ',
. '(m/s), MIXFLG=0,3 (m3/s)')
44 FORMAT (' ',E7.1,T12,'Average river width (m)')
45 FORMAT (' ',E7.1,T12,'Depth of effluent discharge point to ',
. 'surface water (m)')
```

C---- Write waste form availability values -----

```
      IF (BURWAS .OR. BIOT .OR. DEEP)
. WRITE (LUN,21) PACKHL, WASDEP, OVRBRD
21 FORMAT (/10('='),' WASTE FORM AVAILABILITY ',43('='))/,1P,
. E7.1, T12,'Waste form/package half life, yr'/
. E7.1,T12,'Thickness of buried waste, m'/
. E7.1,T12,'Depth of soil overburden, m')
```

C---- Write biotic transport values -----

```
      IF (BIOT) THEN
        WRITE (LUN,46)
        IF (BTPRE) WRITE (LUN,47)
        IF (BTNTK) WRITE (LUN,48)
        WRITE (LUN,49) BTDSET
      ENDIF

46 FORMAT (/10('='),' BIOTIC TRANSPORT OF BURIED SOURCE ',33('='))
47 FORMAT (' ',T12,'Is considered during inventory decay/buildup ',
. 'period.')
48 FORMAT (' ',T12,'Is considered during intake period.')
49 FORMAT (
. ' ',I7,T12,'Pre-Intake conditions: 1-Arid Non Ag,2-Humid Non Ag',
```

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, ' 3-Agriculture')

C---- Write external exposure values -----

IF (GROUND .OR. AIREXT .OR. FINITE .OR. RECRE) THEN

WRITE (LUN,80)

IF (AIREXT .OR. FINITE) THEN

IF (ACUTE) THEN

WRITE (LUN,81) FRCLD

ELSE

WRITE (LUN,82) HRPLUM

ENDIF

ENDIF

IF (GROUND) THEN

WRITE (LUN,83) HRGRD

IF (SWAT .OR. BAS(4) .OR. BAS(5)) THEN

IF (IRRSR .GT. 0) THEN

WRITE (LUN,86) IRRSR, RIRRR, IRTIMR

ELSE

WRITE (LUN,'(T12,A)')

. 'Residential irrigation not considered.'

ENDIF

ENDIF

ENDIF

IF (RECRE) THEN

WRITE (LUN,84) HRSWIM, HRBOAT, HRSHOR, SHRTYP

IF (SWAT) WRITE (LUN,87) RECTT

ENDIF

ENDIF

80 FORMAT (/10('='),' EXTERNAL EXPOSURE ',50('='))

81 FORMAT (' ',1PE7.1,T12,'Fraction of time spent in cloud')

82 FORMAT (' ',1PE7.1,T12,'Hours of exposure to plume')

83 FORMAT (' ',1PE7.1,T12,'Hours of exposure to ground ',

. 'contamination')

84 FORMAT (' ',1P,E7.1,T12,'Hours of exposure from swimming'/

. ' ',E7.1,T12,'Hours of exposure from boating'/

. ' ',E7.1,T12,'Hours of exposure from shoreline activities'/

. ' ',0P,I7,T12,'Shoreline type: 1-river, 2-lake, 3-ocean, ',

. '4-tidal basin')

86 FORMAT (' ',I7,T12,'Residential irrigation source ',

. '1-ground water, ', '2-surface water'/

. ' ',1PE7.1,T12,'Residential irrigation application rate (in/yr)'/

. ' ',E7.1,T12,'Residential irrigation duration (mo/yr)')

87 FORMAT (' ',1PE7.1,T12,'Surface water transit time to ',

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.'recreational site (h)')

C---- Write inhalation values -----

```
IF (INHAL) THEN
  WRITE (LUN,59) HRINH
  IF (IRES .GT. 0) THEN
    WRITE (LUN,30) IRES
    IF (IRES .EQ. 2) THEN
      WRITE (LUN, 31) AVALSL
    ELSEIF (IRES .EQ. 1) THEN
      WRITE (LUN, 32) XMLF
    ENDIF
  ELSE
    WRITE (LUN,'(T12,A)') 'Resuspension not considered'
  ENDIF
ENDIF

59 FORMAT (/10('='),' INHALATION ',57('='))/, 1P,
. ' ',E7.1,T12,'Hours of exposure to contamination per year')
30 FORMAT (' ',I7, T12,'Resuspension model: 1-Mass Loading, ',
. '2-Anspaugh')
31 FORMAT (' ',1P, E7.1, T12,'Top soil available (cm)')
32 FORMAT (' ',1P, E7.1, T12, 'Mass loading factor (g/m3)')
```

C---- Write ingestion population values -----

```
IF ((AIR .AND. (TFOOD .OR. ANFOOD)) .OR.
. (POPDOS .AND. (AQFOOD .OR. DRINK))) WRITE (LUN,57)
IF (AIR .AND. (TFOOD .OR. ANFOOD)) THEN
  WRITE (LUN,53) FOQOPT, FOQLAB(FOQOPT+1)
  IF (FOQOPT .EQ. 0) WRITE (LUN,54) FOQ
ENDIF

IF (POPDOS) THEN
  IF (AQFOOD) WRITE (LUN,55) AQUPOP
  IF (DRINK) WRITE (LUN,56) DWPOP
  IF (TFOOD .OR. ANFOOD .OR. AQFOOD) THEN
    IF (EXPORT) THEN
      WRITE (LUN,'(T12,A)')
      . 'Dose from food exported out of region considered.'
    ELSEIF (IMPORT) THEN
      WRITE (LUN,'(T12,A)')
      . 'Uncontaminated food imported into region considered.'
    ELSE
      WRITE (LUN,'(T12,A)')
      . 'Food production in region assumed to equal consumption.'
```

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```
ENDIF
ENDIF
ENDIF
```

```
53 FORMAT (' ',I7,T12,'Atmospheric production definition: ',A35)
54 FORMAT (' ',1PE7.1,T12,'Food-weighted chi/Q (food s/m3)')
55 FORMAT (' ',1PE7.1,T12,'Population ingesting aquatic foods ',
.         '(person)')
56 FORMAT (' ',1PE7.1,T12,'Population ingesting drinking water ',
.         '(person)')
57 FORMAT (/10('='),' INGESTION POPULATION ',46('='))
```

C---- Write drinking water values -----

```
IF (DRINK) WRITE (LUN,52) DWUSAG, DWSRC, DWTRET, HOLDDW
```

```
52 FORMAT (/10('='),' DRINKING WATER SOURCE/IRRIGATION ',34('='),1P,/
.         ',E7.1,T12,'Drinking water consumption rate (l/yr)'/ OP,
.         ',I7,T12,'Drinking water source: 1-ground, 2-surface, ',
.         '3-system '/,
.         ',L7, T12,'Drinking water treatment: T/F'/
.         ',F7.1,T12,'Drinking water transit/holdup time (d)')
```

C---- Write aquatic foods values -----

```
IF (AQFOOD) THEN
  WRITE (LUN, 60)
  DO 110 IAQ = 1, NAQ
    IF (AQF(IAQ)) THEN
      IF (EXPORT .OR. IMPORT) THEN
        WRITE (LUN,61) AQFLAB(IAQ), AQUIT(IAQ), TPRODQ(IAQ),
.                   HLDUP2(IAQ), USAG(IAQ)
      ELSE
        WRITE (LUN,161) AQFLAB(IAQ), AQUIT(IAQ),
.                   HLDUP2(IAQ), USAG(IAQ)
      ENDIF
    ENDIF
  110 CONTINUE
ENDIF
```

```
60 FORMAT (/10('='),' AQUATIC FOODS INGESTION ', 43('='))//
.         T12,' TRAN-      PROD-      ----CONSUMPTION----'/
.         T12,'FOOD      SIT      UCTION      HOLDUP      RATE'/
.         T12,'TYPE      h      kg/yr      d      kg/yr'/
.         T12,'-----'//
```

```
61 FORMAT (11X, A8, 1P, 4E10.2)
161 FORMAT (11X, A8, 1P, E10.2, 10X, 2E10.2)
```

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C---- Write terrestrial food values -----

```
      IF (TFOOD) THEN
        WRITE (LUN,64)
        DO 120 ITF = 1, NTF
          IF (TFD(ITF)) THEN
            IF (EXPORT .OR. IMPORT) THEN
              WRITE (LUN,65) PLTLAB(ITF), GRWP(ITF),
                . IRRST(ITF), RIRR(ITF), IRTIMT(ITF),
                . YELD(ITF), TPRODT(ITF), HLDUP(ITF), CONS(ITF)
            ELSE
              WRITE (LUN,165) PLTLAB(ITF), GRWP(ITF),
                . IRRST(ITF), RIRR(ITF), IRTIMT(ITF),
                . YELD(ITF), HLDUP(ITF), CONS(ITF)
            ENDIF
          ENDIF
        120 CONTINUE
      ENDIF

      64 FORMAT (/10('='),' TERRESTRIAL FOOD INGESTION ',40('='),//
        .T12,'      GROW  --IRRIGATION--      PROD-' ,
        . '---CONSUMPTION--' /
        .T12,'FOOD      TIME  S RATE    TIME    YIELD  UCTION  ',
        . 'HOLDUP      RATE' /
        .T12,'TYPE      d      * in/yr  mo/yr    kg/m2   kg/yr   ',
        . 'd          kg/yr' /
        .T12,'-----' ,
        . '-----' )

      65 FORMAT (11X,A8, F6.1, 2X, I1, F6.1, F7.1, 1X, F7.1, 2X, 1P, E8.2,
        . OP, 2X, F6.1, 1PE9.1)
      165 FORMAT (11X,A8, F6.1, 2X, I1, F6.1, F7.1, 1X, F7.1, 2X,
        . 10X, F6.1, 1PE9.1)
```

C---- Write animal product values -----

```
      IF (ANFOOD) THEN
        WRITE (LUN, 70)
        DO 130 IAN = 1, NAN
          IF (ANF(IAN)) THEN
            IF (ACUTE .AND. NTKEND .EQ. 1) THEN
              IF (EXPORT .OR. IMPORT) THEN
                WRITE (LUN,75) ANMLAB(IAN), CONS2(IAN), HLDUPA(IAN),
                  . TPRODA(IAN), DWFACA(IAN), GRWPA(IAN), IRRSA(IAN),
                  . RIRRA(IAN), IRTIMA(IAN), YELDA(IAN), STORMT(IAN)
              ELSE
                WRITE (LUN,175) ANMLAB(IAN), CONS2(IAN), HLDUPA(IAN),
                  . DWFACA(IAN), GRWPA(IAN), IRRSA(IAN),
                  . RIRRA(IAN), IRTIMA(IAN), YELDA(IAN), STORMT(IAN)
              ENDIF
            ENDIF
          ENDIF
        130 CONTINUE
      ENDIF
```

ENVIN

```

ENDIF
ELSE
  IF (EXPORT .OR. IMPORT) THEN
    WRITE (LUN,71) ANMLAB(IAN), CONS2(IAN), HLDUPA(IAN),
      TPRODA(IAN), DWFACA(IAN), DIETFR(IAN), GRWPA(IAN),
      IRRSA(IAN), RIRRA(IAN), IRTIMA(IAN),
      YELDA(IAN), STORTM(IAN)
  ELSE
    WRITE (LUN,171) ANMLAB(IAN), CONS2(IAN), HLDUPA(IAN),
      DWFACA(IAN), DIETFR(IAN), GRWPA(IAN), IRRSA(IAN),
      RIRRA(IAN), IRTIMA(IAN), YELDA(IAN), STORTM(IAN)
  ENDIF
ENDIF
ENDIF
130 CONTINUE

  IF (ANF(1) .OR. ANF(3)) WRITE (LUN,72)

  IF (ACUTE .AND. NTKEND .EQ. 1) THEN
    IF (ANF(1)) WRITE (LUN,77) ANMLAB(1),
      GRWPA(5), IRRSA(5), RIRRA(5),
      IRTIMA(5), YELDA(5), STORTM(5)
    IF (ANF(3)) WRITE (LUN,77) ANMLAB(3),
      GRWPA(6), IRRSA(6), RIRRA(6),
      IRTIMA(6), YELDA(6), STORTM(6)
  ELSE
    IF (ANF(1)) WRITE (LUN,73) ANMLAB(1),
      DIETFR(5), GRWPA(5), IRRSA(5), RIRRA(5),
      IRTIMA(5), YELDA(5), STORTM(5)
    IF (ANF(3)) WRITE (LUN,73) ANMLAB(3),
      DIETFR(6), GRWPA(6), IRRSA(6), RIRRA(6),
      IRTIMA(6), YELDA(6), STORTM(6)
  ENDIF
ENDIF

  IF (ACUTE .AND. NTKEND .GT. 1) THEN
    WRITE (LUN,*) ' '
    WRITE (LUN,*)
    ' Note: Animal diet fraction for years 2 through ',NTKEND
  ENDIF

70 FORMAT (/10('='),' ANIMAL FOOD INGESTION ',45('='),//
  ' ---HUMAN--- TOTAL DRINK ',
  ' -----STORED FEED----- '/
  ' CONSUMPTION PROD- WATER ',
  ' DIET GROW -IRRIGATION-- STOR- '/
  ' FOOD RATE HOLDUP UCTION CONTAM ',
  ' FRAC- TIME S RATE TIME YIELD AGE '/
  ' TYPE kg/yr d kg/yr FRACT. ',

```

ENVIN

```
. 'TION d * in/yr mo/yr kg/m3 d '/'
. '-----'
. '-----'

72 FORMAT (/T41,'-----FRESH FORAGE-----')
71 FORMAT (A8, 2X, 1PE7.1, OPF6.1, 1PE7.1, OPF8.2,
. OPF6.1, F6.2, I3, F6.1, F6.1, F7.2, F6.1)
171 FORMAT (A8, 2X, 1PE7.1, OPF6.1, 7X, F8.2,
. OPF6.1, F6.2, I3, F6.1, F6.1, F7.2, F6.1)
73 FORMAT (A8, 30X, F6.2, F6.1, I3, F6.1, F6.1, F7.2, F6.1)

75 FORMAT (A8, 2X, 1PE7.1, OPF6.1, 1PE7.1, OPF8.2,
. F6.2, 6X, I3, F6.1, F6.1, F7.2, F6.1)
175 FORMAT (A8, 2X, 1PE7.1, OPF6.1, 7X, F8.2,
. 6X, F6.2, I3, F6.1, F6.1, F7.2, F6.1)
77 FORMAT (A8, 36X, F6.2, I3, F6.1, F6.1, F7.2, F6.1)

C---- Signature lines -----
WRITE (LUN,85)
85 FORMAT (/79('='))
WRITE(LUN,89)
89 FORMAT(///,'Input prepared by: _____',
. Date: _____, '//')
. 'Input checked by: _____',
. Date: _____, '//')
WRITE (LUN,85)

RETURN

C---- Error Messages -----
98 CALL FILERR (2, LUN, 'In RITQA')

C-----
END
C-----
C
SUBROUTINE GETDAT (IFIL, FILDAT)
C
C This module queries the system for and returns the creation date
C of the file listed in FILN(IFIL). The work buffer file (Lun 6)
C is utilized for this operation.
C
C Module of Program ENVIN of the GENII Software Package
C Pacific Northwest Laboratory Environmental Dosimetry System
C
C Last Modification: 29-Mar-88 RAP
C Reviewed and Approved: 12-Sept-88 BA Napier
```


ENVIN

```
C
C-----
C
C      CMND      - Constructed command sent to DOS
C      FILDAT    - File creation date read from work buffer file and
C                  returned to calling program
C      IFIL      - Logical unit number of the current file
C      ILUN      - Logical unit number of the work buffer file
C      L         - File directory line read from work buffer file
C-----
C
      INCLUDE 'FILES.CMN'

      CHARACTER FILDAT*8, CMND*70, DUM*1, L*60
      INTEGER IFIL, ILUN
      ILUN = 7

      CMND = '
      WRITE (CMND (1:4), '(A)') 'dir '
      WRITE (CMND (5:), '(A)') FILN(IFIL)
      WRITE (CMND (25:27), '(A)') '>'
      WRITE (CMND (28:), '(A)') FILN(ILUN)

      CALL SYSTEM (CMND)

      CALL OPNFIL (1, 0, ILUN)
      READ (ILUN, '(A1/A1/A1/A1)') DUM, DUM, DUM, DUM
      READ (ILUN, '(A)') L
      FILDAT = L(24:31)
      CLOSE (ILUN)

      RETURN
C-----
      END
```

ENVIN

```
C-----
C
C      FUNCTION RWAKE( AREA,CHT,RHT,W0,F0,DIST,OHT,U10,RHU,IST,
C      +              SIGMAY,SIGMAZ,LAYER,PI)
C
C      This function computes diffusion estimates for releases made in
C      Building wakes. The function RWAKE estimates normalized
C      concentrations (X/Q) resulting from releases made in building
C      wakes. The function is an implementation of the building wake
C      diffusion model developed for the U.S. Nuclear Regulatory
C      Commission by J. V. Ramsdell. The model was developed using
C      building wake diffusion data obtained in experiments conducted
C      at 7 reactors.
C
C      Written by J.V. Ramsdell (July 10, 1987, January 30, 1988)
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 2-Aug-88 RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C-----
C
C      AREA      - Building area (m2), input
C      CHT        - Building height (m), input
C      DIST       - Horizontal distance to receptor (m), input
C      F0         - Flow (m3/s), input
C      IST        - Diffusion class, input
C      LAYER      - Mixing layer depth, input
C      OHT        - Receptor height (m), input
C      RHT        - Release height (m), input
C      RHU        - Release height wind speed, input
C      SIGMAY     - Horizontal diffusion coefficient, input
C      SIGMAZ     - Vertical diffusion coefficient, input
C      U10        - Wind speed at 10 m (m/s), input
C      W0         - Effluent vertical velocity (m/s), input
C      WMOD       - Normalized concentration (s/m^3), output
C-----
C
C      Wake model constants--
C      C0 = 150.
C      CX = -1.2
C      CU = 0.68
C      CA = -1.2
C
C      Compute denominator of Gaussian plume model--
C      PLUMED = PI * SIGMAY * SIGMAZ * U10
```

ENVIN

```
C      Compute limiting distance for wake enhancement to diffusion rate--
CL = SQRT( AREA )

C      Compute 'stretched string distance'
XS = DIST + ABS( RHT - OHT )

C      Limit XS to wake enhancement limiting distance--
XSL = AMIN1( XS, 20.0*CL )

C      Compute building surface release X/Q--
BMOD = C0 * U10**CU * SQRT( FLOAT( IST ) ) * AREA**CA * XSL**CX

C      Compute composite wake X/Q--
ARG = (LAYER / SIGMAZ)**2

      IF(ARG .LT. 0.758 ) THEN
        WXOQ = 1.0 / ( SQRT( 2*PI ) * SIGMA * LAYER * U10 )
      ELSEIF (ARG .GT. 10.0) THEN
        GZ = 2.0
        WXOQ = 0.5 * GZ / ( F0 + PLUMED + 1.0 / BMOD )
      ELSE
        GZ = 2.0 + 4*EXP(-2*ARG) + 4*EXP(-8*ARG)
        WXOQ = 0.5 * GZ / ( F0 + PLUMED + 1.0 / BMOD )
      ENDIF

      IF( WO .GT. 0.0 .AND. RHT .GE. CHT ) THEN
C      NRC XOQDOQ Split-H Model--

C      Compute X/Q from elevated plume--
      IF( ARG .LT. 0.758 ) THEN
        EMOD = 1.0 / ( SQRT( 2*PI ) * SIGMA * LAYER * RHU )
      ELSE
        WSIGZ = SIGMAZ
        IF(IST .GT. 4) CALL SIGMA( DIST,4,WSIGZ,WSIGY)
        PLUMED = 2*PI * SIGMA * SIGMAZ * RHU

        GZ = 2*EXP(-0.5*(RHT/WSIGZ)**2 )

        ARG1 = -0.5*((2*LAYER-RHT)/SIGMAZ)**2
        IF (-ARG1 .LT. 30.0) GZ = GZ + 2*EXP(ARG1)

        ARG2 = -0.5*((2*LAYER+RHT)/WSIGZ)**2
        IF (-ARG2 .LT. 30.0) GZ = GZ + 2*EXP(ARG2)

        ARG3 = -0.5*((4*LAYER-RHT)/SIGMAZ)**2
        IF (-ARG3 .LT. 30.0) GZ = GZ + 2*EXP(ARG3)

        ARG4 = -0.5*((4*LAYER+RHT)/WSIGZ)**2
        IF (-ARG4 .LT. 30.0) GZ = GZ + 2*EXP(ARG4)
```

ENVIN

```
EMOD = GZ / PLUMED
WR = WO / RHU
IF( WR .GT. 1.0 ) THEN
C      Compute fraction of time plume is in wake--
      IF( WR .LE. 1.5 ) THEN
        WF = 2.58 - 1.58 * WR
      ELSE IF( WR .LT. 5.0 ) THEN
        WF = 0.3 - 0.06 * WR
      ELSE
        WF = 0.0
      ENDIF
C      Combine wake and elevated plume concentrations--
      RWAKE = ( 1.0 - WF ) * EMOD + WF * WXOQ
    ELSE
C      Plume is in wake 100% of the time--
      RWAKE = WXOQ
    ENDIF
  ENDIF
ELSE
C      Plume is entrained in wake--
      RWAKE = WXOQ
    ENDIF
  RETURN
C-----
END
```

ENVIN

```
C-----
C
C      FUNCTION USTAR (HT, ZO, SPD, IST)
C
C      Function to compute USTAR from wind speed. The function uses
C      an observed wind, its measurement height, and the surface
C      roughness length along with diabatic wind profile -- see
C      Panofsky and Dutton (1984) Section 6.5 -- to estimate USTAR.
C      The specific profile used is determined by the atmospheric
C      class.
C
C      Written by J. V. Ramsdell
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 19-Feb-88  RAP
C      Reviewed and Approved: 12-Sept-88  8A Napier
C-----
C
C      HT          - Measurement height, m
C      INVMOL      - 1/Monin-Obukov length used in diabatic wind profiles
C      IST         - Atmospheric stability class
C      SPD         - Wind speed, m/sec
C      ZO          - Surface roughness length, m
C-----
C
C      REAL INVMOL, MOLINV
C      PI = 3.14159
C      MOLINV = INVMOL( IST, ZO )
C
C      IF (HT .LT. 1.0) THEN
C          HTA = 10.0
C      ELSE
C          HTA = HT
C      ENDIF
C
C      IF (IST .LE. 3) THEN
C          Unstable conditions--
C
C          X = (1 - 16 * HTA * MOLINV)**0.25
C          PSI = ALOG( (0.5+X*X/2) * (0.5+X/2)**2 ) - 2*ATAN(X) + PI/2
C
C      ELSEIF (IST .GE. 5) THEN
C          Stable conditions--
C
C          PSI = -5 * HTA * MOLINV
```

ENVIN

```
      ELSE
C      Neutral conditions--
      PSI = 0.0
      ENDIF
      USTAR = 0.4 * SPD / ( ALDG( HTA/Z0 ) - PSI )
      RETURN
C-----
      END
```

ENV

C-----
C
C Program title: ENV - A module of the GENII
C environmental dosimetry software
C package.
C
C Prepared for: U. S. Department of Energy under
C Contract DE-AC06-76RLO 1830
C
C Contact: Bruce Napier
C Pacific Northwest Laboratory
C Richland WA 99352
C (509) 375-3916
C
C Code developers: B. A. Napier, R. A. Peloquin,
C D. L. Strenge, and J. V. Ramsdell
C Pacific Northwest Laboratory
C Richland WA 99352
C

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C any third party's use, or the results of such use, of any portion
C of this program or represents that its use by such third party
C would not infringe privately owned rights.
C

C--- Program Information -----

C Problem description: To perform environmental transport and
C exposure calculations for individuals
C or population groups, acute or chronic,
C as required for near-field and
C far-field short-term scenarios.
C
C Results format: The output of ENV is a data transfer file
C called ENV.OUT used as input to the following
C
C program of the package, DOSE. A separate
C report is prepared describing the media
C concentrations calculated.
C
C Computer: This version is for the IBM PC/AT.
C
C Programming language: FORTRAN compiled using Lahey(tm)
C FORTRAN Compiler.

ENV

Machine requirements: IBM PC/AT with a minimum of 640 Kbytes random access memory and 1 20-Mbyte fixed disk drive.

Reference: B. A. Napier, R. A. Peloquin, D. L. Streng, and J. V. Ramsdell. 1988. "GENII - The Hanford Environmental Radiation Dosimetry Software System." PNL-6584, Volumes 1, 2, and 3. Pacific Northwest Laboratory, Richland, WA 99352

PROGRAM ENV

This module controls reading of the input files, initializing parameters, and indexing of the radionuclide chain and time step loops.

Module of Program ENV of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 19-Aug-88 RAP
Reviewed and Approved: 12-Sept-88 BA Napier

IC - Index of the current radionuclide chain
IP - Index of the current exposure pathway
INCHAN() - Number of radionuclides in each chain
QAIRAV() - Air term saved for other seasons of acute release
QSWSV() - Surface water release term saved for other seasons of acute release

INCLUDE 'CONC.CMN'
INCLUDE 'OPT.CMN'
INCLUDE 'RAD.CMN'
INCLUDE 'SOLPAR.CMN'
INCLUDE 'TIMES.CMN'

INTEGER INCHAN(70), I8EFOR, YRTOGO
REAL TYR, QAIRSV(9), QSWSV(9)
LOGICAL SAVBUG

ENV

```
C      Get system date and time, read file names--
      CALL MAKDA2
      CALL OPNFIL (3,0,1)

C      Read case-specific parameters from the input file--
      CALL REDCAS (INCHAN)

C      Calculate population and production parameters--
      CALL XQCAL

C      Open outputs file and write heading information--
      CALL OPNFIL (2,1,13)
      LUN = 21
      CALL OPNFIL (2,0,LUN)
      CALL HEADNG (LUN)

C      Open temporary files for acute case--
      CALL OPNFIL (8,0,7)
      CALL OPNFIL (8,0,49)
      CALL OPNFIL (8,0,50)

C      For each radionuclide chain--
      DO 100 IC = 1, NCHAIN

C          Initialize chain parameters and read a radionuclide chain data set--
          NONUC = INCHAN(IC)
          CALL INITNV
          CALL REDCHA
          SAVBUG = DEBUG

C----- Acute calculation -----
          IF (ACUTE) THEN

C              Clear non-agricultural and skip flags--
              DOAIR = .TRUE.
              DOIRR = .TRUE.
              DOBIOT = .TRUE.
              DOWAST = .TRUE.
              NONAG = .FALSE.

              DEBUG = SAVBUG
              NTIME = INT (NTKEND)

              NSEAS = 1
              IF (TFOOD .OR. ANFOOD) NSEAS = 4

C              Save release term--
```

ENV

```
DO 211 IN = 1, NONUC
  QAIRSV(IN) = QAIR(IN)
  QSWSV(IN) = QSW(IN)
211 CONTINUE

C      Assumed prospective, do four seasons, starting with winter
C      if terrestrial food or animal product consumption is considered--

DO 210 ISEAS = 1, NSEAS

  DO 213 IN = 1, NONUC
    QAIR(IN) = QAIRSV(IN)
    QSW(IN) = QSWSV(IN)
213 CONTINUE

    ITIME = 1
    ITIMT = 1
    CALL ACUTE1 (ISEAS)
    CALL EXPOS1 (ISEAS)

    DO 212 IN = 1, NONUC
      QAIR(IN) = 0.0
      QSW(IN) = 0.0
      PWTAIR(IN) = 0.0
      PWTXAR(IN) = 0.0
      DO 216 IP = 1, NPATH
        EXPOS(IN,IP) = 0.0
216 CONTINUE
212 CONTINUE

    DO 214 ITIME = 2, NTIME

C      Increment over-all time index--
      ITIMT = ITIMT + 1
      TYR = FLOAT (ITIME)
      IF (DEBUG) WRITE (*,1) ITIME, ITIMT,
        .          (ELT(IN),AW(IN), IN=1,NONUC)
      IF (ITIME .GT. 2) DEBUG = .FALSE.

C      Initialize exposures--
      DO 312 IN = 1, NONUC
        DO 314 IP = 1, NPATH
          EXPOS(IN,IP) = 0.0
314 CONTINUE
312 CONTINUE

C      Calculate transport--
      CALL TRNSPT (.TRUE.)
      CALL RITMED (.TRUE.)
```

ENV

```
C          Calculate exposure--
          CALL EXPOSR (0)

214        CONTINUE

C          Write exposure data set to file--
          CALL RITEXP (ISEAS, INCHAN)

210        CONTINUE

          ELSE

C----- Chronic exposure -----

C          Do transport pre-calculations--
          IF (BIOT .OR. DEEP .OR. BURWAS) CALL BIOCAL
          IF (SWAT) CALL SWCAL
          IF (AIR .OR. AIRCN) CALL AIRCAL

C          Determine number of years of prior decay/building--
          IBEFOR = INT (BEFORE)
          NBEFORE = MAX (IBEFOR, BEFAIR, BEFIRR)

C          Non-agricultural conditions considered only for biotic transport--
          IF (BEFAIR .GT. 0 .OR. BEFIRR .GT. 0) NONAG = .FALSE.

C          For each year of the decay/buildup period--
          DO 102 ITIME = 1, NBEFORE

C          Increment over-all time index, years-to-go--
          ITIMT = ITIMT + 1
          YRTOGO = NBEFORE - ITIME + 1

          IF (ITIME .GT. 3) DEBUG = .FALSE.
          IF (DEBUG) WRITE (*,2) ITIME, (ELT(IN),AW(IN),IN=1,NONUC)

C          Clear skip flags if calculations are to be performed--
          IF (BIOT .AND. BTPRE .AND. LOIC .GE. YRTOGO) DOBIOT=.TRUE.
          IF (BEFORE .GE. YRTOGO) DOWAST = .TRUE.
          IF (BEFAIR .GE. YRTOGO) DOAIR = .TRUE.
          IF (BEFIRR .GE. YRTOGO) DOIRR = .TRUE.

          CALL TRNSPT (.FALSE.)

102        CONTINUE

C          Land use change from nonag to ag--
          CALL PRIOR
```

ENV

```
C      Clear non-agricultural and skip flags--
      DOAIR = .TRUE.
      DOIRR = .TRUE.
      DOBIOT = .TRUE.
      DOWAST = .TRUE.
      NONAG = .FALSE.

      DEBUG = SAVBUG
      NTIME = INT (NTKEND)
      DO 200 ITIME = 1, NTIME

C      Increment over-all time index--
      ITIMT = ITIMT + 1
      TYR = FLOAT (ITIME)
      IF (DEBUG) WRITE (*,1) ITIME, ITIMT,
        (ELT(IN),AW(IN), IN=1,NONUC)
      IF (ITIME .GT. 2) DEBUG = .FALSE.

      IF (TYR .GT. RELEND) THEN

        IF (SWAT) THEN
C          Surface water release has ended--
          DO 140 IN = 1, NONUC
            SWCON(IN) = 0.0
            SWIRR(IN) = 0.0
140          CONTINUE
          ENDIF

        IF (AIR) THEN
C          Air release has ended--
          DO 141 IN = 1, NONUC
            ARPCON(IN) = 0.0
            DO 144 ITF = 1, NTF
              ARFCON(IN,ITF) = 0.0
144            CONTINUE
            DO 146 IAN = 1, NAN+2
              ARF2CN(IN,IAN) = 0.0
146            CONTINUE
141          CONTINUE
          ENDIF
        ENDIF

C      Initialize exposures--
      DO 316 IN = 1, NONUC
        DO 318 IP = 1, NPATH
          EXPOS(IN,IP) = 0.0
318        CONTINUE
316      CONTINUE
```

ENV

```
C      Calculate transport--
      CALL TRNSPT (.TRUE.)

C      Calculate exposure--
      CALL EXPOSR (0)

C      Write media report--
      CALL RITMED (.TRUE.)

200    CONTINUE

C      Write exposure data set to file--
      CALL RITEXP (0, INCHAN)

      ENDIF

100 CONTINUE

C      Write additional seasons to output file--
      IF (ACUTE .AND. NSEAS .GT. 1) CALL RITEXP (0, INCHAN)

      STOP

C---- Format Statements -----
      1 FORMAT (' Release Year:',I4, ' Over-all year:',I4, 4X,
               . 9(A2,A6,1X))
      2 FORMAT (' Yr: ',I3, 2X, 9(A2,A6, 1X))

C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE ACUTE1 (ISEAS)
C
C      This subroutine calculates transport through air and surface
C      water from an acute release as well as inhalation and external
C      exposure.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 13-Jun-BB  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      CTOIRR() - Initial concentration in surface soil from irrigation
C                for each radionuclide in the current chain, UoA/m2
C      DAL      - Double precision temporary variable
C      DKAIRA() - Air concentration decayed for travel time to each
C                distance in the specified sector for population dose,
C                UoA
C      DNTGRL   - Double precision temporary variable
C      FIRST()  - Flag set if this is first time through subroutine, for
C                report printing
C      WATCON() - Time-integrated surface water concentration decayed
C                for travel time to irrigation-withdrawal location,
C                UoA yr/L
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'DECAY.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'LABELS.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'SWPAR.CMN'
C      INCLUDE 'TIMES.CMN'
C
C      REAL T, DKAIRA(9,10), CTOIRR(9), WATCON(9)
C      REAL*8 DAL, DNTGRL
C      LOGICAL FIRST
C      DATA FIRST /.TRUE./
C
C      Atmospheric deposition--
C      IF (AIR) THEN
```

ENV

```
IF (XOQOPT .NE. 1) THEN
C      XOQOPT=0, a or b--
      IF (POPDOS) THEN
C      Decay for travel time to each distance in specified sector--
        DO 321 I = 1, NDIST
          T = TTAIR(I) * YRSEC
          CALL CHAIN (T, DUMMY, QAIR, DKAIRA(1,I), 0)
          IF (DEBUG) THEN
            WRITE (*,*) 'Decayed air at distance', X(I),':',
              (DKAIRA(IN,I),IN=1,NONUC)
          ENDIF
        321 CONTINUE
      ELSE
C      XOQOPT = 3--
C      Maximum or average individual, decay to specified location--
        T = TTAIRI * YRSEC
        CALL CHAIN (T, DUMMY, QAIR, DKAIRA(1,1), 0)
        IF (DEBUG) THEN
          WRITE (*,*) 'Decayed air at distance', MIDIST,':',
            (DKAIRA(I,1),I=1,NONUC)
        ENDIF
      ENDIF
      IF (FINITE) THEN
        IF (POPDOS) THEN
C      Calculate population-weighted submersion dose coefficients--
          DO 424 IN = 1, NONUC
            PWTXAR(IN) = 0.0
            DO 422 I = 1, NDIST
              DO 423 K = 1, 6
                PWTXAR(IN) = PWTXAR(IN) + DKAIRA(IN,I) * PWTX(I,K)
                  * EDIS(K,IN) * FC(K)
              423 CONTINUE
            422 CONTINUE
            PWTXAR(IN) = PWTXAR(IN) / POPT
          424 CONTINUE
        ELSE
C      Maximum or average individual submersion dose coefficients--
          DO 430 IN = 1, NONUC
            PWTXAR(IN) = 0.0
            DO 432 K = 1, 6
              PWTXAR(IN) = PWTXAR(IN) + DKAIRA(IN,1) * DRFSAV(K)
                * EDIS(K,IN) * FC(K)
            432 CONTINUE
          430 CONTINUE
        ENDIF
      ENDIF
    
```

ENV

```
ENDIF
      IF (DEBUG) WRITE (*,*) 'PWTXAR:',(PWTXAR(I),I=1,NONUC)
ENDIF
ENDIF
C      Infinite plume--
      IF (XOQOPT .EQ. 1) THEN
C      No decay--
      DO 312 IN = 1, NONUC
        PWTAIR(IN) = QAIR(IN) * XOQI
        CTOAIR(IN) = PWTAIR(IN) * DPVL(IN)
312    CONTINUE
      ELSE
C      IF (POPDOS) THEN
C      Calculate average population-weighted air concentration--
      DO 324 IN = 1, NONUC
        PWTAIR(IN) = 0.0
        DO 322 I = 1, NDIST
          PWTAIR(IN) = PWTAIR(IN) + DKAIRA(IN,I) * PWT(I)
322    CONTINUE
        PWTAIR(IN) = PWTAIR(IN) / POPT
        CTOAIR(IN) = PWTAIR(IN) * DPVL(IN)
324    CONTINUE
      IF (DEBUG) WRITE (*,*) 'CTOAIR:',(CTOAIR(I),I=1,NONUC)
      ELSE
C      Maximum or average individual--
      DO 300 IN = 1, NONUC
        PWTAIR(IN) = DKAIRA(IN,1) * XOQI
        CTOAIR(IN) = PWTAIR(IN) * DPVL(IN)
300    CONTINUE
      IF (DEBUG) WRITE (*,*) 'CTOAIR:',(CTOAIR(I),I=1,NONUC)
      ENDIF
      ENDIF
      ELSE
C      Air release not considered--
      DO 326 IN = 1, NONUC
        PWTXAR(IN) = 0.0
        PWTAIR(IN) = 0.0
        CTOAIR(IN) = 0.0
326    CONTINUE
      ENDIF
C      Surface water time-integrated concentration--
```


ENV

```
IF (SWAT) THEN
    DO 302 IN = 1, NONUC
        SWACUT(IN) = QSW(IN) * MIXR / SWFLOW * M3L * YRSEC
302    CONTINUE

    IF (DOIRR) THEN
C        Decay for transit time to withdrawal site--
        T = SWTT * YRHR
        CALL CHAIN (T, DUMMY, SWACUT, WATCON, 0)
    ELSE
        DO 304 IN = 1, NONUC
            WATCON(IN) = 0.0
304    CONTINUE
        ENDIF

    ELSE
        DO 306 IN = 1, NONUC
            SWACUT(IN) = 0.0
            WATCON(IN) = 0.0
306    CONTINUE
        ENDIF

C    Residential soil concentration--
    DO 307 IN = 1, NONUC

C        Irrigation contribution--
        IF (SWAT .AND. ISEAS .GT. 1) THEN
            CTOIRR(IN) = WATCON(IN) * RIRRR * LM2IN
        ELSE
            CTOIRR(IN) = 0.0
        ENDIF

C        Get average soil concentration--
        DAL = DBLE (AL(IN))
        IF (DAL .GT. 50.000) THEN
            DNTGRL = 1.000 / DAL
        ELSE
            DNTGRL = (1.000 - DEXP(-DAL)) / DAL
        ENDIF
        RESSOL(IN) = (CTOAIR(IN) + CTOIRR(IN)) * DNTGRL

307 CONTINUE

C---- Print media report -----
    LUN = 21
    IF (FIRST) THEN
        WRITE (LUN, 12) UNIT1(IUNIT), UNIT1(IUNIT), UNIT1(IUNIT)
```

ENV

```
FIRST = .FALSE.  
ENDIF
```

```
DO 132 IN = 1, NONUC  
  WRITE (LUN,14) ELT(IN), AW(IN), SEALAB(ISEAS), PWTAIR(IN),  
    .           RESSOL(IN), SWACUT(IN)  
132 CONTINUE
```

C---- Format Statements -----

```
10 FORMAT (' Year: ',I4,'          Media for Acute Release')
```

```
12 FORMAT (//  
  .           '-----Residential-----'/  
  .           'Average                        Time'/  
  .           'Population-                    Integrated'/  
  .           'Radio- Season Weighted Surface Surface'/  
  .           'nuclide or Year Air      Soil Water'/  
  .           'A3,' sec/m3  ',A3,'/m2  ',A3,' yr/L'/  
  .           '-----' )
```

```
14 FORMAT (' ', A2, A6, A8, 1P, 6 (4X, E8.1E2))
```

```
RETURN
```

C-----
END

ENV

```
C-----
C
C   SUBROUTINE ACUTEA (ISEAS)
C
C   This subroutine calculates exposure through ingestion of
C   animal products from an acute release for a given season.
C
C   Module of Program ENV of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 29-Aug-88  RAP
C   Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C   ANIMCN  - Animal product concentration from forage, feed, and
C             drinking water, UoA-yr/kg and UoA/kg
C   CBARA() - Time integrated forage concentration from air for each
C             radionuclide in the current chain, UoA-yr/kg
C   CBARI() - Time-integrated forage concentration from irrigation
C             for each radionuclide in the current chain, UoA-yr/kg
C   CTOIRR() - Initial concentration in the surface soil from
C             irrigation for each radionuclide in the current
C             chain, UoA/m2
C   DW      - Time-integrated animal product concentration resulting
C             from ingestion of drinking water, UoA-yr/kg
C   FORAGE() - Time-integrated animal product concentration from
C             consumption of fresh forage of beef,(5), and milk
C             cows,(6), UoA-yr/kg, for each radionuclide in the
C             current chain
C   GRAIN() - Animal product concentration from ingestion of grain,
C             UoA/kg
C   ISEAS    - Index of the current season, where 1=winter, 2=spring,
C             3=summer, 4=autumn
C   LEAFCN() - Concentration in plant from leaf uptake for grains,
C             for each radionuclide in the current chain, UoA/kg
C   LEAFDK   - Time to decay leaves of grains, yr
C   PWTAIR() - Average population-weighted air concentration for each
C             radionuclide in the current chain, UoA-sec/m3
C   ROOTCN() - Concentration in grains from root uptake for each radio-
C             nuclide in the current chain, UoA/kg
C   SOLHAR() - Surface soil concentration at time of harvest, UoA/m2
C   TENV2    - Weathering constant, yr-1
C   TIMHAR   - Time to harvest, yr
C   WATCON() - Time-integrated surface water concentration decayed for
C             transit time to irrigation-withdrawal location, UoA yr/L
C-----
C
```

ENV

```
INCLUDE 'AFPPAR.CMN'
INCLUDE 'AIRPAR.CMN'
INCLUDE 'ANMPAR.CMN'
INCLUDE 'CONC.CMN'
INCLUDE 'DECAY.CMN'
INCLUDE 'FODPAR.CMN'
INCLUDE 'OPT.CMN'
INCLUDE 'RAD.CMN'
INCLUDE 'SOLPAR.CMN'
INCLUDE 'SWPAR.CMN'
INCLUDE 'TIMES.CMN'

REAL TIMHAR, LEAFDK, TENV2, TENV(9), SOLHAR(9),
.   CTOIRR(9), CBARA(9), CBARI(9), WATCON(9),
.   ROOTCN(9), LEAFCN(9), FORAGE(9,6), DW, GRAIN(9), FR
INTEGER ISEAS

C---- Set parameters based on season -----
      IF (ISEAS .EQ. 1) THEN
C      Winter

          DOIRR = .FALSE.
          TIMHAR = 0.50
          LEAFDK = 0.0
          TENV2 = ALOG2 / WTIM / YRDA

      ELSEIF (ISEAS .EQ. 2) THEN
C      Spring

          DOIRR = .TRUE.
          TIMHAR = 0.25
          LEAFDK = 0.0
          TENV2 = ALOG2 / WTIM / YRDA

      ELSEIF (ISEAS .EQ. 3) THEN
C      Summer

          DOIRR = .TRUE.
          TIMHAR = 0.083
          LEAFDK = 30.0 * YRDA
          TENV2 = ALOG2 / WTIM / YRDA

      ELSEIF (ISEAS .EQ. 4) THEN
C      Autumn

          DOIRR = .TRUE.
          TIMHAR = 0.0
```

ENV

```
      LEAFDK = 0.0
      TENV2 = 0.0

ENDIF

C    Weathering constant changes by season--
DO 100 IN = 1, NONUC
      TENV(IN) = TENV2
100 CONTINUE

C    Irrigation deposition--
IF (SWAT .AND. DOIRR) THEN
      T = SWTT * YRHR
      CALL CHAIN (T, DUMMY, SWACUT, WATCON, 0)
ENDIF

C---- First do fresh forage -----
DO 400 IAN = 5, 6
      IF ((IAN.EQ.5 .AND. ANF(1)) .OR. (IAN.EQ.6 .AND. ANF(3))) THEN
            DO 320 IN = 1, NONUC

C              Irrigation deposition--
              IF (SWAT .AND. DOIRR) THEN
                    CTOIRR(IN) = WATCON(IN) * RIRRA(IAN) * LM2IN
              ELSE
                    CTOIRR(IN) = 0.0
              ENDIF

C              Set surface soil concentration--
              SL2CON(IN,IAN) = CTOAIR(IN) + CTOIRR(IN)

320      CONTINUE

              IF (ISEAS .EQ. 1) THEN
C                Winter, decay soil to harvest time--
                    CALL CHAIN (TIMHAR, DUMMY, SL2CON(1,IAN), SOLHAR, 0)
                    DO 322 IN = 1, NONUC
                          ROOTCN(IN) = SOLHAR(IN) / SLDN
                                * BVI(3,IN) * DRYFA2(IAN) * RF1
322      CONTINUE

              ELSEIF (ISEAS .EQ. 4) THEN
C                Autumn, no root uptake--
                    DO 325 IN = 1, NONUC
                          ROOTCN(IN) = 0.0
325      CONTINUE
```

ENV

```

      ELSE
C      Spring or summer--
      DO 326 IN = 1, NONUC
        ROOTCN(IN) = SL2CON(IN, IAN) / SLDN
          * BVI(3, IN) * DRYFA2(IAN) * RF1
326      CONTINUE
      CALL CHAIN ((1.0), DUMMY, ROOTCN, ROOTCN, 1)

      ENDIF

      IF (ISEAS .GT. 1) THEN
C      Fresh forage leaves, except for winter--

        DEPFR1 = 1.0 - EXP (-2.9 * BIOMA2(IAN) * DRYFA2(IAN))

        DO 340 IN = 1, NONUC
          CBARA(IN) = CTOAIR(IN) * DEPFR1
          CBARI(IN) = CTOIRR(IN) * DEPFR2
          IF (BIOMA2(IAN) .GT. 0.0) THEN
            LEAFCN(IN) = (CBARA(IN) + CBARI(IN)) * TRANSA(IAN)
              / BIOMA2(IAN)
          ELSE
            LEAFCN(IN) = 0.0
          ENDIF
340      CONTINUE

          IF (ISEAS .EQ. 4) THEN
            CALL CHAIN ((1.0), DUMMY, LEAFCN, LEAFCN, 1)
          ELSE
            CALL CHAIN ((1.0), TENV, LEAFCN, LEAFCN, 1)
          ENDIF

        ENDIF

        DO 342 IN = 1, NONUC
          FORAGE(IN, IAN) = (LEAFCN(IN) + ROOTCN(IN)) * FRACUT(ISEAS)
342      CONTINUE

        ENDIF
400 CONTINUE

      DO 310 IAN = 1, NAN
        IF (ANF(IAN)) THEN
C----- Next do stored feed and grain -----

        DO 324 IN = 1, NONUC
```

ENV

```

      IF (SWAT .AND. DOIRR) THEN
        CTOIRR(IN) = WATCON(IN) * RIRRA(IAN) * LM2IN
      ELSE
        CTOIRR(IN) = 0.0
      ENDIF
324    CONTINUE

C      Set surface soil concentration--
      DO 330 IN = 1, NONUC
        SL2CON(IN, IAN) = CTOAIR(IN) + CTOIRR(IN)
330    CONTINUE

C      Decay soil to harvest time--
      CALL CHAIN (TIMHAR, DUMMY, SL2CON(1, IAN), SOLHAR, 0)

C      Root uptake--
      DO 350 IN = 1, NONUC
        IF (ISEAS .LT. 4) THEN
          ROOTCN(IN) = SOLHAR(IN) / SLDN * BVI(3, IN) * RF1
        ELSE
          ROOTCN(IN) = 0.0
        ENDIF
350    CONTINUE

      DO 354 IN = 1, NONUC
        LEAFCN(IN) = 0.0
354    CONTINUE

C      IF (ISEAS .GT. 2) THEN
        Leaf uptake, summer and autumn--

        DEPFR1 = 1.0 - EXP (-2.9 * BIOMA2(IAN) * DRYFA2(IAN))

        DO 352 IN = 1, NONUC
          IF (BIOMA2(IAN) .GT. 0.0)
            LEAFCN(IN) = (CTOAIR(IN) * DEPFR1 + CTOIRR(IN) * DEPFR2)
                          * TRANSA(IAN) / BIOMA2(IAN)
          .
          .
352    CONTINUE

          IF (ISEAS .EQ. 3)
            .      CALL CHAIN (LEAFDK, TENV, LEAFCN, LEAFCN, 0)

        ENDIF

C      Set fraction of animal diet consisting of grain--
      IF (IAN .EQ. 1 .OR. IAN .EQ. 3) THEN
        FR = 1.0 - FRACUT(ISEAS)
      ELSE
```

ENV

```
      FR = 1.0
    ENDIF

    DO 356 IN = 1, NONUC
      GRAIN(IN) = (ROOTCN(IN) + LEAFCN(IN)) * FR
356    CONTINUE
      CALL CHAIN ((1.0), DUMMY, GRAIN, GRAIN, 1)

C----- Total -----

    DO 358 IN = 1, NONUC

C      Animal consumption of drinking water--
      DW = WATCON(IN) * DWATER(IAN) * DWFACA(IAN)

C      Total animal product concentration--
      ANIMCN = GRAIN(IN) * CONSUM(IAN) + DW
      IF (IAN .EQ. 1) ANIMCN = ANIMCN + FORAGE(IN,5) * CONSUM(5)
      IF (IAN .EQ. 3) ANIMCN = ANIMCN + FORAGE(IN,6) * CONSUM(6)
      ANIMCN = ANIMCN * FMI(IAN,IN)

C      Holdup between harvest and consumption--
      T = HLDUPA(IAN) * YRDA
      CALL CHAIN (T, DUMMY, ANIMCN, ANIMCN, 0)

C      Human consumption of animal products--
      EXPOS(IN,7+IAN) = ANIMCN * CONS2(IAN) * EFPOPA(IAN)
      * ADJET2(IAN)

358    CONTINUE
    ENDIF
310 CONTINUE

    RETURN

C-----
    END
```


ENV

```
C-----
C
C   SUBROUTINE ACUTEC (ISEAS)
C
C   This subroutine calculates exposure through ingestion of
C   terrestrial foods from an acute release for a given season.
C
C   Module of Program ENV of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 17-Aug-88  RAP
C   Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C   CBARA() - Time integrated plant concentration from air for each
C             radionuclide in the current chain, UoA-yr/kg
C   CBARI() - Time-integrated plant concentration from irrigation
C             for each radionuclide in the current chain, UoA-yr/kg
C   CTOIRR() - Initial concentration in the surface soil from
C             irrigation for each radionuclide in the current
C             chain, UoA/m2
C   FOODCN() - Concentration in food, UoA yr/kg
C   ISEAS    - Index of the current season, where 1=winter, 2=spring,
C             3=summer, 4=autumn
C   LEAFCN() - Concentration in plant from leaf uptake for grains,
C             fruits, and root vegetables for each radionuclide in
C             the current chain, UoA/kg
C   LEAFDK   - Time to decay leaves of grains, fruits, and root
C             vegetables, yr
C   ROOTCN() - Concentration in plant from root uptake for each radio-
C             nuclide in the current chain, UoA/kg
C   SOLHAR() - Surface soil concentration at time of harvest, UoA/m2
C   T        - Time in adjusted units for CHAIN calls
C   TENV2    - Weathering constant, yr-1
C   TIMHAR   - Time to harvest, yr
C   WATCON() - Time-integrated surface water concentration decayed for
C             transit to irrigation-withdrawal location, UoA yr/L
C-----
C
C   INCLUDE 'AFPPAR.CMN'
C   INCLUDE 'AIRPAR.CMN'
C   INCLUDE 'CONC.CMN'
C   INCLUDE 'DECAY.CMN'
C   INCLUDE 'FODPAR.CMN'
C   INCLUDE 'OPT.CMN'
C   INCLUDE 'RAD.CMN'
C   INCLUDE 'SOLPAR.CMN'
```

ENV

```
INCLUDE 'SWPAR.CMN'
INCLUDE 'TIMES.CMN'

REAL TIMHAR, LEAFDK, TENV2, TENV(9), SOLHAR(9),
.   CTOIRR(9), CBARA(9), CBARI(9), WATCON(9),
.   ROOTCN(9), LEAFCN(9), FOODCN(9)
INTEGER ISEAS

C---- Set parameters based on season -----
      IF (ISEAS .EQ. 1) THEN
C      Winter

      DOIRR = .FALSE.
      TIMHAR = 0.50
      LEAFDK = 0.0
      TENV2 = ALOG2 / WTIM / YRDA

      ELSEIF (ISEAS .EQ. 2) THEN
C      Spring

      DOIRR = .TRUE.
      TIMHAR = 0.25
      LEAFDK = 0.0
      TENV2 = ALOG2 / WTIM / YRDA

      ELSEIF (ISEAS .EQ. 3) THEN
C      Summer

      DOIRR = .TRUE.
      TIMHAR = 0.083
      LEAFDK = 30.0 * YRDA
      TENV2 = ALOG2 / WTIM / YRDA

      ELSEIF (ISEAS .EQ. 4) THEN
C      Autumn

      DOIRR = .TRUE.
      TIMHAR = 0.0
      LEAFDK = 0.0
      TENV2 = 0.0

      ENDIF

C      Weathering constant changes by season
      DO 100 IN = 1, NONUC
        TENV(IN) = TENV2
100 CONTINUE
```

ENV

```
C      For each terrestrial food pathway--
      DO 310 ITF = 1, NTF
        IF (TFD(ITF)) THEN

C      Irrigation deposition--
      IF (SWAT .AND. DOIRR) THEN

        T = SWTT * YRHR
        CALL CHAIN (T, DUMMY, SWACUT, WATCON, 0)

        DO 320 IN = 1, NONUC
          CTOIRR(IN) = WATCON(IN) * RIRR(ITF) * LM2IN
320      CONTINUE
        ELSE
          DO 328 IN = 1, NONUC
            CTOIRR(IN) = 0.0
328      CONTINUE
          ENDIF

C      Set surface soil concentration--
      DO 330 IN = 1, NONUC
        SOLCON(IN,ITF) = CTOAIR(IN) + CTOIRR(IN)
330      CONTINUE

C      Plant concentration from root uptake, except autumn--
      IF (ISEAS .EQ. 4) THEN

C      Autumn, no root uptake--
      DO 351 IN = 1, NONUC
        ROOTCN(IN) = 0.0
351      CONTINUE

      ELSEIF (ITF .EQ. 1 .AND. (ISEAS.EQ.2 .OR. ISEAS.EQ.3)) THEN

C      Leafy vegetables, spring and summer--
      DO 353 IN = 1, NONUC
        ROOTCN(IN) = SOLCON(IN,ITF) / SLDN
          * BVI(ITF,IN) * DRYFAC(ITF) * RF1
353      CONTINUE
        CALL CHAIN ((1.0), DUMMY, ROOTCN, ROOTCN, 1)

      ELSE

C      Decay soil to harvest time--
      CALL CHAIN (TIMHAR, DUMMY, SOLCON(1,ITF), SOLHAR, 0)
      DO 350 IN = 1, NONUC
        ROOTCN(IN) = SOLHAR(IN) / SLDN
          * 8VI(ITF,IN) * DRYFAC(ITF) * RF1
350      CONTINUE
```

ENV

```
ENDIF

IF (ITF .EQ. 1) THEN
C   Leaf uptake, leafy vegetables--

   DEPFR1 = 1.0 - EXP (-2.9 * BIOMAS(ITF) * DRYFAC(ITF))

   DO 340 IN = 1, NONUC
     IF (ISEAS .EQ. 1) THEN
C       Winter--
       LEAFCN(IN) = 0.0
     ELSE
       CBARA(IN) = CTOAIR(IN) * DEPFR1
       CBARI(IN) = CTOIRR(IN) * DEPFR2
       LEAFCN(IN) = (CBARA(IN) + CBARI(IN))
                     * TRANS(ITF) / BIOMAS(ITF)
     ENDIF
340   CONTINUE

   IF (ISEAS .EQ. 4) THEN
C     Autumn--
     CALL CHAIN ((1.0), DUMMY, LEAFCN, LEAFCN, 1)
   ELSEIF (ISEAS .EQ. 2 .OR. ISEAS .EQ. 3) THEN
C     Spring or Summer--
     CALL CHAIN ((1.0), TENV, LEAFCN, LEAFCN, 1)
   ENDIF

ELSE
C   Leaves of grain, fruits, root vegetables--

   IF (ISEAS .GT. 2) THEN

     IF (ITF .EQ. 4) THEN
       DEPFR1 = 1.0 - EXP (-2.9 * BIOMAS(ITF) * DRYFAC(ITF))
     ELSE
       DEPFR1 = 1.0 - EXP (-3.6 * BIOMAS(ITF) * DRYFAC(ITF))
     ENDIF

     DO 352 IN = 1, NONUC
       LEAFCN(IN) = (CTOAIR(IN) * DEPFR1 +
                     CTOIRR(IN) * DEPFR2)
                     / BIOMAS(ITF) * TRANS(ITF)
     CONTINUE
352

     IF (ISEAS .EQ. 3)
       CALL CHAIN (LEAFDK, TENV, LEAFCN, LEAFCN, 0)
```

ENV

```

      ELSE
        DO 354 IN = 1, NONUC
          LEAFCN(IN) = 0.0
354      CONTINUE
        ENDIF

      ENDIF

C      Total food concentration--
      DO 360 IN = 1, NONUC
        FOODCN(IN) = ROOTCN(IN) + LEAFCN(IN)
360      CONTINUE

C      Holdup between harvest and consumption--
      T = HLDUP(ITF) * YRDA
      CALL CHAIN (T, DUMMY, FOODCN, FOODCN, 0)

C      Human Consumption Integral (Leafy in Winter, all others always)
      IF (ITF .GT. 1 .OR. ISEAS .EQ. 1)
        CALL CHAIN ((1.0), DUMMY, FOODCN, FOODCN, 1)

      DO 362 IN = 1, NONUC
        Human uptake from foods--
        EXPOS(IN,ITF+3) = FOODCN(IN) * CONS(ITF) * EFPOP(ITF) *
          ADJEAT(ITF)
362      CONTINUE

      ENDIF
310 CONTINUE

      RETURN
C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE AIRCAL
C
C      This module calculates average population-weighted and average
C      food-weighted air concentrations.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88  RAP
C      Reviewed and Approved: 12-Sept-88  8A Napier
C-----
C
C      AFRAC      - Fraction of grid area in current sector
C      AREAT      - Total area in grid
C      DKAIR()    - Air source term decayed for transit, for the current
C                  exposure pathway, distance and direction
C      RTEMP()    - Temporary input and calculation array (infinite plume)
C      RXTEMP()   - Temporary input and calculation array (finite plume)
C      T          - Time in years passed to CHAIN
C-----
C
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'AQUPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C
C      CHARACTER DUM*8
C      REAL RTEMP(9), RXTEMP(9), DKAIR(9)
C-----
C---- Air concentrations -----
C
C      IF (AIRC�) THEN
C
C          Air concnetration was input--
C          DO 103 IN = 1, NONUC
C              ARPCON(IN) = AIRCON(IN) * SECYR
C103  CONTINUE
C
C          ELSEIF (XQOPT .EQ. 1) THEN
C
C          Chi/Q value was input, no decay in transit--
```

ENV

```
      DO 102 IN = 1, NONUC
        ARPCON(IN) = QAIR(IN) * XOQI / POPT
102    CONTINUE

      ELSEIF (POPDOS) THEN

C      Population dose, joint frequency data or Chi/Q array entered--

        DO 101 IN = 1, NONUC
          RTEMP(IN) = 0.0
          IF (FINITE) RXTEMP(IN) = 0.0
101    CONTINUE

C      Sum over each distance and direction--
        DO 100 IX = 1, NDIST
          DO 110 ID = 1, NDIR

C      Calculate decay in transit--
          T = X(IX) / AVEU(ID) * YRSEC
          CALL CHAIN (T, DUMMY, QAIR, DKAIR, 0)

C      Multiply by chi/Q and population; accumulate total--
          DO 120 IN = 1, NONUC

            IF (FINITE) THEN
              DO 115 IE = 1, 6
                RXTEMP(IN) = RXTEMP(IN) + DKAIR(IN) *
                  DRFOQ(IO,IX,IE) * POP(IX,ID) *
                  EDIS(IE,IN) * FC(IE)
115              CONTINUE
            ENDIF

            RTEMP(IN) = RTEMP(IN) +
              DKAIR(IN) * XOQ(IX,ID) * POP(IX,ID)

120          CONTINUE

110        CONTINUE
100      CONTINUE

      DO 130 IN = 1, NONUC
C      Divide by total population for air paths--

        IF (FINITE) THEN
          ARPCN(IN) = RXTEMP(IN) / POPT
        ENDIF

        ARPCON(IN) = RTEMP(IN) / POPT
```

ENV

```
130  CONTINUE

      ELSE
C      Individual at specified or determined location--
      DO 104 IN = 1, NONUC

C      Calculate decay in transit--
      IF (XOQOPT .EQ. 3) THEN
        T = MIDIST / MIUBAR * YRSEC
      ELSEIF (XOQOPT .EQ. 2) THEN
        T = MIDIST / AVEU(MIDIR) * YRSEC
      ELSE
        GOTO 92
      ENDIF
      CALL CHAIN (T, DUMMY, QAIR, DKAIR, 0)

      IF (FINITE) THEN
        ARPCN(IN) = 0.0
        DO 107 IE = 1, 6
          ARPCN(IN) = ARPCN(IN) + DKAIR(IN) * DRFSAV(IE)
                      * EDIS(IE, IN) * FC(IE)
107      CONTINUE
        ENDIF

C      Infinite plume, selected Chi/Q stored in XOQI--
        ARPCN(IN) = DKAIR(IN) * XOQI

104  CONTINUE

      ENDIF

      IF (DEBUG) THEN
        IF (FINITE) THEN
          WRITE (*,*) 'Air (ARPCN):', ARPCN(1)
        ENDIF
        WRITE (*,*) 'Air (ARPCON):', ARPCON(1)
      ENDIF

C---- Terrestrial foods air concentrations-----
      IF (TFOOD) THEN
        DO 140 ITF = 1, NTF
          IF (TFD(ITF)) THEN

            IF (FOQOPT .EQ. 0) THEN

C              Food-weighted chi/Q was input--
              DO 144 IN = 1, NONUC
```


ENV

```

      ARFCON(IN,ITF) = QAIR(IN) * FOQ
144      CONTINUE

      ELSEIF (FOQOPT .EQ. 1) THEN

C        Set food-weighted air to pop-weighted air--
          DO 142 IN = 1, NONUC
            ARFCON(IN,ITF) = ARPCON(IN)
142      CONTINUE

      ELSEIF (FOQOPT .GT. 1) THEN

C        Calculate air concentrations--
          DO 413 IN = 1, NONUC
            RTEMP(IN) = 0.0
413      CONTINUE

          DO 412 ID = 1, NDIR
            DO 414 IX = 1, NDIST

C            Calculate decay in transit--
              T = X(IX) / AVEU(ID) * YRSEC
              CALL CHAIN (T, DUMMY, QAIR, DKAIR, 0)

C            Multiply by chi/Q and effective pop; accumulate total--
              DO 454 IN = 1, NONUC
                RTEMP(IN) = RTEMP(IN) + DKAIR(IN) * XOQ(IX,ID)
                  * FPRD(IX,ID,ITF)
454      CONTINUE
414      CONTINUE
412      CONTINUE

          DO 458 IN = 1, NONUC
            ARFCON(IN,ITF) = RTEMP(IN) / TPRODT(ITF)
458      CONTINUE

      ENDIF
    ENDIF
140  CONTINUE
  ENDIF

C---- Animal product-weighted air concentrations -----

  IF (ANFOOD) THEN
    DO 150 IAN = 1, NAN
      IF (ANF(IAN)) THEN

        IF (FOQOPT .EQ. 0) THEN
```

ENV

```
C      Food-weighted chi/Q was input--
      DO 154 IN = 1, NONUC
        ARF2CN(IN,IAN) = QAIR(IN) * FOQ
        IF (IAN .EQ. 1) ARF2CN(IN,5) = ARF2CN(IN,1)
        IF (IAN .EQ. 3) ARF2CN(IN,6) = ARF2CN(IN,3)
154      CONTINUE

      ELSEIF (FOQOPT .EQ. 1) THEN

C      Set food-weighted air to pop-weighted--
      DO 152 IN = 1, NONUC
        ARF2CN(IN,IAN) = ARPCON(IN)
        IF (IAN .EQ. 1) ARF2CN(IN,5) = ARF2CN(IN,1)
        IF (IAN .EQ. 3) ARF2CN(IN,6) = ARF2CN(IN,3)
152      CONTINUE

      ELSEIF (FOQOPT .GT. 1) THEN

C      Calculate air concentrations--

      DO 415 IN = 1, NONUC
        RTEMP(IN) = 0.0
415      CONTINUE

      DO 442 ID = 1, NDIR

        DO 444 IX = 1, NDIST

C          Calculate decay in transit--
          T = X(IX) / AVEU(ID) * YRSEC
          CALL CHAIN (T, DUMMY, QAIR, DKAIR, 0)

C          Multiply by chi/Q and effective pop; accumulate total--
          DO 464 IN = 1, NONUC
            RTEMP(IN) = RTEMP(IN) + DKAIR(IN) * XOQ(IX,ID)
              * FPRDA(IX,ID,IAN) / CONS2(IAN)
464          CONTINUE
444          CONTINUE
442          CONTINUE

C      Calculate animal food-weighted air concentration--
      DO 468 IN = 1, NONUC
        ARF2CN(IN,IAN) = RTEMP(IN) / EFPOPA(IAN)
        IF (IAN .EQ. 1) ARF2CN(IN,5) = ARF2CN(IN,1)
        IF (IAN .EQ. 3) ARF2CN(IN,6) = ARF2CN(IN,3)
468      CONTINUE

      ENDIF
```

ENV

```
      ENDIF  
150   CONTINUE  
      ENDIF
```

```
      RETURN
```

```
C---- Error Conditions -----
```

```
92  WRITE (*,*) 'XOQOPT invalid in AIRCAL: ',XOQOPT  
    CALL EXIT (1)
```

```
99  CALL FILERR (2, LUN, 'In AIRCAL')
```

```
C-----  
      END
```

ENV

```
C-----
C
C      SUBROUTINE ANMCAL
C
C      This subroutine calculates uptake rate from consumption of
C      animal products.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 17-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      Internal parameters:
C
C      ANFLAG      - option flag for each of the feed and fodder types
C      DW          - animal drinking water contribution, UoA/L
C      EDBL()      - Concentration in animals from the six feed categories
C      IBV         - index of BVI value to use, either (1) fresh, (4) stored;
C                  soil-to-plant transfer factor for feed and forage
C      LEAF()      - Total leaf concentration, each radionuclide, UoA/kg
C      LEAF1a      - Leaf concentration from air, UoA/kg
C      LEAF1b      - Leaf concentration from resuspension, UoA/kg
C      LEAF2       - Leaf concentration from irrigation, UoA/kg
C      PLT()       - Plant concentration for each feed and fodder type, UoA/kg
C
C      ROOT1       - Root uptake contribution from surface soil, UoA/kg
C      ROOT2       - Root uptake contribution from deep soil, UoA/kg
C      T           - decay/integral time, sec
C      TENV        - Weathering time constant (-) for each radionuclide
C      WATCON()    - water concentration used for each radionuclide in the,
C                  current chain, either ground water or surface water
C
C      Assumptions:
C
C      1) Animals drink irrigation water if irrigation is considered,
C         otherwise animals assumed to drink surface water
C-----
C
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'SOLPAR.CMN'
```

ENV

```
REAL TENV(9), LEAF(9), PLT(9,6), EDBL(9,6), DW, LEAF1A, LEAF1B,  
    LEAF2, ROOT1, ROOT2, WATCDN(9)  
INTEGER IBV  
LOGICAL ANFLG  
  
IF (.NOT. DERANM .OR. ANMFED) THEN  
  
C      Calculate weathering constant--  
      TENV2 = ALOG2 / WTIM / YRDA  
  
C      Move fresh forage concentration into PLT--  
      IF (ANMFED) THEN  
        DO 112 IN = 1, NONUC  
          PLT(IN,5) = ANMCON(IN,1)  
          PLT(IN,6) = ANMCON(IN,3)  
          ANMCON(IN,1) = 0.0  
          ANMCON(IN,3) = 0.0  
112    CONTINUE  
      ENDIF  
  
C      For each animal feed and fodder pathway--  
      DO 100 IAN = 1, NAN+2  
  
C      Set option flag/concentration ratio index for feed or forage--  
      IF (IAN .LT. 5) THEN  
        ANFLG = ANF(IAN)  
        IBV = 4  
      ELSEIF (IAN .EQ. 5) THEN  
        ANFLG = ANF(1)  
        IBV = 1  
      ELSE  
        ANFLG = ANF(3)  
        IBV = 1  
      ENDIF  
  
C      Set water source for irrigation and drinking water, drinking  
C      water defaults to surface water if no irrigation--  
      DO 114 IN = 1, NONUC  
        IF (IRRSA(IAN) .EQ. 1) THEN  
          WATCON(IN) = GWCON(IN)  
        ELSE  
          WATCON(IN) = SWIRR(IN)  
        ENDIF  
114    CONTINUE  
  
      IF (ANFLG) THEN  
        IF (.NOT. ANMFED) THEN
```

ENV

```
DEPFR1 = 1.0 - EXP (-2.9 * BIOMA2(IAN) * DRYFA2(IAN))

C      Calculate contribution from deposition onto leaves--
DO 110 IN = 1, NONUC

      PLT(IN, IAN) = 0.0
      EDBL(IN, IAN) = 0.0

C      Calculate leaf deposition rate from air--
      LEAF1A = ARF2CN(IN, IAN) * DPVL(IN) * DEPFR1

C      Calculate leaf deposition from resuspension--
      LEAF1B = SL2CON(IN, IAN) * LEAFRS * DPVRES * SECYR
      * DEPFR1

C      Calculate leaf deposition rate from irrigation--
      LEAF2 = 0.0
      IF (IRRSA(IAN) .GT. 0) THEN
        IF (IRTIMA(IAN) .GT. 0.0)
          LEAF2 = WATCON(IN) * RIRRA(IAN) * LM2IN /
            IRTIMA(IAN) * MOYR * DEPFR2
      ENDIF

C      Calculate total leaf deposition rate--
      LEAF(IN) = 0.0
      IF (BIOMA2(IAN) .GT. 0.0)
        LEAF(IN) = (LEAF1A + LEAF1B + LEAF2) * TRANSA(IAN)
        / BIOMA2(IAN)

      IF (DEBUG .AND. IN .EQ. 1)
        WRITE (*,1) IAN, LEAF1A, LEAF1B, LEAF2, LEAF(1)

C      Set weathering constant for each radionuclide--
      TENV(IN) = TENV2

110    CONTINUE

C      Apply weathering correction (accumulation & decay) to leaves--
      T = GRWPA(IAN) * YRDA
      IF (T .GT. 0.0) CALL CHAIN (T, TENV, LEAF, LEAF, 1)

C      Calculate root contribution and fodder concentration--
DO 120 IN = 1, NONUC

C      Calculate root uptake contribution (surface and deep soil)--
      ROOT1 = SL2CON(IN, IAN) / SLDN
      * BVI(IBV, IN) * DRYFA2(IAN) * RF1
      ROOT2 = 0.0
      IF (DEEP)
```

ENV

```
.      ROOT2 = DS2CON(IN,IAN) / SSLDN
.      * BVI(IBV,IN) * DRYFA2(IAN) * RF2

C      Save uptake from soil for next year's harvest removal--
      IF (HARVST) THEN
        HARVA(IN,IAN,1) = (LEAF(IN) + ROOT1) * YELDA(IAN)
        IF (DEEP .AND. RF2 .GT. 0.0) THEN
          HARVA(IN,IAN,2) = ROOT2 * YELDA(IAN) / WASDEP
        ELSE
          HARVA(IN,IAN,2) = 0.0
        ENDIF
      ENDIF

C      Total plant concentration for each food and fodder--
      PLT(IN,IAN) = LEAF(IN) + ROOT1 + ROOT2

      IF (DEBUG .AND. IN .EQ. 1) WRITE (*,2)
        IAN,LEAF(1),ROOT1,ROOT2,PLT(1,IAN)

120    CONTINUE
      ENDIF

C----- Decay for holdup between feed harvest and animal consumption--

      T = 1.0
      CALL CHAIN (T, DUMMY, HARVA(1,IAN,1), HARVA(1,IAN,1), 0)
      IF (DEEP)
        CALL CHAIN (T, DUMMY, HARVA(1,IAN,2), HARVA(1,IAN,2), 0)

      T = STORTM(IAN) * YRDA
      IF (T .GT. 0.0)
        CALL CHAIN (T, DUMMY, PLT(1,IAN), PLT(1,IAN), 0)

C----- Calculate animal product concentration -----
      DO 130 IN = 1, NONUC

C      Animal product concentration for each type of fodder--
      EDBL(IN,IAN) = PLT(IN,IAN) * FMI(IAN,IN) * CONSUM(IAN) *
        DIETFR(IAN)

C      Calculate animal drinking water contribution--
      DW = 0.0
      IF (IAN .LT. 5) DW = WATCON(IN) *
        FMI(IAN,IN) * DWATER(IAN) * DWFACA(IAN)

      IF (DEBUG .AND. IN .EQ. 1) WRITE (*,*)
        'EDBL/DW:',EDBL(IN,IAN),DW

C      Add stored feed, fresh forage, and drink water contributions--
```

ENV

```
      IF (IAN .LT. 5) THEN
        ANMCON(IN,IAN) = EDBL(IN,IAN) + DW
      ELSEIF (IAN .EQ. 5) THEN
        ANMCON(IN,1) = ANMCON(IN,1) + EDBL(IN,IAN)
      ELSEIF (IAN .EQ. 6) THEN
        ANMCON(IN,3) = ANMCON(IN,3) + EDBL(IN,IAN)
      ENDIF

130      CONTINUE
      ENDIF
100      CONTINUE
      ENDIF

C----- For each animal product -----
      DO 200 IAN = 1, NAN
        IF (ANF(IAN)) THEN

          IF (DEBUG) WRITE (*,*) 'ANMCON:', ANMCON(1,IAN)

C          Holdup between slaughter/harvest and human consumption--
          IF (.NOT. DERANM) THEN
            T = HLDUPA(IAN) * YRDA
            CALL CHAIN (T, DUMMY, ANMCON(1,IAN), ANMCON(1,IAN), 0)
          ENDIF

C          Human uptake from contaminated animal products--
          DO 210 IN = 1, NONUC
            EXPOS(IN,7+IAN) = ANMCON(IN,IAN) * CONS2(IAN) * EFPOPA(IAN)
                               * ADJET2(IAN)
          210      CONTINUE

          ENDIF
        200 CONTINUE

      RETURN

C----- Format Statements -----
      1 FORMAT (' ANM: (1A/1B/2/LEAF):',I2,1P,4E10.2)
      2 FORMAT (' ANM: (LEAF/ROOT1/ROOT2/PLT):',I2,1P,4E10.2)

C-----
      END
```


ENV

```
C-----
C
C      SUBROUTINE AQUICAL
C
C      This subroutine calculates human uptake rate from consumption of
C      aquatic food.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 13-Jan-88 RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      SWDK()   - Surface water concentration, decayed for transit,
C                UoA/L
C      TYR      - Decay time in years
C-----

      INCLUDE 'CONC.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'AQUPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'AFPPAR.CMN'
      INCLUDE 'TIMES.CMN'

      REAL SWDK(9), TYR

      DO 100 IAQ = 1, NAQ
        IF (AQF(IAQ)) THEN
          IF (.NOT. DERAQU) THEN
C
C          Decay surface water for time in transit--
            TYR = AQUIT(IAQ) * YRHR
            IF (ACUTE) THEN
              CALL CHAIN (TYR, DUMMY, SWACUT, SWDK, 0)
            ELSE
              CALL CHAIN (TYR, DUMMY, SWCON, SWDK, 0)
            ENDIF
C
C          Calculate aquatic foods concentrations--
            DO 110 IN = 1, NONUC
              AQUCON(IN,IAQ) = SWDK(IN) * BIOACF(IAQ,IN)
110          CONTINUE
            IF (DEBUG) WRITE (*,*) 'IAN, SWDK, AQUCON:',
```

ENV

```
.      IAQ, SWDK(1), AQUCON(1,IAQ)
      ENDIF
C      Decay for holdup time--
      IF (.NOT. DERAQU) THEN
        T = HLDUP2(IAQ) * YRDA
        CALL CHAIN ( T, DUMMY, AQUCON(1,IAQ), AQUCON(1,IAQ), 0)
      ENDIF
C      Exposure from consumption of aquatic foods--
      DO 120 IN = 1, NONUC
        EXPOS(IN,17+IAQ) = AQUCON(IN,IAQ)
                          * USAG(IAQ) * AQUPOP * ADJETQ(IAQ)
120    CONTINUE
      ENDIF
100 CONTINUE
      RETURN
C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE CANDH
C
C      This module calculates environmental concentrations of C-14 and
C      H-3 using simplified specific-activity models for acute and chronic
C      exposures.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 30-Aug-88 RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C-----
C
C      AIRBOX() - air concentration for each radionuclide in the
C                current chain, set based on whether acute or chronic
C                exposure
C      ANFLAG   - option flag for each of the feed and fodder types
C      ANMFR    - fraction of animal diet for the current animal feed
C                type, set based on whether acute or chronic exposure
C      DW1()    - Intake via drinking water, used for tritium
C      DW2()    - Concentration in drinking water, used for tritium
C      ED8L()   - Concentration in animals from the six feed categories,
C                used for carbon
C      EDBL1()  - Intake via food, used for tritium
C      EDBL2()  - Concentration in food, used for tritium
C      LEAF()   - Total leaf concentration, each radionuclide, UoA/kg
C      LEAF1a   - Leaf concentration from air, UoA/kg
C      LEAF2    - Leaf concentration from irrigation, UoA/kg
C      WATCON() - Water concentration used for each radionuclide in the
C                current chain, either ground water or surface water
C
C      Assumptions:
C
C      1) Animals drink irrigation water if irrigation is considered,
C         otherwise animals assumed to drink surface water
C-----
C
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'SOLPAR.CMN'
```

ENV

```
REAL LEAF(9), EDBL(9,6), LEAF1A, LEAF2, WATCON(9), AIRBOX(9),  
.   EDBL1(6), EDBL2(6), DW1(4), DW2(4), ANMFR,  
.   C(6), C0, C1, C2, C3,  
.   H(6), H1, H2, H33,  
.   W(6), W1, W2, W3  
LOGICAL ANFLG
```

```
DATA C /0.24, 0.20, 0.07, 0.15, 0.24, 0.07/  
DATA C0 /2.0E-5/  
DATA C1 /1.6E-4/  
DATA C2 /0.09/  
DATA C3 /0.4/
```

```
DATA H / 0.094, 0.087, 0.083, 0.092, 0.094, 0.083/  
DATA H1 /9.0/  
DATA H2 /0.008/  
DATA H33 /0.0625/
```

```
DATA W / 0.60, 0.70, 0.88, 0.75, 0.60, 0.88/  
DATA W1 /0.80/  
DATA W2 /0.12/  
DATA W3 /0.80/
```

```
DATA Z1 /0.1/, Z2 /0.03/
```

```
DATA SKG /0.01/  
DATA PKG /0.1/  
DATA RMV /1.25/
```

```
IF (H3) THEN  
  W1M = W1 / H1 + (1.0 - W1) * H33  
  W2M = W2 / H1 + (1.0 - W2) * H33  
  W3M = W3 / H1 + (1.0 - W3) * H33  
ENDIF
```

C-----

C Process each selected terrestrial food type--

```
IF (TFOOD) THEN  
  DO 101 ITF = 1, NTF  
    IF (TFD(ITF)) THEN  
      IF (.NOT. DERCRP) THEN
```

C Set media compartments--

```
IF (ACUTE) THEN
```

ENV

```
DO 122 IN = 1, NONUC
  IF (C14) THEN
    AIRBOX(IN) = PWTAIR(IN) / 3600.0
      * 2.0 / (GRWP(ITF) * 24.0)
  ELSEIF (H3) THEN
    AIRBOX(IN) = PWTAIR(IN) / 3600.0
  ENDIF

  IF (IRRST(ITF) .EQ. 2) THEN
    WATCON(IN) = SWACUT(IN) / 3600.0
  ELSE
    WATCON(IN) = 0.0
  ENDIF

122    CONTINUE

ELSE

  DO 123 IN = 1, NONUC

    AIRBOX(IN) = ARFCON(IN,ITF) * YRSEC

    IF (IRRST(ITF) .EQ. 2) THEN
      WATCON(IN) = SWIRR(IN)
    ELSEIF (IRRST(ITF) .EQ. 1) THEN
      WATCON(IN) = GWCON(IN)
    ELSE
      WATCON(IN) = 0.0
    ENDIF

123    CONTINUE

  ENDIF

DO I11 IN = 1, NONUC
C    Calculate leaf concentration--
  IF (C14) THEN
    LEAF1A = AIRBOX(IN) / C1
  ELSEIF (H3) THEN
    LEAF1A = AIRBOX(IN) * H1 / H2
  ENDIF

C    Calculate leaf concentration from irrigation--
  LEAF2 = 0.0
  IF (IRTIMT(ITF) .GT. 0.0) THEN
    IF (C14) THEN
      LEAF2 = WATCON(IN) * RIRR(ITF) * LM2IN /
        IRTIMT(ITF) * MOYR * PKG * RMV
```

ENV

```

                                / SLDN / SKG

                                ELSEIF (H3) THEN
                                  LEAF2 = WATCON(IN) * H1
                                ENDIF
                                ENDIF

C      Calculate total leaf and plant concentrations --
      LEAF(IN) = LEAF1A + LEAF2

      IF (ITF .EQ. 3) THEN
        IF (C14) THEN
          PLTCON(IN,ITF) = LEAF(IN) * C3
        ELSEIF (H3) THEN
          PLTCON(IN,ITF) = LEAF(IN) * W1M
        ENDIF

        ELSE
          IF (C14) THEN
            PLTCON(IN,ITF) = LEAF(IN) * C2
          ELSEIF (H3) THEN
            PLTCON(IN,ITF) = LEAF(IN) * W2M
          ENDIF
        ENDIF

111      CONTINUE

C      Decay for holdup time between harvest and consumption--
      T = HLDUP(ITF) * YRDA
      CALL CHAIN (T, DUMMY, PLTCON(1,ITF), PLTCON(1,ITF), 0)

      ENDIF

C      Calculate human uptake from crops ---
      DO 131 IN = 1, NONUC
        EXPOS(IN,3+ITF) = PLTCON(IN,ITF) * CONS(ITF)
                          * EFPOP(ITF) * ADJEAT(ITF)
131      CONTINUE

      ENDIF
101      CONTINUE
      ENDIF

C----- Process each selected animal pathway -----
C      IF (ANFOOD) THEN
        IF (.NOT. DERANM .OR. ANMFED) THEN
```

ENV

```
IF (ANMFED) THEN
  DO 112 IN = 1, NONUC
    ANMCON(IN,1) = 0.0
    ANMCON(IN,3) = 0.0
112  CONTINUE
ENDIF

C    For each animal feed and fodder pathway--
DO 100 IAN = 1, NAN+2

C    Set option flag/concentration ratio index for feed or forage--
IF (IAN .LT. 5) THEN
  ANFLG = ANF(IAN)
ELSEIF (IAN .EQ. 5) THEN
  ANFLG = ANF(1)
ELSE
  ANFLG = ANF(3)
ENDIF

C    Set media compartments--
IF (ACUTE) THEN
  DO 132 IN = 1, NONUC
    IF (C14) THEN
      AIRBOX(IN) = PWTAIR(IN) / 3600.0
                  * 2.0 / (GRWPA(IAN) * 24.0)
    ELSEIF (H3) THEN
      AIRBOX(IN) = PWTAIR(IN) / 3600.0
    END IF

    IF (IRRSA(IAN) .EQ. 2) THEN
      WATCON(IN) = SWACUT(IN) / 3600.0
    ELSE
      WATCON(IN) = 0.0
    ENDIF
132  CONTINUE

C    Set acute diet fraction for autumn--
IF (IAN .EQ. 1) THEN
  ANMFR = 1.0 - FRACUT(4)
ELSEIF (IAN .EQ. 2) THEN
  ANMFR = 1.0
ELSEIF (IAN .EQ. 3) THEN
  ANMFR = 1.0 - FRACUT(4)
ELSEIF (IAN .EQ. 4) THEN
```

ENV

```

      ANMFR = 1.0
    ELSE
      ANMFR = FRACUT(4)
    ENDIF
  ELSE
C      Chronic--
      DO 133 IN = 1, NONUC
        AIRBOX(IN) = ARF2CN(IN, IAN) * YRSEC
        IF (IRRSA(IAN) .EQ. 2) THEN
          WATCON(IN) = SWIRR(IN)
        ELSEIF (IRRSA(IAN) .EQ. 1) THEN
          WATCON(IN) = GWCON(IN)
        ELSE
          WATCON(IN) = 0.0
        ENDIF
133      CONTINUE
C      Set chronic exposure animal diet fraction--
      ANMFR = DIETFR(IAN)
    ENDIF
    IF (ANFLG) THEN
      IF (.NOT. ANMFED) THEN
C        Calculate contribution from deposition onto leaves--
        DO 110 IN = 1, NONUC
C          Calculate leaf deposition rate from air--
          IF (C14) THEN
            LEAF1A = AIRBOX(IN) / C1
          ELSEIF (H3) THEN
            LEAF1A = AIRBOX(IN) * H1 / H2
          ENDIF
C          Calculate leaf deposition rate from irrigation--
          LEAF2 = 0.0
          IF (IRRSA(IAN) .GT. 0.0 .AND. IRTIMA(IAN) .GT. 0.0)
            THEN
            IF (C14) THEN
              LEAF2 = WATCON(IN) * RIRRA(IAN) * LM2IN /
                IRTIMA(IAN) * MOYR * PKG * RMV
            
```


ENV

```

                                / SLDN / SKG

                                ELSEIF (H3) THEN
                                  LEAF2 = WATCON(IN) * H1

                                ENDIF
                                ENDIF

C      Calculate total plant concentration--
      LEAF(IN) = LEAF1A + LEAF2

      IF (C14) THEN
        EDBL(IN,IAN) = LEAF(IN) * C(IAN) * ANMFR

      ELSEIF (H3) THEN

        WXM = W3M
        IF (IAN .LT. 5) WXM = W2M

        EDBL1(IAN) = LEAF(IN) * CONSUM(IAN) * WXM * ANMFR
        EDBL2(IAN) = CONSUM(IAN) * WXM * ANMFR

C      Calculate animal drinking water contribution--
      IF (IAN .LT. 5) THEN
        DW1(IAN) = WATCON(IN) * DWATER(IAN) * DWFACA(IAN)
        DW2(IAN) = DWATER(IAN) * DWFACA(IAN) / H1
      ENDIF

                                ENDIF
110      CONTINUE
                                ENDIF

                                ENDIF
100      CONTINUE
                                ENDIF

C      Add stored feed, fresh forage, and drinking water contributions--

      IF (C14) THEN
        ANMCON(1,1) = EDBL(1,1) + EDBL(1,5)
        ANMCON(1,2) = EDBL(1,2)
        ANMCON(1,3) = EDBL(1,3) + EDBL(1,6)
        ANMCON(1,4) = EDBL(1,4)

      ELSEIF (H3) THEN

C      Meat--
      RTEMP = (EDBL2(1) + EDBL2(5) + DW2(1))
      IF (RTEMP .GT. 0.0) THEN
```

ENV

```

      ANMCON(1,1) = (EDBL1(1) + EDBL1(5) + DW1(1)) / RTEMP *
                   (W(1) / H1 + (1.0 - W(1)) * H(1))

    ELSE
      ANMCON(1,1) = 0.0
    ENDIF

C   Poultry--
    RTEMP = (EDBL2(2) + DW2(2))
    IF (RTEMP .GT. 0.0) THEN
      ANMCON(1,2) = (EDBL1(2) + DW1(2)) / RTEMP *
                   (W(2) / H1 + (1.0 - W(2)) * H(2))
    ELSE
      ANMCON(1,2) = 0.0
    ENDIF

C   Milk--
    RTEMP = (EDBL2(3) + EDBL2(6) + DW2(3))
    IF (RTEMP .GT. 0.0) THEN
      ANMCON(1,3) = (EDBL1(3) + EDBL1(6) + DW1(3)) / RTEMP *
                   (W(3) / H1 + (1.0 - W(3)) * H(3))
    ELSE
      ANMCON(1,3) = 0.0
    ENDIF

C   Eggs--
    RTEMP = (EDBL2(4) + DW2(4))
    IF (RTEMP .GT. 0.0) THEN
      ANMCON(1,4) = (EDBL1(4) + DW1(4)) / RTEMP *
                   (W(4) / H1 + (1.0 - W(4)) * H(4))
    ELSE
      ANMCON(1,4) = 0.0
    ENDIF

  ENDIF

DO 200 IAN = 1, NAN
  IF (ANF(IAN)) THEN

C   Holdup between slaughter/harvest and human consumption--
    IF (.NOT. DERANM) THEN
      T = HLDUPA(IAN) * YRDA
      CALL CHAIN (T, DUMMY, ANMCON(1,IAN), ANMCON(1,IAN), 0)
    ENDIF

C   Human uptake from contaminated animal products--
    DO 210 IN = 1, NONUC
      EXPOS(IN,7+IAN) = ANMCON(IN,IAN) * CONS2(IAN) *
                       EFPOPA(IAN) * ADJET2(IAN)
    
```

ENV

210 CONTINUE

 ENDIF
200 CONTINUE
 ENDIF

 RETURN

C-----
 END

ENV

```
C-----
C
C      SUBROUTINE CHAIN (T, AB, AM, AO, INTGRL)
C
C      This subroutine calculates radioactive decay and buildup for a
C      chain of radionuclides for a given time period, allowing for
C      nonradiological removal to a sink, or the time integral of the
C      activity
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 6-Nov-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      T          - Time over which decay is to be considered. Units of
C                  T must be compatible with the units of the decay con-
C                  stants, AL
C      AB()       - Sum of the non radiological removal constants in units
C                  compatible with T
C      AM()       - Initial quantity of each radionuclide (Ci)
C      AO()       - Final activity (or time integral) of each radionuclide
C      INTRGL     - Control integer set > 0 to calculate time integral
C                  of activity, otherwise calculate decay
C-----
C
C      INCLUDE 'DECAY.CMN'
C
C      REAL*8 A(45), SUMPR, ASUM, AMD(9), EXPO(9), ABD(9)
C      REAL*8 ARG, TERM
C      DIMENSION AM(9), AO(9), AB(9)
C
C      Divide by lambda--
C      DO 113 IJK = 1, 9
C          EXPO(IJK) = 0.000
C          ABD(IJK) = DBLE (AB(IJK) + AL(IJK))
C          IF (AL(IJK) .NE. 0.0) AMD(IJK) = DBLE (AM(IJK) / AL(IJK))
113 CONTINUE
C
C      INITIALIZE COEFFICIENT ARRAY TO ZERO--
C
C      N2N = NUC * (NUC-1) / 2 + NUC
C
```

ENV

```
C      CALL ZEROR (N2N, A)
      DO 100 IJK = 1, N2N
        A(IJK) = 0.000
100 CONTINUE
C
C      DO LOOP ON CHAIN MEMBERS,  MAX = NUC--
      DO 5 J = 1, NUC
C
C      CALCULATE EXPONENTIAL FOR CURRENT NUCLIDE--
      ARG=-ABD(J) * T
C
      IF (INTGRL .GT. 0) THEN
        IF (ARG .GT. 0.0) THEN
          WRITE (*,111) ARG
111      FORMAT (' ERROR IN EXMO OF ACHAIN, POS ARG= '
              1PE10.3)
        ELSE
C      FORM IS:  (1 - DEXP (ARG) ) / AB  FOR INTGRL > 0
          IF (-ARG .GT. 50.0) THEN
            EXPO(J) = 1.000 / ABD(J)
          ELSEIF (-ARG .GT. 0.001) THEN
            EXPO(J) = (1.000 - DEXP(ARG)) / ABD(J)
          ELSE
            FX = -(DLOG10(-ARG))
            I = 10 - IFIX(FX)
            IF (I .LT. 2) I=2
            TERM = - ARG
            EXPO(J) = -ARG / ABD(J)
            DO 13 IT = 2, I
              TERM = (TERM*ARG) / DBLE(IT)
              EXPO(J) = EXPO(J) + TERM / ABD(J)
13      CONTINUE
            ENDIF
          ENDIF
        ELSE
C      FORM IS EXP(ARG) FOR INTGRL = 0
          IF (-ARG .GT. 50.0) THEN
            EXPO(J) = 0.000
```

ENV

```
      ELSE
        EXPO(J) = DEXP (ARG)
      ENDIF
    ENDIF

C
C   SET STARTING INDEX FOR TERM ARRAY A--
JJ = J * (J-1) / 2

C
C   SET CHAIN POSITION MINUS ONE--
J1 = J - 1

C
IF(J1 .GT. 0) THEN

C
    IMAX = MIN0 (J1, 2)
    DO 3 M = 1, J1
      DO 2 L = M, J1
        DD 1 I = 1, IMAX

C
          IF (IFRM(I,J) .EQ. L) THEN
            A(M+JJ) = A(M+JJ) + DK(I,J) * AL(L) * A(M+L * (L-1)/2)
          ENDIF

C
1      CONTINUE
2      CONTINUE

C
    A(M+JJ) = A(M+JJ) / (ABD(J) - ABD(M))
```

ENV

```
C
      3      CONTINUE
C
      ENDIF
C
C
      ASUM = 0.0D0
      IF (J1 .EQ. 0) GO TO 11
      DO 12 IRAP = 1, J1
         JK = JJ + IRAP
         ASUM = ASUM + A(JK)
12     CONTINUE
11     CONTINUE

      A(J+JJ) = AMD(J) - ASUM

      SUMPR = 0.0D0
      J2 = J
      DO 8884 IN = 1, J2
         JK = JJ + IN
         SUMPR = SUMPR + EXPO(IN) * A(JK)
8884    CONTINUE

C      Multiply by lambda, return to single precision--
      AO(J) = SNGL (SUMPR * AL(J))
C
      5 CONTINUE

      RETURN

C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE CRPCAL
C
C      This subroutine calculates human uptake rate from consumption of
C      terrestrial foods.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 17-Aug-88 RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C-----
C
C      LEAF1a   - Intermediate leaf deposition rate from air (UoA/m2 yr)
C      LEAF1b   - Intermediate leaf deposition rate from resuspension,
C                (UoA/m2 yr)
C      LEAF2    - Intermediate leaf deposition rate from irrigation,
C                (UoA/M2 yr)
C      TENV     - Weathering constant, yr-1
C      WATCON   - water concentration used for the current radionuclide,
C                either ground water or surface water (UoA/L)
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SOLPAR.CMN'
C
C      REAL TENV(9), LEAF(9), LEAF1A, LEAF1B, LEAF2, WATCON
C----- Calculate weathering constant -----
C
C      TENV2 = ALOG2 / WTIM / YRDA
C      IF (DEBUG) WRITE (*,*) 'Weathering (TENV2): ', TENV2
C
C      Process each selected terrestrial food type--
C      DO 100 ITF = 1, NTF
C        IF (TFD(ITF)) THEN
C          IF (.NOT. DERCRP) THEN
C----- Calculate contribution from leaves -----
C
C          IF (ITF .EQ. 2 .OR. ITF .EQ. 3) THEN
C            DEPFRI = 1.0 - EXP (-3.6 * BIOMAS(ITF) * DRYFAC(ITF))
```


ENV

```
ELSE
  DEPFR1 = 1.0 - EXP (-2.9 * BIOMAS(ITF) * DRYFAC(ITF))
ENDIF

DO 110 IN = 1, NONUC

C      Calculate leaf deposition rate from air--
      LEAF1A = ARFCON(IN,ITF) * DPVL(IN) * DEPFR1

C      Calculate leaf depositon rate from resuspension--
      LEAF1B = SOLCON(IN,ITF) * LEAFRS * DPVRES * SECYR * DEPFR1

C      Calculate leaf deposition rate from irrigation--
      LEAF2 = 0.0
      IF (IRRST(ITF) .GT. 0) THEN
        IF (IRRST(ITF) .EQ. 1) THEN
          WATCON = GWCON(IN)
        ELSE
          WATCON = SWIRR(IN)
        ENDIF
        IF (IRTIMT(ITF) .GT. 0.0) THEN
          LEAF2 = WATCON * RIRR(ITF) * LM2IN / IRTIMT(ITF)
            * MOYR * DEPFR2
        ENDIF
      ENDIF

C      Calculate total leaf deposition rate --
      LEAF(IN) = 0.0
      IF (BIOMAS(ITF) .GT. 0.0)
        LEAF(IN) = (LEAF1a + LEAF1b + LEAF2)
          * TRANS(ITF) / BIOMAS(ITF)

      IF (DEBUG .AND. IN .EQ. 1) WRITE (*,*)
        'LEAF1a/LEAF1b/LEAF2/LEAF:',LEAF1A,LEAF1B,LEAF2,LEAF(1)

C      ---- Set weathering constant for each radionuclide -----
      TENV(IN) = TENV2

110    CONTINUE

C      Apply weathering correction (accumulation & decay) to leaves--
      T = GRWP(ITF) * YRDA
      CALL CHAIN (T, TENV, LEAF, LEAF, 1)
C      LEAF() now in concentration units

C----- Calculate root contribution and plant concentration -----
DO 120 IN = 1, NONUC

C      Calculate root uptake contribution (surface & deep soil)--
```

ENV

```

      ROOT1 = SOLCON(IN,ITF) / SLDN
      * BVI(ITF,IN) * DRYFAC(ITF) * RF1
      ROOT2 = 0.0
      IF (DEEP)
      * DSCON(IN,ITF) / SSLDN
      * BVI(ITF,IN) * DRYFAC(ITF) * RF2
C      Save uptake from soil for next year's harvest removal--
      IF (HARVST) THEN
        HARVT(IN,ITF,1) = (LEAF(IN) + ROOT1) * YELD(ITF)
        IF (DEEP .AND. RF2 .GT. 0.0) THEN
          HARVT(IN,ITF,2) = ROOT2 * YELD(ITF) / WASDEP
        ELSE
          HARVT(IN,ITF,2) = 0.0
        ENDIF
      ENDIF

C      Calculate total plant concentration--
      PLTCON(IN,ITF) = LEAF(IN) + ROOT1 + ROOT2

      IF (DEBUG .AND. IN .EQ. 1) WRITE (*,*)
        'LEAF/ROOT1/ROOT2/PLTCON:',
        ITF, LEAF(1),ROOT1,ROOT2, PLTCON(1,ITF)
120      CONTINUE

C----- Decay for holdup time between harvest and consumption -----
      T = 1.0
      CALL CHAIN (T, DUMMY, HARVT(1,ITF,1), HARVT(1,ITF,1), 0)
      IF (DEEP)
      * CALL CHAIN (T, DUMMY, HARVT(1,ITF,2), HARVT(1,ITF,2), 0)

      T = HLDUP(ITF) * YRDA
      ENDIF

C----- Calculate human uptake from crops -----
      DO 130 IN = 1, NONUC
        EXPOS(IN,3+ITF) = PLTCON(IN,ITF) * CONS(ITF)
        * EFPOP(ITF) * ADJEAT(ITF)
130      CONTINUE

      ENDIF
100 CONTINUE

      RETURN

C-----
```

ENV

END

ENV

```
C-----
C
C      SUBROUTINE DKHARV
C
C      This subroutine calculates radionuclide decay in the surface
C      soil (top 15 cm), deep soil (available for uptake), and the waste
C      form compartments for a single radionuclide decay chain. In
C      addition, this subroutine calculates harvest removal of radio-
C      nuclides in the surface and deep soil compartments for both
C      terrestrial foods and animal product pathways. This subroutine
C      is used for both near-field and far-field scenarios.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  8A Napier
C-----

      INCLUDE 'SOLPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'CONC.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'FODPAR.CMN'
      INCLUDE 'ANMPAR.CMN'

      LOGICAL ANFLG

      IF (DOWAST .AND. BURWAS) THEN
C      Decay contained waste for previous year--
        TEMP = QWAS(1)
        CALL CHAIN (ONEYR, LEACHR, QWAS, QWAS, 0)
        IF (DEBUG) WRITE (*,*) 'QWAS before/after decay:',
          .      TEMP, QWAS(1)
        ENDIF

      IF (NONAG) THEN
C      Decay non-agricultural soil compartments--
        CALL CHAIN (ONEYR, LEACHR, NONAGS, NONAGS, 0)
        IF (DEEP) CALL CHAIN (ONEYR, DUMMY, NONAGD, NONAGD, 0)

      ELSE
C      Residential/resuspension soil compartments--
        CALL CHAIN (ONEYR, LEACHR, RESSOL, RESSOL, 0)
        IF (DEEP) CALL CHAIN (ONEYR, DUMMY, DSRES, DSRES, 0)
```

ENV

```
C      For terrestrial foods soil compartment--
      IF (TFOOD) THEN
        DO 130 ITF = 1, NTF
          IF (TFD(ITF)) THEN

C          Decay soils for previous year--
          TEMP = SOLCON(1,ITF)
          CALL CHAIN (ONEYR, LEACHR, SOLCON(1,ITF), SOLCON(1,ITF),0)
          IF (DEEP) CALL CHAIN
            (ONEYR, DUMMY, DSCON(1,ITF), DSCON(1,ITF), 0)

C          Harvest removal--
          IF (HARVST) THEN
            DO 120 IN = 1, NONUC
              SOLCON(IN,ITF) = SOLCON(IN,ITF) - HARVT(IN,ITF,1)
              IF (DEEP) DSCON(IN,ITF) =
                DSCON(IN,ITF) - HARVT(IN,ITF,2)
120          CONTINUE
          ENDIF

          IF (DEBUG) WRITE (*,*)
            'Crop soil before/after decay & harvest, HARVT:',
            ITF, TEMP, SOLCON(1,ITF),HARVT(1,ITF,1)

          ENDIF
130        CONTINUE
      ENDIF

C      For animal product soil compartment--
      IF (ANFOOD) THEN
        DO 132 IAN = 1, NAN+2

          IF (IAN .LT. 5) THEN
            ANFLG = ANF(IAN)
          ELSEIF (IAN .EQ. 5) THEN
            ANFLG = ANF(1)
          ELSE
            ANFLG = ANF(3)
          ENDIF

          IF (ANFLG) THEN

C          Decay soils for previous year--
          TEMP = SL2CON(1,IAN)
          CALL CHAIN (ONEYR, LEACHR, SL2CON(1,IAN), SL2CON(1,IAN),0)
          IF (DEEP) CALL CHAIN
            (ONEYR, DUMMY, DS2CON(1,IAN), DS2CON(1,IAN), 0)

C          Harvest removal--
```

ENV

```
      IF (HARVST) THEN
        DO 122 IN = 1, NONUC
          SL2CON(IN,IAN) = SL2CON(IN,IAN) - HARVA(IN,IAN,1)
          IF (DEEP) DS2CON(IN,IAN) =
            DS2CON(IN,IAN) - HARVA(IN,IAN,2)
122      CONTINUE
        ENDIF

        IF (DEBUG) WRITE (*,*)
          'Ann soil before/after decay & harvest, HARVA:',
          IAN, TEMP, SL2CON(1,IAN), HARVA(1,IAN,1)

      ENDIF
132    CONTINUE
      ENDIF
    ENDIF

    RETURN
C-----
    END
```

ENV

```
C-----
C
C      SUBROUTINE DRKCAL
C
C      This subroutine calculates drinking water uptake rates--
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 13-Jan-88 RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      WATCON() - Drinking water concentration, units of activity/L
C      TYR      - Decay time in years
C-----

      INCLUDE 'AQUPAR.CMN'
      INCLUDE 'CONC.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'RAD.CMN'

      REAL WATCON(9), TYR

      IF (.NOT. DERDRK) THEN

        DO 100 IN = 1, NONUC

C          Determine drinking water source--
          IF (ACUTE) THEN
            WATCON(IN) = SWACUT(IN)
          ELSEIF (DWSRC .EQ. 1) THEN
            WATCON(IN) = GWCON(IN)
          ELSEIF (DWSRC .EQ. 2) THEN
            WATCON(IN) = SWCON(IN)
          ELSEIF (DWSRC .EQ. 3) THEN
            WATCON(IN) = DWCON(IN)
          ELSE
            WATCON(IN) = 0.0
          ENDIF

C          Apply drinking water cleanup factor--
          IF (DWTRET .AND. DWSRC .NE. 3)
            WATCON(IN) = WATCON(IN) * DWCLEN(IN)

100    CONTINUE
```

ENV

C Transit time and holdup until consumption--
 TYR = HOLDDW * YRDA
 CALL CHAIN (TYR, DUMMY, WATCON, WATCON, 0)

 ELSE

 DO 210 IN = 1, NONUC
 WATCON(IN) = DWCON(IN)
210 CONTINUE

 ENDIF

C Calculate exposure from consumption of drinking water--
 DO 200 IN = 1, NONUC
 EXPOS(IN,17) = WATCON(IN) * DWUSAG * DWPOP
200 CONTINUE

 RETURN

C-----
 END

ENV

```
C-----
C
C      SUBROUTINE EDRANM
C
C      This subroutine calculates radionuclide concentrations in the
C      surface soil (top 15 cm) and deep soil (available for uptake)
C      for the animal foods pathways for a single radionuclide decay
C      chain. This subroutine is used for both near-field and far-field
C      scenarios. Processes considered: irrigation deposition, atmospheric
C      deposition, leaching, and biotic transport.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 14-Jan-88  RAP
C      Reviewed and Approved: 12-Sept-B8  BA Napier
C-----
C
C      ANFLG      - Option flag for each of the animal fodder types
C      IBV        - Index of BVI value to use, either 1-fresh, 4-stored;
C                  soil-to-plant transfer factor for fodder, corresponds
C                  to leafy vegetables and grains of terrestrial plants
C      RTATM      - Atmospheric removal rate, UoA/m2-yr
C      RTBIO()    - Biotic transport removal rate, UoA/m2-yr
C      RTIRR      - Irrigation removal rate, UoA/m2-yr
C      WATCON     - Irrigation water concentration of current radionuclide
C                  chain member, UoA/l
C-----
C
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SOLPAR.CMN'
C
C      REAL RTIRR, RTATM, RTBIO(9), WATCON
C      LOGICAL ANFLG
C      INTEGER IBV
C
C      DO 410 IAN = 1, NAN+2
C
C      Set option ratio, concentration ratio index for grass or grain--
C      IF (IAN .LT. 5) THEN
C        ANFLG = ANF(IAN)
C        IBV = 4
C      ELSEIF (IAN .EQ. 5) THEN
```

ENV

```
      ANFLG = ANF(1)
      IBV = 1
ELSE
      ANFLG = ANF(3)
      IBV = 1
ENDIF

IF (ANFLG) THEN
  DO 400 IN = 1, NONUC

C      Irrigation deposition--
      RTIRR = 0.0
      IF (IRRSA(IAN) .GT. 0) THEN
        IF (IRRSA(IAN) .EQ. 1) THEN
          WATCON = GWCON(IN)
        ELSE
          WATCON = SWIRR(IN)
        ENDIF
        RTIRR = WATCON * RIRRA(IAN) * LM2IN
      ENDIF

C      Atmospheric deposition--
      RTATM = 0.0
      IF (DOAIR) RTATM = ARF2CN(IN,IAN) * DPVL(IN)

C      Biotic transport--
      RTBIO(IN) = 0.0
      IF (BIOT .AND. DOBIOT) THEN
        RTEMP = BVI(IBV,IN) * RF2 * YELDA(IAN) / SSLDN
        RTBIO(IN) = DS2CON(IN,IAN) * (EXCAMT + RTEMP) / WASDEP
        IF (DEBUG .AND. IN .EQ. 1) WRITE (*,*)
          'RTEMP, RTBIO:',RTEMP, RTBIO(1)
      ENDIF

C      Sum environmental rates--
      RTENV(IN) = RTIRR + RTATM + RTBIO(IN)
      RTAVAL(IN) = RTBIO(IN)

400    CONTINUE

      IF (DEBUG) WRITE (*,*)
        'Ann soil:(RTIRR/RTATM/RTBIO):',
        RTIRR, RTATM, RTBIO(1)

C      ---- Integrate over one year -----

C      Total deposition/removal contributions to surface soil--
      CALL CHAIN (ONEYR, LEACHR, RTENV, RTENV, 1)
```

ENV

```
C      Calculate total change in available waste--
      IF (DEEP) CALL CHAIN (ONEYR, DUMMY, RTAVAL, RTAVAL, 1)

C      ---- Add total integrations to soil and waste concentrations --

      DO 420 IN = 1, NONUC
        SL2CON(IN, IAN) = SL2CON(IN, IAN) + RTENV(IN)
        IF (DEEP) DS2CON(IN, IAN) = DS2CON(IN, IAN) - RTAVAL(IN)
420    CONTINUE

      IF (DEBUG) THEN
        WRITE (*,*) 'Anm soil:', IAN, SL2CON(1, IAN)
        IF (DEEP) WRITE (*,*) ' and deep:', DS2CON(1, IAN)
      ENDIF

      ENDIF
410 CONTINUE

      RETURN
C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE EDRCRP
C
C      This subroutine calculates radionuclide concentrations in the
C      surface soil (top 15 cm) and deep soil (available for uptake)
C      compartments for the terrestrial food pathways for a single
C      radionuclide decay chain. This subroutine is used for both
C      near-field and far-field scenarios. Processes considered:
C      irrigation deposition, atmospheric deposition, leaching,
C      and biotic transport
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 14-Jan-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      RTATM      - Atmospheric removal rate, UoA/m2-yr
C      RTBIO()    - Biotic transport removal rate, UoA/m2-yr
C      RTIRR      - Irrigation removal rate, UoA/m2-yr
C      WATCON     - Irrigation water concentration of current radionuclide
C                  chain member, UoA/l
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'DPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SOLPAR.CMN'
C
C      REAL RTIRR, RTATM, RTBIO(9), WATCON
C
C      DO 310 ITF = 1, NTF
C        IF (TFD(ITF)) THEN
C
C          DO 300 IN = 1, NONUC
C
C            Irrigation deposition--
C
C            RTIRR = 0.0
C            IF (IRRST(ITF) .GT. 0 .AND. DOIRR) THEN
C              IF (IRRST(ITF) .EQ. 1) THEN
C                WATCON = GWCON(IN)
C              ELSE
```

ENV

```
      WATCON = SWIRR(IN)
    ENDIF
    RTIRR = WATCON * RIRR(ITF) * LM2IN
  ENDIF

C      Atmospheric deposition--

      RTATM = 0.0
      IF (DOAIR) RTATM = ARFCON(IN,ITF) * DPVL(IN)

C      Biotic transport--
      RTBIO(IN) = 0.0
      IF (BIOT .AND. DOBIOT) THEN
        RTEMP = BVI(ITF,IN) * RF2 * YELD(ITF) / SSLDN
        RTBIO(IN) = DSCON(IN,ITF) * (EXCAMT + RTEMP) / WASDEP
        IF (DEBUG .AND. IN .EQ. 1) WRITE (*,*)
          'RTEMP, RTBIO:',RTEMP, RTBIO(1)
      ENDIF

C      Sum environmental deposition/contribution rates--
      RTENV(IN) = RTIRR + RTATM + RTBIO(IN)
      RTAVAL(IN) = RTBIO(IN)

      IF (DEBUG .AND. IN .EQ. 1) WRITE (*,*)
        'Crop soil:(RTIRR/RTATM/RTBIO):',
        RTIRR, RTATM, RTBIO(1)

300    CONTINUE

C      ---- Integrate over one year -----

      RTEMP = RTENV(1)
C      Environmental deposition/removal contributions to surface soil--
      CALL CHAIN (ONEYR, LEACHR, RTENV, RTENV, 1)
      IF (DEBUG) WRITE (*,*) 'RTENV before/after integration:',
        RTEMP, RTENV(1)

C      Calculate net rate of change in deep soil--
      IF (DEEP) CALL CHAIN (ONEYR, DUMMY, RTAVAL, RTAVAL, 1)

C      ---- Add total integrations to soil and waste concentrations --

      DO 320 IN = 1, NONUC
        SOLCON(IN,ITF) = SOLCON(IN,ITF) + RTENV(IN)
        IF (DEEP) DSCON(IN,ITF) = DSCON(IN,ITF) - RTAVAL(IN)
320    CONTINUE

      IF (DEBUG) THEN
        WRITE (*,*) 'Crop soil:',ITF, SOLCON(1,ITF)
```

ENV

IF (DEEP) WRITE (*,*) ' and deep:', DSCON(1,ITF)
ENDIF

ENDIF
310 CONTINUE

RETURN
C-----
END

ENV

```
C-----
C
C      SUBROUTINE EDRNON
C
C      This subroutine calculates radionuclide concentrations in the
C      surface soil (top 15 cm), deep soil (available for uptake)
C      and the waste form compartments for a single radionuclide decay
C      chain for non agricultural scenarios during the option inventory
C      decay/buildup period. This subroutine is used for near-field
C      scenarios, Processes considered: leaching and biotic transport.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 6-Sep-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      RTBIO() - Biotic transport removal rate, UoA/m2-yr
C-----

      INCLUDE 'SOLPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'CONC.CMN'
      INCLUDE 'TIMES.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'FODPAR.CMN'
      INCLUDE 'ANMPAR.CMN'

      REAL RTBIO(9)

      DO 320 IN = 1, NONUC

C      Non-agricultural biotic transport scenario--
      RTBIO(IN) = 0.0
      IF (BIOT .AND. DOBIOT) THEN

          RTEMP = BVI(1,IN) * RF2 * YELDBT(BTDSET) / SSLDN
          RTBIO(IN) = NONAGD(IN) * (EXCAMT + RTEMP) / WASDEP

          IF (DEBUG .AND. IN.EQ.1) WRITE (*,*)
            'RTEMP, RTBIO:',RTEMP, RTBIO(1)
          ENDIF
          RTAVAL(IN) = RTBIO(IN)

      320 CONTINUE
```

ENV

```
      IF (DEBUG .AND. DEEP)
.    WRITE (*,*) 'Non-ag biotic transport rate:',RTAVAL(1)

C    ---- Integrate over one year -----
C    Environmental deposition/removal contributions to surface soil--
      CALL CHAIN (ONEYR, LEACHR, RTBIO, RTBIO, 1)
C    Calculate removal from deep soil due to biotic transport--
      IF (DEEP) CALL CHAIN (ONEYR, DUMMY, RTAVAL, RTAVAL, 1)

      IF (DEBUG) THEN
        WRITE (*,*) 'Add to non-agr surface soil:',RTBIO(1),
.      ' Subtract from deep:',RTAVAL(1)
      ENDIF

C    ---- Add total integrations to soil and waste concentrations --

      DO 520 IN = 1, NONUC
        NONAGS(IN) = NONAGS(IN) + RTBIO(IN)
        IF (DEEP) NONAGD(IN) = NONAGD(IN) - RTAVAL(IN)
520 CONTINUE

      IF (DEBUG) WRITE (*,*)
.    'Non-agr soil:',NONAGS(1),' and deep:',NONAGD(1)

      RETURN
C-----
      END
```


ENV

```
C-----
C
C      SUBROUTINE EDRRES
C
C      This subroutine calculates radionuclide deposition/removal to
C      residential/resuspension soil for a single radionuclide decay chain.
C      This subroutine is used for both near-field and far-field
C      scenarios.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 14-Jan-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      RTATM      - Atmospheric removal rate, UoA/m2-yr
C      RTBIO()    - Biotic transport removal rate, UoA/m2-yr
C      RTENV()    - Total environmental removal rate, UoA/m2-yr, for each
C                  member of the current radionuclide chain
C      RTIRR      - Irrigation removal rate, UoA/m2-yr
C                  chain member, UoA/L
C      WATCON     - Irrigation water concentration, source may be either
C                  ground or surface water, UoA/L
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SOLPAR.CMN'
C
C      REAL RTIRR, RTATM, RTBIO(9), WATCON
C
C      DO 500 IN = 1, NONUC
C
C      Irrigation deposition--
C
C      RTIRR = 0.0
C      IF (RESIRR .AND. DOIRR) THEN
C        IF (IRRSR .EQ. 1) THEN
C          WATCON = GWCON(IN)
C        ELSE
C          WATCON = SWIRR(IN)
C        ENDIF
C      RTIRR = WATCON * RIRRR * LM2IN
```

ENV

```
ENDIF

C   Atmospheric deposition--

RTATM = 0.0
IF (DOAIR) RTATM = ARPCON(IN) * DPVL(IN)

C   Biotic transport--
RTBIO(IN) = 0.0
IF (BIOT .AND. DOBIOT) THEN
    RTEMP = BVI(1,IN) * RF2 * YELDBT(3) / SSLDN
    RTBIO(IN) = DSRES(IN) * (EXCAMT + RTEMP) / WASDEP
    IF (DEBUG .AND. IN .EQ. 1) WRITE (*,*)
    .   'RTEMP, RTBIO: ',RTEMP, RTBIO(1)
ENDIF

C   Sum environmental deposition/contribution rates--
RTENV(IN) = RTIRR + RTATM + RTBIO(IN)
RTAVAL(IN) = RTBIO(IN)

    IF (DEBUG .AND. IN .EQ. 1) WRITE (*,*)
    .   'Res soil:(RTIRR/RTATM/RTBIO):',
    .   RTIRR, RTATM, RTBIO(1)

500 CONTINUE

C   Integrate over one year--
C   Environmental deposition/removal contributions to soils--

CALL CHAIN (ONEYR, LEACHR, RTENV, RTENV, 1)
IF (DEEP) CALL CHAIN (ONEYR, DUMMY, RTAVAL, RTAVAL, 1)

C   Add total integrations to residential soils--
DO 520 IN = 1, NONUC
    RESSOL(IN) = RESSOL(IN) + RTENV(IN)
    IF (DEEP) DSRES(IN) = DSRES(IN) - RTAVAL(IN)
520 CONTINUE

RETURN
C-----
END
```

ENV

```
C-----
C
C   SUBROUTINE EXPOS (ISEAS)
C
C   This module controls environmental exposure calculations for a
C   radionuclide chain.
C
C   Module of Program ENV of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 30-Aug-88  RAP
C   Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C   ISEAS    - Season index for acute cases
C-----

      INCLUDE 'CONC.CMN'
      INCLUDE 'EXPALL.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'TIMES.CMN'

      IF (ACUTE .AND. ITIMT .EQ. 1) THEN
C
C   Food uptake from acute release--
      IF (C14 .OR. H3) THEN
        IF (ISEAS .EQ. 4) CALL CANDH
      ELSE
        IF (TFOOD) CALL ACUTEC (ISEAS)
        IF (ANFOOD) CALL ACUTEA (ISEAS)
      ENDIF
      ELSE
C
C   Calculate uptake rate from terrestrial foods, animal products--
      IF (C14 .OR. H3) THEN
        CALL CANDH
      ELSE
        IF (TFOOD) CALL CRPCAL
        IF (ANFOOD) CALL ANMCAL
      ENDIF
      ENDIF
C
C   Calculate uptake from drinking water--
      IF (DRINK) CALL DRKCAL
```

ENV

```
C   Calculate uptake from aquatic food ingestion--  
    IF (AQFOOD) CALL AQUICAL  
  
C   Calculate inhalation rate--  
    IF (INHAL) CALL INHCAL  
  
C   Calculate external exposure rates and inadvertent soil ingestion--  
    IF (AIREXT .OR. FINITE .OR. GROUND .OR. SLING .OR. RECRE)  
      CALL EXTCAL  
  
C   Transfer to exposure rate array--  
    DO 201 IP = 1, NPATH  
      DO 202 IN = 1, NONUC  
        EXPOST(ETIME,IN,IP) = EXPOS(IN,IP)  
202   CONTINUE  
201 CONTINUE  
  
    RETURN  
C-----  
    END
```

ENV

```
C-----
C
C      SUBROUTINE EXTCAL
C
C      This subroutine controls calculation of external dose as well
C      as dose from inadvertent ingestion of soil.  Exposure from
C      infinite and finite plumes are calculated.
C
C      The surface water is decayed for time in transit and then
C      external exposure rates are calculated for contaminated soil
C      at the residential site and for recreational activities.
C      Internal exposure from inadvertent ingestion of swimming
C      water is also calculated.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 2-Aug-88 RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      T          - Length of time sediment is exposed to contaminated
C                  water also transit time to recreational site, yr
C      WATCON()    - Surface water concentration decayed for time in
C                  transit to site, UoA/L
C      AREAEX      - Source area external dose modification factor,
C                  dimensionless
C      HECTAR      - Hectare to m2 correction factor, m2.
C      FIRST       - Logical cleared after first pass of logic.
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'EXTPAR.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'SWPAR.CMN'
C      INCLUDE 'TIMES.CMN'
C
C      REAL T, WATCON(9), AREAEX, HECTAR
C      LOGICAL FIRST
C      DATA HECTAR /10000.0/, FIRST /.TRUE./
C----- Calculate exposure from plumes -----
```

ENV

```
IF (ACUTE) THEN
  IF (ITIMT .EQ. 1) THEN
    DO 404 IN = 1, NONUC
      IF (FINITE) THEN
        EXPOS(IN,1) = PWTXAR(IN) * FRCLD * POPT
      ELSEIF (AIREXT) THEN
        EXPOS(IN,1) = PWTAIR(IN) * YRSEC * FRCLD * POPT
      ENDIF
    404    CONTINUE
    ENDIF
  ELSE
    C    Chronic--
    IF (FINITE) THEN
    C    Finite plume--
      DO 80 IN = 1, NONUC
        EXPOS(IN,1) = ARPXCN(IN) * HRPLUM * YRHR * POPT
    80    CONTINUE
      ELSEIF (AIREXT) THEN
    C    Infinite plume--
        DO 130 IN = 1, NONUC
          EXPOS(IN,1) = ARPCON(IN) * YRSEC * HRPLUM * YRHR * POPT
    130    CONTINUE
        ENDIF
      ENDIF
    C---- Calculate exposure from contaminated soil -----
    IF (GROUND) THEN
      IF (FIRST) THEN
        IF (FRSIZ .GE. 1250.0 .OR. FRSIZ .EQ. 0.0) THEN
          AREAEX = 1.0
        ELSEIF (FRSIZ .GE. 500.0) THEN
          AREAEX = 2.7 * FRSIZ / HECTAR + 0.67
        ELSEIF (FRSIZ .GE. 100.0) THEN
          AREAEX = 6.5 * FRSIZ / HECTAR + 0.48
        ELSEIF (FRSIZ .GE. 25.0) THEN
          AREAEX = 20.0 * FRSIZ / HECTAR + 0.35
        ELSE
          AREAEX = 160.0 * FRSIZ / HECTAR
        ENDIF
      ENDIF
    ENDIF
  ENDIF
```

ENV

```
LUN = 28
CALL OPNFIL (5, 0, LUN)
CALL HEADNG (LUN)
WRITE (LUN, *)
.   'Source area external dose modification factor: ', AREAEX
FIRST = .FALSE.
CLOSE (LUN)

ENDIF

DO 120 IN = 1, NONUC
  IF (ACUTE) THEN
    EXPOS(IN,3) = RESSOL(IN) * HRGRD * YRHR * POPT
  ELSE
    EXPOS(IN,3) = RESSOL(IN) * HRGRD * YRHR * POPT * AREAEX
    IF (DEEP) EXPOS(IN,22) = DSRES(IN) * HRGRD * YRHR * POPT *
      AREAEX
    IF (BURWAS) EXPOS(IN,23) = QWAS(IN) * HRGRD * YRHR * POPT *
      AREAEX
  ENDIF
120  CONTINUE

ENDIF

C---- Calculate exposure from recreational activities -----
IF (RECRE) THEN
  IF (ACUTE) THEN

C      Decay surface water for time in transit to recreational site--
      T = RECTT * YRHR
      CALL CHAIN (T, DUMMY, SWACUT, WATCON, 0)

C      Calculate sediment concentration--

      IF (T .LE. RELEND) THEN
        DO 101 IN = 1, NONUC
          SEDCON(IN) = WATCON(IN) * TCWS
101      CONTINUE
        ELSE
          CALL CHAIN (1.0, DUMMY, SEDCON, SEDCON, 0)
        ENDIF
      IF (DEBUG) WRITE (*,*) 'WATCON, SEDCON: ', WATCON(1), SEDCON(1)

C      Calculate exposure rates--
      IF (.NOT. POPDOS) THEN
        DO 112 IN = 1, NONUC
```

ENV

```
C      Swimming exposure--
      IF (REC(1)) THEN
C        EXPOS(IN,14) = WATCON(IN)
        Inadvertent swimming water ingestion--
C        EXPOS(IN,13) = WATCON(IN)
      ENDIF

C      Boating exposure--
      IF (REC(2)) EXPOS(IN,15) = WATCON(IN)

C      Fishing and shoreline exposure--
      IF (REC(3)) EXPOS(IN,16) = SEDCON(IN) * SHORWI(SHRTYP) *
        HRSHOR * YRHR * POPT

112    CONTINUE
      ENDIF

    ELSE
C      Chronic exposure--

C      Decay surface water for time in transit to recreational site--
      T = RECTT * YRHR
      CALL CHAIN (T, DUMMY, SWCON, WATCON, 0)

C      Calculate sediment concentration--

      IF (T .LE. RELEND) THEN
        CALL CHAIN (1.0, DUMMY, WATCON, SEDCON, 1)
        DO 100 IN = 1, NONUC
          SEDCON(IN) = SEDCON(IN) * TCWS
100      CONTINUE
        ELSE
          CALL CHAIN (1.0, DUMMY, SEDCON, SEDCON, 0)
        ENDIF
      IF (DEBUG) WRITE (*,*) 'WATCON, SEDCON: ',WATCON(1), SEDCON(1)

C      Calculate exposure rates--
      DO 110 IN = 1, NONUC

C      Swimming exposure--
      IF (REC(1)) THEN
        EXPOS(IN,14) = WATCON(IN) * HRSWIM * YRHR * POPT

C      Inadvertent swimming water ingestion--
        EXPOS(IN,13) = WATCON(IN) * HRSWIM * INGWAT * POPT

      ENDIF
```


ENV

```
C      Boating exposure--
      IF (REC(2))
        .      EXPOS(IN,15) = WATCON(IN) * HRBOAT * YRHR * POPT

C      Fishing and shoreline exposure--
      IF (REC(3)) EXPOS(IN,16) = SEDCON(IN) * SHORWI(SHRTYP) *
        .      HRSHOR * YRHR * POPT

110    CONTINUE

      ENDIF
      ENDIF

C---- Calculate exposure from soil ingestion-----
      IF (SLING) THEN
        DO 132 IN = 1, NONUC
          EXPOS(IN,12) = RESSOL(IN) * SOLING / SLDN * KGMG
          EXPOS(IN,12) = EXPOS(IN,12) * DAYYR * POPT
132    CONTINUE
      ENDIF

      RETURN

C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE INHCAL
C
C      This subroutine calculates inhalation exposure rates--
C
C      Module of ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 6-Apr-88 RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C
C-----
C
C      1.0E-4 - Resuspension factor at time=0, (m-1), Anspaugh model
C      1.0E-9 - Resuspension factor at time=17 yr, (m-1), Anspaugh model
C      INHCON() - Air concentration to use for inhalation calculations,
C                includes resuspension contribution
C      T        - Real ITIME (d)
C
C-----

      INCLUDE 'AFPPAR.CMN'
      INCLUDE 'CONC.CMN'
      INCLUDE 'EXTPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'SOLPAR.CMN'
      INCLUDE 'TIMES.CMN'

      REAL INHCON(9), T

C---- Calculate resuspension factor -----
      IF (IRES .EQ. 1) THEN

C      Use Mass Loading Model; calculate only once--
      IF (ITIMT .EQ. 1 .OR. ITIME .EQ. 1) THEN
        RESFAC = XMLF / SLDN * KGG
      ENDIF

      ELSEIF (IRES .EQ. 2) THEN

C      Use Anspaugh Model--
      IF (ITIMT .LE. 25) THEN
        T = SQRT (FLOAT (ITIMT) * DAYYR)
        RESFAC = (1.0E-4 * EXP (- 0.15 * T) + 1.0E-9)
                * AVALSL / SURCM
      ELSE
```

ENV

```
      RESFAC = 1.0E-9 * AVALSL / SURCM
    ENDIF

    ELSE
      RESFAC = 0
    ENDIF

    IF (DEBUG) WRITE (*,*) 'Resuspension factor:',RESFAC

C---- Calculate first year acute inhalation -----
    IF (ACUTE .AND. ITIMT .EQ. 1) THEN

      DO 402 IN = 1, NONUC

C        Acute portion of exposure--
        ACUTEP = PWTAIR(IN) * RINHA * M3CM3 * FRCLOD * POPT

C        Chronic portion of exposure--
        CHRONP = RESSOL(IN) * RESFAC * HRINH * RINH * M3CM3 * YRHR *
          .      SECYR * POPT

          IF (DEBUG) WRITE (*,*) 'Acute inhalation (ACUTEP, CHRONP)',
            .      ACUTEP, CHRONP

          EXPOS(IN,2) = ACUTEP + CHRONP

      402  CONTINUE

    ELSE

C---- Chronic exposure -----

C    Air concentration includes resuspension contribution--

      DO 200 IN = 1, NONUC
        INHCON(IN) = (ARPCON(IN) * YRSEC) + (RESSOL(IN) * RESFAC)
        IF (DEBUG) WRITE (*,*) 'Inhalation air:', INHCON(IN)
      200  CONTINUE

      DO 100 IN = 1, NONUC
        EXPOS(IN,2) = INHCON(IN) * HRINH * RINH * YRHR *
          .      M3CM3 * SECYR * POPT
      100  CONTINUE
      ENDIF

    RETURN

C-----
    END
```

ENV

```
C-----
C
C      SUBROUTINE INITNV
C
C      This module initializes parameter values for each radionuclide
C      chain.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----

      INCLUDE 'ANMPAR.CMN'
      INCLUDE 'AQUPAR.CMN'
      INCLUDE 'CONC.CMN'
      INCLUDE 'EXPALL.CMN'
      INCLUDE 'FODPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'SOLPAR.CMN'
      INCLUDE 'TIMES.CMN'

      DO 200 IN = 1, 9
        QAIR(IN) = 0.0
        QSW(IN) = 0.0
        QWAS(IN) = 0.0
        NONAGS(IN) = 0.0
        RESSOL(IN) = 0.0
        NONAGD(IN) = 0.0
        DSRES(IN) = 0.0
        GWCON(IN) = 0.0
        SWCON(IN) = 0.0
        AIRCON(IN) = 0.0
        ARPCON(IN) = 0.0
        SEDCON(IN) = 0.0
        DWCON(IN) = 0.0
        RTAVAL(IN) = 0.0
        PAKADD(IN) = 0.0
        RTENV(IN) = 0.0

      DO 202 I = 1, 4
        SOLCON(IN,I) = 0.0
        DSCON(IN,I) = 0.0
        ARFCON(IN,I) = 0.0
        AQUCON(IN,I) = 0.0
        PLTCON(IN,I) = 0.0
```

ENV

```
      ANMCON(IN,I) = 0.0
      HARVT(IN,I,1) = 0.0
      HARVT(IN,I,2) = 0.0
202  CONTINUE

      DO 204 I = 1, 6
        ARF2CN(IN,I) = 0.0
        SL2CON(IN,I) = 0.0
        DS2CON(IN,I) = 0.0
        HARVA(IN,I,1) = 0.0
        HARVA(IN,I,2) = 0.0
204  CONTINUE

      DO 102 IP = 1, NPATH
        EXPOS(IN,IP) = 0.0
        DO 104 IY = 1, NTIME
          EXPOST(IY,IN,IP) = 0.0
104  CONTINUE
102  CONTINUE

200 CONTINUE

C    Eating adjustment factor--
      DO 300 I = 1, 4
        ADJEAT(I) = 1.0
        ADJET2(I) = 1.0
        ADJETQ(I) = 1.0
300 CONTINUE

C    Set over-all time index (covers both prior and release periods)--
      ITIMT = 0

C    Initialize transport skip flags--
      DOAIR = .FALSE.
      DOIRR = .FALSE.
      DOBIOT = .FALSE.
      DOWAST = .FALSE.

C    Initialize derived concentration input flags--
      DERCRP = .FALSE.
      DERANM = .FALSE.
      DERAQU = .FALSE.
      DERDRK = .FALSE.

      RETURN
C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE INTPOL
C
C      This module interpolates between two chi/q values at specified
C      distances.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----

      INCLUDE 'AIRPAR.CMN'
      INCLUDE 'AFPPAR.CMN'
      INCLUDE 'OPT.CMN'

C      Find direction--
      IDR = 0
      DO 111 I = 1, NDIR
        IF (MIDIR .EQ. IDIR(I)) IDR = I
111  CONTINUE
      IF (IDR .LT. 1 .OR. IDR .GT. 16) GOTO 91

C      Find distance brackette--
      IDS = 0
      DO 114 I = 1, NDIST
        IF (MIDIST .GT. X(I)) IDS = I
114  CONTINUE
      IF (IDS .LT. 1 .OR. IDS .EQ. NDIST) GOTO 92

C      Calculate distance offset--

      DISDIF = (X(IDS+1) - X(IDS))
      IF (DISDIF .GT. 0.0) THEN
        DISDIF = (MIDIST - X(IDS)) / DISDIF
      ELSE
        DISDIF = 0.0
      ENDIF

      XOQI = (XOQ(IDS+1,IDR) - XOQ(IDS,IDR)) * DISDIF
      XOQI = XOQI + XOQ(IDS,IDR)

      IF (DEBUG) THEN
```

ENV

```
WRITE (*,*) ' Interpolation: '  
WRITE (*,*) '   X(IDS)   X(IDS+1)   MIDIST'  
WRITE (*,*) X(IDS), X(IDS+1), MIDIST  
WRITE (*,*) '   XOQ(IDS,IDR) XOQ(IDS+1,IDR), XOQI'  
WRITE (*,*) XOQ(IDS,IDR), XOQ(IDS+1,IDR), XOQI  
ENDIF
```

RETURN

C---- Error Messages -----

```
91 WRITE (*,*) ' Error in direction in interpolation in INTPOL'  
   CALL EXIT (1)
```

```
92 WRITE (*,*) 'MI distance outside range of chi/Q file in INTPOL'  
   CALL EXIT (1)
```

C-----
END

ENV

```
C-----
C
C   SUBROUTINE PACKAG
C
C   This subroutine calculates radionuclide release for packaging
C   for a single radionuclide decay chain. This subroutine is used
C   for near-field.
C
C   Module of Program ENV of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 23-Mar-88  RAP
C   Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C   DAL      - Double precision temporary variable
C   DNTGRL   -  $1.0 - e(-\lambda \text{ package half life} * T) / \lambda$ 
C   RTWAST() - Waste removal rate, UoA/m3 yr
C   TYR      - REAL ITIMT, over-all time index; includes prior period
C-----
C
C   INCLUDE 'CONC.CMN'
C   INCLUDE 'OPT.CMN'
C   INCLUDE 'RAD.CMN'
C   INCLUDE 'SOLPAR.CMN'
C   INCLUDE 'TIMES.CMN'
C
C   REAL RTWAST(9), TYR
C   REAL*8 DAL, DNTGRL
C
C   TYR = FLOAT (ITIMT)
C
C   Calculate package decay integral term--
C   DAL = DBLE (PACKHL)
C   IF (DAL .GT. 50.0D0) THEN
C     DNTGRL = 1.0D0 / DAL
C   ELSE
C     DNTGRL = (1.0D0 - DEXP(-DAL * ONEYR)) / DAL
C   ENDIF
C
C   Waste package availability over one year--
C   DO 350 IN = 1, NONUC
C     RTWAST(IN) = QWAS(IN) * DNTGRL
C 350 CONTINUE
C
C   Remove waste degradation contribution from waste, and add
```


ENV

```
C    to deep soil--
      DO 360 IN = 1, NONUC
          QWAS(IN) = QWAS(IN) - RTWAST(IN)
          PAKADD(IN) = RTWAST(IN)
          IF (NONAG) THEN
C      Non-agricultural scenario--
          NONAGD(IN) = NONAGD(IN) + PAKADD(IN)
          ELSE
C      Agricutural/residential scenario--
          DSRES(IN) = DSRES(IN) + PAKADD(IN)
          DO 361 ITF = 1, NTF
              DSCON(IN,ITF) = DSCON(IN,ITF) + PAKADD(IN)
361      CONTINUE
          DO 362 IAN = 1, NAN+2
              DS2CON(IN,IAN) = DS2CON(IN,IAN) + PAKADD(IN)
362      CONTINUE
          ENDIF
      360 CONTINUE
          IF (DEBUG) THEN
              WRITE (*,*) 'Waste after degradation:',QWAS(1)
              WRITE (*,*) 'Available waste:',PAKADD(1)
          ENDIF
          RETURN
C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE PRIOR
C
C      This subroutine calculates radionuclide decay and buildup prior
C      to the intake period.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 29-Dec-87 RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C-----
C
C      IBEFOR   - Integer of BEFORE, yr
C      YRTOGO   - Number of years remaining in inventory decay/buildup
C                  period, yr
C-----

      INCLUDE 'CONC.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'SOLPAR.CMN'

C      If non-agricultural scenario, redistribute into food pathway
C      and residential soil compartments, and clear flag--

      IF (NONAG) THEN

C      Residential/resuspension soil--
      DO 124 IN = 1, NONUC
        RESSOL(IN) = NONAGS(IN)
        DSRES(IN) = NONAGD(IN)
124    CONTINUE

C      Terrestrial foods soil--
      IF (TFOOD) THEN
        DO 120 ITF = 1, NTF
          DO 122 IN = 1, NDNUC
            IF (TFD(ITF)) THEN
              SOLCON(IN,ITF) = NONAGS(IN)
              DSCON(IN,ITF) = NONAGD(IN)
            ENDIF
122          CONTINUE
120        CONTINUE
      ENDIF
```

ENV

```
C      Animal fodder soil--
      IF (ANFOOD) THEN
        DO 130 IAN = 1, NAN
          DO 132 IN = 1, NONUC
            IF (ANF(IAN)) THEN
              SL2CON(IN, IAN) = NONAGS(IN)
              DS2CON(IN, IAN) = NONAGD(IN)
            ENDIF
          CONTINUE
        130 CONTINUE
      ENDIF

      ENDIF

      RETURN
C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE REDCAS (INCHAN)
C
C      This module reads the ENV program input file.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 19-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      I      - Radionuclide loop index
C      INCHAN() - Number of radionuclides in each chain, passed to ENV
C      J      - Input concentration loop index
C-----

      INCLUDE 'AFPPAR.CMN'
      INCLUDE 'AIRPAR.CMN'
      INCLUDE 'ANMPAR.CMN'
      INCLUDE 'AQUPAR.CMN'
      INCLUDE 'ENVPAR.CMN'
      INCLUDE 'EXTPAR.CMN'
      INCLUDE 'FODPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'SOLPAR.CMN'
      INCLUDE 'SWPAR.CMN'
      INCLUDE 'TIMES.CMN'

      INTEGER INCHAN(70), NUCTOT, ITEMP
      CHARACTER DUM*1, ELTT(100)*2, AWT(100)*6

      LUN = 11
      CALL OPNFIL (4,0,LUN)

C---- Set default conditions -----
C      Far-field root fractions (sur/deep)--
      RF1 = 1.0
      RF2 = 0.0

C---- Read input options and general parameters -----

      READ (LUN,'(A)',ERR=98,END=99) DUM
      READ (LUN,*) OUTEDE, OUTRAD, OUTPTH, DEBUG,
      .          NEAR, POPDOS, ACUTE, ONEDOS, AEDE, MAXDOS, CUMDOS,
```

ENV

```
.      DOSTYP, RELTRM, BASIC, DERIVE, AIRCN, DEEP,
.      FINITE

READ (LUN,*) NCHAIN, IUNIT, SOLUNT, NUCTOT, POPOPT, POPT
READ (LUN,*) (INCHAN(I),I=1,NCHAIN)
READ (LUN,72) (ELTT(IN), AWT(IN),IN=1,NUCTOT)
72 FORMAT (9(A2,A6)/)

READ (LUN,*) AIR, SWAT, BIOT, BURWAS
READ (LUN,*) PATH, RECRE, AQFOOD, TFOOD, ANFOOD
READ (LUN,*) NTKEND, DCEND, RELEND, BEFAIR, BEFIRR
IF (NEAR) READ (LUN,*) BEFORE, LOIC, RFI, RF2, MANULR, FRSIZ

READ (LUN,*) NDIST
BACKSPACE (LUN)
IF (NDIST .GT. 5) THEN
  READ (LUN,*) ITEMP, (X(I),I=1,5)
  READ (LUN,*) (X(I),I=6,NDIST)
ELSE
  READ (LUN,*) ITEMP, (X(I),I=1,NDIST)
  READ (LUN,'(A)') DUM
ENDIF
```

C---- Read air transport values -----

```
IF (AIR) THEN
  READ (LUN,*) STACK, XOQOPT, SHITE, SFLOW, XOQI, SRAD
  READ (LUN,*) ETEMP, MIDIST, MIDIR, EFFSTK, JFIN, TTAIRI
  READ (LUN,*) MIUBAR, IRELES, BUILDX, BUILDH
  READ (LUN,*) TPOPS, (TTAIR(I),I=1,NDIST)
  IF (.NOT. POPDOS) THEN
    IF (FINITE) READ (LUN,*) (DRFSAV(J),J=1,6)
  ELSEIF (XOQOPT .GT. 1) THEN
    IF (FINITE) THEN
      READ (LUN,*) ((PWTX(I,J), J=1,6), I=1,10)
    ENDIF
    READ (LUN,*) (PWT(I),I=1,NDIST)
  ENDIF
ENDIF
```

C---- Read surface water transport values -----

```
IF (SWAT) THEN
  READ (LUN,*) MIXFLG, MIXR, SWFLOW, SWTT
  IF (MIXFLG .GT. 0) READ (LUN,*)
    SWQB, SWLSX, SWOSY, SWDPTH, SWIDTH, SWDZ
ENDIF
```

C---- Read waste availability values -----

ENV

```
      IF (BURWAS .OR. BIOT .OR. DEEP) READ (LUN,*)  
      .   PACKHL, WASDEP, OVRBRD  
  
C---- Read biotic transport values -----  
      IF (BIOT) READ (LUN,*) BTPRE, BTNTK, BTDSET, NONAG  
  
C---- Read external exposure values -----  
      READ (LUN,*) HRPLUM, FRCLOD  
      IF (GROUND) READ (LUN,*) HRGRD, RESIRR, IRRSR, RIRRR, IRTIMR  
      IF (RECRE) READ (LUN,*) HRSWIM, HRBOAT, HRSHOR, SHRTYP, RECTT  
  
C---- Read inhalation values -----  
      IF (INHAL) READ (LUN,*) HRINH, IRES, AVALSL, XMLF  
  
C---- Read ingestion population values -----  
      READ (LUN,*) FOQOPT, FOQ, AQUDPD, DWPOP, EXPORT  
  
C---- Read drinking water values -----  
      IF (DRINK) READ (LUN,*) DWUSAG, DWSRC, DWTRET, HOLDDW  
  
C---- Read aquatic foods values -----  
      IF (AQFOOD) THEN  
        READ (LUN,*) (AQF(IAQ),IAQ=1,NAQ), ISALT  
        DO 110 IAQ = 1, NAQ  
          IF (AQF(IAQ)) READ (LUN,*)  
            .           AQUQT(IAQ), TPRODQ(IAQ),  
            .           HLDUP2(IAQ), USAG(IAQ)  
110    CONTINUE  
      ENDIF  
  
C---- Read terrestrial food values -----  
      IF (TFOOD) THEN  
        READ (LUN,*) (TFD(ITF),ITF=1,NTF)  
        DO 120 ITF = 1, NTF  
          IF (TFD(ITF)) READ (LUN,*) GRWP(ITF),  
            .           IRRST(ITF), RIRR(ITF), IRTIMT(ITF),  
            .           YELD(ITF), TPROD(ITF), HLDUP(ITF), CONS(ITF)  
120    CONTINUE  
      ENDIF
```

ENV

C----- Read animal product values -----

```
IF (ANFOOD) THEN
  READ (LUN,*) (ANF(IAN), IAN=1,NAN)
  DO 130 IAN = 1, NAN
    IF (ANF(IAN)) THEN
      READ (LUN,*)
      .   CONS2(IAN), HLDUPA(IAN), TPRODA(IAN), DWFACA(IAN)
      .   READ (LUN,*) DIETFR(IAN), GRWPA(IAN), IRRSA(IAN),
      .   RIRRA(IAN), IRTIMA(IAN), YELDA(IAN), STORTM(IAN)
    ENDIF
130  CONTINUE
    IF (ANF(1)) READ (LUN,*)
    .   DIETFR(5), GRWPA(5), IRRSA(5), RIRRA(5),
    .   IRTIMA(5), YELDA(5), STORTM(5)
    IF (ANF(3)) READ (LUN,*)
    .   DIETFR(6), GRWPA(6), IRRSA(6), RIRRA(6),
    .   IRTIMA(6), YELDA(6), STORTM(6)
  ENDIF
```

C----- Read default parameter values -----

```
READ (LUN,*) PRCNTI, HARVST,
.   NVU, SVU, DPVRES, LEAFRS, DEPFR1, DEPFR2, SURCM,
.   SLDN, SSLDN, SOLING, WTIM, TRANS, TRANSA, CONSUM,
.   DWATER, FRACUT, SHORWI, INGWAT, TCWS, YELDBT,
.   TOTEXC, EXCAV, RINH, RINHA, BIOMAS, BIOMA2,
.   DRYFAC, DRYFA2
```

RETURN

C----- Error Messages -----

```
98 CALL FILERR (3, LUN, 'In REDCAS')
99 CALL FILERR (2, LUN, 'In REDCAS')
```

C-----
END

ENV

```
C-----
C
C      SUBROUTINE REDIST
C
C      This subroutine calculates surface soil concentration due to
C      manual redistribution of the deep soil to the surface (e.g.,
C      excavation for a basement or foundation). This redistribution
C      occurs in the first year of the exposure period.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 22-Mar-88 RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C-----
C
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'OPT.CMN'
C
C      DO 172 IN = 1, NONUC
C
C      Residential/resuspension soil--
C      RESSOL(IN) = RESSOL(IN) + DSRES(IN) * MANULR
C
C      Terrestrial food pathway--
C      DO 170 ITF = 1, NTF
C      IF (TFD(ITF)) SOLCON(IN,ITF) = SOLCON(IN,ITF) +
C      DSCON(IN,ITF) * MANULR
170 CONTINUE
C
C      Animal food pathway--
C      DO 174 IAN = 1, NAN
C      IF (ANF(IAN)) SL2CON(IN,IAN) = SL2CON(IN,IAN) +
C      DS2CON(IN,IAN) * MANULR
C      IF (ANF(IAN) .AND. IAN .EQ. 1) SL2CON(IN,5) = SL2CON(IN,5) +
C      DS2CON(IN,5) * MANULR
C      IF (ANF(IAN) .AND. IAN .EQ. 3) SL2CON(IN,6) = SL2CON(IN,6) +
C      DS2CON(IN,6) * MANULR
174 CONTINUE
C
172 CONTINUE
C
C      RETURN
C-----
C      END
```


ENV

```
C-----
C
C      SUBROUTINE REDCHA
C
C      Read radionuclide-specific information for a chain from the
C      ENV program input file and set radionuclide-specific flags and
C      derived concentration flags.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 6-Apr-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      ANI      - Input animal product concentration
C      AQU      - Input aquatic foods concentration
C      DUM      - CHARACTER dummy input variable
C      PLT      - Input terrestrial plant concentration
C      SOL      - Input surface soil concentration
C      SOL2     - Input deep soil concentration
C-----
C
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'AQUPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'DECAY.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SOLPAR.CMN'
C
C      CHARACTER DUM*1
C      REAL PLT, ANI, AQU, SOL, SOL2
C
C      LUN = 11
C      READ (LUN,'(A)') DUM
C
C      Set number of radiouclides into DECAY common block--
C      NUC = NONUC
C
C      DO 100 I = 1, NONUC
C
C          READ (LUN,1000) ELT(I), AW(I), BONE(I),
C                          CLASS(I), ICL(I)
```

ENV

```
IF (RELTRM) READ (LUN,*) QAIR(I), QSW(I), QWAS(I)
IF (BASIC) READ (LUN,*) AIRCON(I), SOL,
      SOL2, GWCON(I), SWCON(I)
IF (OERIVE) READ (LUN,*) PLT, ANI, DWCON(I), AQU

READ (LUN,*) HL(I), AL(I), IFRM(1,I), IFRM(2,I), DK(1,I),
      DK(2,I)
READ (LUN,*) DPVL(I), LEACHR(I), (BVI(J,I),J=1,NTF)
READ (LUN,*) (FMI(J,I), J=1,6)
READ (LUN,*) (BIOACF(J,I),J=1,NAN), DWCLEN(I)
IF (FINITE) READ (LUN,*) (EDIS(J,I), J=1,6)

IF (BASIC) THEN

C      Set irrigation surface water--
      SWIRR(I) = SWCON(I)

      IF (NONAG) THEN

C          Set non agricultural soil--
          NONAGS(I) = SOL

      ELSE

C          Set soil concentration for each food pathway--
          DO 112 ITF = 1, NTF
              IF (TFD(ITF)) THEN
                  SOLCON(I,ITF) = SOL
                  DSCON(I,ITF) = SOL2
              ENDIF
112      CONTINUE
          DO 114 IAN = 1, NAN+2
              SL2CON(I,IAN) = SOL
              DS2CON(I,IAN) = SOL2
114      CONTINUE

C          Set residential soil--
          RESSOL(I) = SOL
          OSRES(I) = SOL2
          ENDIF

      ENDIF

      ANMFED = .FALSE.
      IF (DERIVE) THEN

C          Set derived concentration flags--
          IF (PLT .GT. 0.0) DERCRP = .TRUE.
          IF (ANI .GT. 0.0) DERANM = .TRUE.
```

ENV

```
IF (AQU .GT. 0.0) DERAQU = .TRUE.
IF (DWCON(I) .GT. 0.0) DERDRK = .TRUE.

C      Set each plant, animal, and aquatic food concentration to input--
DO 110 J = 1, 4

      IF (TFOOD) THEN
        IF (TFD(J)) PLTCON(I,J) = PLT
      ELSEIF (DERCRP .AND. ANFOOD) THEN
        ANMFED = .TRUE.
        IF (ANF(J)) ANMCON(I,J) = PLT
      ELSEIF (ANFOOD) THEN
        IF (ANF(J)) ANMCON(I,J) = ANI
      ENDIF

      IF (AQF(J)) AQUCON(I,J) = AQU

110    CONTINUE

      ENDIF

100 CONTINUE

C      Set radionuclide-specific flags--
C14 = .FALSE.
H3 = .FALSE.
IF (ELT(1) .EQ. 'C ') C14 = .TRUE.
IF (ELT(1) .EQ. 'H ') H3 = .TRUE.

      RETURN

C---- Format Statements -----
1000 FORMAT (1X,A2,A6,2X,A1,2X,A1,2X,I3)

C-----
      END
```

ENV

```
C-----
C
C      SUBROUTINE RITEXP (ISEAS, INCHAN)
C
C      This subroutine writes data sets of exposure rates to the inter-
C      mediate output file that will be read by DOSE. Media
C      concentrations are also written to a file.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 6-Apr-88  RAP
C      Reviewed and Approved: 12-Sept-88  8A Napier
C-----
C
C      FIRST      - Logical cleared after first call to this subroutine
C-----

      INCLUDE 'EXPALL.CMN'
      INCLUDE 'LABELS.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'TIMES.CMN'

      INTEGER INCHAN(70)
      LOGICAL FIRST
      DATA FIRST /.TRUE./

      LUN = 13
      IF (FIRST) THEN

        DO 120 IP = 1, NPATH
          IF (IP .EQ. 1 .AND. FINITE) THEN
            WRITE (LUN,'(5A)') 'Finite ',EXPLAB(IP), ': ',
.              UNIT1(IUNIT),' person rem/Ci yr'

          ELSEIF (PATH(IP)) THEN
            WRITE (LUN,'(5A)') EXPLAB(IP), ': ',
.              UNIT1(IUNIT),'/',UNIT2(IP)
          ENDIF
        120 CONTINUE
        FIRST = .FALSE.

      ENDIF

C---- Set time loop termination -----
```

ENV

```
NT = NTIME
IF (ACUTE .AND. NT .EQ. 0) NT = 1
```

C---- Write additional seasons to output file -----

```
IF (ACUTE .AND. ISEAS .EQ. 0) THEN
```

```
DO 130 IS = 2, 4
```

```
IF (IS .EQ. 2) THEN
```

```
LUN2 = 7
```

```
ELSEIF (IS .EQ. 3) THEN
```

```
LUN2 = 49
```

```
ELSEIF (IS .EQ. 4) THEN
```

```
LUN2 = 50
```

```
ENDIF
```

```
REWIND (LUN2)
```

```
DO 140 IC = 1, NCHAIN
```

```
DO 142 IN = 1, INCHAN(IC)
```

```
READ (LUN2) ELT(IN), AW(IN), SEALAB(IS)
```

```
DO 150 IP = 1, NPATH
```

```
IF (PATH(IP) .OR. (IP .EQ. 1 .AND. FINITE)) THEN
```

```
READ (LUN2) EXPLAB(IP),
```

```
(EXPOST(IT,IN,IP), IT=1, NT)
```

```
ENDIF
```

```
150 CONTINUE
```

```
WRITE (LUN,1000) ELT(IN), AW(IN), SEALAB(IS)
```

```
DO 160 IP = 1, NPATH
```

```
IF (PATH(IP) .OR. (IP .EQ. 1 .AND. FINITE)) THEN
```

```
WRITE (LUN,1010) EXPLAB(IP),
```

```
(EXPOST(IT,IN,IP), IT=1, NT)
```

```
ENDIF
```

```
160 CONTINUE
```

```
142 CONTINUE
```

```
140 CONTINUE
```

```
130 CONTINUE
```

```
CLOSE (LUN)
```

```
CLOSE (LUN2)
```

C---- Write to unformatted temporary file by season -----

ENV

```
ELSEIF (ACUTE .AND. ISEAS .GT. 1) THEN
  IF (ISEAS .EQ. 2) THEN
    LUN = 7
  ELSEIF (ISEAS .EQ. 3) THEN
    LUN = 49
  ELSEIF (ISEAS .EQ. 4) THEN
    LUN = 50
  ENDIF

  DO 180 IN = 1, NONUC

    WRITE (LUN) ELT(IN), AW(IN), SEALAB(ISEAS)

    DO 182 IP = 1, NPATH
      IF (PATH(IP) .OR. (IP .EQ. 1 .AND. FINITE)) THEN
        WRITE (LUN) EXPLAB(IP),
          (EXPOST(IT,IN,IP), IT=1, NT)
      ENDIF
182    CONTINUE

180  CONTINUE
```

C---- Write to output file -----

```
ELSE

  DO 100 IN = 1, NONUC

    IF (ACUTE .AND. (TFOOD .OR. ANFOOD)) THEN
      WRITE (LUN,1000,ERR=98) ELT(IN), AW(IN), SEALAB(ISEAS)
    ELSE
      WRITE (LUN,1000,ERR=98) ELT(IN), AW(IN)
    ENDIF

    DO 110 IP = 1, NPATH
      IF (PATH(IP) .OR. (IP .EQ. 1 .AND. FINITE)) THEN
        WRITE (LUN,1010,ERR=98) EXPLAB(IP),
          (EXPOST(IT,IN,IP), IT=1, NT)
      ENDIF
110    CONTINUE

100  CONTINUE
ENDIF

RETURN
```

C---- Error Messages -----

ENV

98 CALL FILERR (3, LUN, 'In RITEXP')

C---- Format Statements -----

1000 FORMAT (1X,A2,A6,10X,A8)
1010 FORMAT (' ',A8,1P, 8E8.1E2 / 9(9X,8E8.1E2/))
1020 FORMAT (' ',A8,1P, 8E8.1E2 / ' ',A3,'/',A2,1X,
 . 8E8.1E2 / 9(9X,8E8.1E2/))

C-----

END

ENV

```
C-----
C
C      SUBROUTINE RITMED (RELFLG)
C
C      This module prints a media report for the residential location.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 26-Feb-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      AIRC      - Air concentration or population-weighted air
C                  concentration used, UoA/m3
C      FIRST     - Logical set if this is the first call to this subroutine
C      RELFLG    - Flag set if this is during the release period
C-----
C
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'TIMES.CMN'
C      INCLUDE 'EXPALL.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'SWPAR.CMN'
C      INCLUDE 'SOLPAR.CMN'
C
C      REAL AIRC
C      LOGICAL FIRST, RELFLG
C      DATA FIRST /.TRUE./
C
C      IF (ACUTE) FIRST = .FALSE.
C      LUN = 21
C
C      IF (FIRST) THEN
C        IF (SWAT .AND. MIXFLG .NE. 0) WRITE (LUN,16) MIXR
C
C        WRITE (LUN, 12) UNIT1(IUNIT), UNIT1(IUNIT), UNIT1(IUNIT),
C          .      UNIT1(IUNIT), UNIT1(IUNIT), UNIT1(IUNIT)
C        FIRST = .FALSE.
C      ENDIF
C
C      IF (RELFLG) THEN
C        DO 132 IN = 1, NONUC
C          AIRC = ARPCON(IN) * YRSEC
C          IF (ACUTE) THEN
C            WRITE (LUN,15) ELT(IN), AW(IN), ITIME, RESSOL(IN)
```


ENV

```
      ELSE
        WRITE (LUN,14) ELT(IN), AW(IN), ITIME, AIRC, RESSOL(IN),
          DSRES(IN), GWCON(IN), SWCON(IN), SWIRR(IN)
      ENDIF
132  CONTINUE
      ENDIF

      RETURN
```

C----- Format Statements -----

```
12  FORMAT (//
.      '-----Residential-----' ,
.      ' Irr.' /
.      ' Radio- Surface Deep Ground ' ,
.      ' Surface Surface' /
.      ' nuclide Year Air Soil Soil Water Water' ,
.      ' Water' /
.      ' ,A3,'/m3 ' ,A3,'/m2 ' ,A3,'/m3 ' ,A3,
.      '/L ' ,A3,'/L ' ,A3,'/L' /
.      '-----' ,
.      '-----')

14  FORMAT (' ', A2, A6, I8, 1P6E8.1)
15  FORMAT (' ', A2, A6, I8, 16X, 1PE8.1)
16  FORMAT (// ' Surface water mixing ratio: ', 1PE8.1E2//)
```

C-----

```
      END
```

ENV

```
C-----
C
C      SUBROUTINE SWCAL
C
C      SWCAL computes dilution factors for flow through river and
C      near-shore lake environments, surface water concentration, and
C      decay during transit to irrigation withdrawal site. Parts of
C      this module were adapted from the LADTAPII computer program;
C      see documentation Volume 1 for reference.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88 RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C
C-----
C
C      D          - Dispersion factor,  $M^{**5}/S^{**2}$ 
C      DY          - Y-direction dispersion,  $M^{**2}/S$ 
C      DZ          - Z-direction dispersion,  $M^{**2}/S$ 
C      F           - Term in series expansion
C      F1          - Integral value in series
C      Q           - Total river flow rate,  $M^{**3}/S$ 
C      SWDZI       - Depth of effluent discharge point used in lake calculation
C      SWOSYI      - Input point used in river calculation
C      VELOC       - Velocity used for concentration calculation, m3/sec
C
C-----
C
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SWPAR.CMN'
C      INCLUDE 'TIMES.CMN'
C
C      REAL VELOC
C
C      IF (MIXFLG .GT. 0) THEN
C
C          Set initial parameter values--
C          DY = 0.06 * SWDPTH * SWFLOW
```

ENV

D = 0.06 * SWDPTH ** 3.0 * SWFLOW ** 2.0

R = D * SWLSX

ENDIF

C---- River solution -----
IF (MIXFLG .EQ. 1) THEN

C Limit intake point to width of the river--

SWOSYI = SWOSY

IF (SWOSY .GT. SWIDTH) SWOSYI = SWIDTH

RJY=SWOSYI/SWIDTH

Q=SWFLOW*SWDPTH*SWIDTH

F1=0.

F=0.

C Series expansion limited to 100 terms--
N=101

620 N=N-1

IF(N .LE. 0) GO TO 790

E1=-(N*P/Q)**2.*R

IF(ABS(E1) .GT. 20.) GO TO 620

E3=N*P*RJY

C Terms of series--
760 F=EXP(E1)*COS(E3)

F1=F1+F

GO TO 620

ENV

```
790  A=1.+2.*F1

C    Limit normalized conc and dilution--
    IF(A .LT. 1.00E-20) THEN
      A=0.

      GO TO 93
    ELSE

      MIXR=(SWQB*A)/Q

    ENDIF

C---- Lake Solution -----

    ELSEIF (MIXFLG .EQ. 2) THEN

      SWDZI = SWDZ
      IF (SWDZ .GT. SWDPTH) SWDZI = SWDPTH

      DZ=0.0059*SWDPTH*SWFLOW

      M=SQRT(0.295*SWLSX/SWDPTH) + SWDZI/2./SWDPTH

C    Failure--
    IF (M .LT. 1) GO TO 93

    DZXU=4.*DZ*SWLSX/SWFLOW

    DYXU=4.*DY*SWLSX/SWFLOW

C    Divide-by-zero check--
    IF (DZXU .EQ. 0.0) GOTO 91
    IF (DYXU .EQ. 0.0) GOTO 92

    AA=(2.*M*SWDPTH-SWDZI)**2./DZXU + SWOSY**2./DYXU

C    Failure--
    IF (AA .GE. 50) GO TO 93

C    Series expansion limited to M terms (i.e., EXP(-50)>solution)--
    MM=-M-1
```

ENV

```
M=2*M+1
F1=0.
FY=0.
FZ=0.
AA=0.

DO 123 I1=1,M
    I=MM+I1
    AA=(2.*I*SWDPTH-SWDZI)**2./DZXU
    AA=EXP(-AA)
    FZ=FZ+2.*AA
123  CONTINUE
    AA=SWOSY**2./DYGU
    FY=2.*EXP(-AA)
    F1=SWQB/4./P/SWLSX/SQRT(DY*DZ)
    MIXR=F1*FY*FZ

ENDIF

C----- Calculate surface water concentrations-----
C      Apply mixing ratio to release term--
      IF (MIXFLG .EQ. 1 .OR. MIXFLG .EQ. 2) THEN
        VELOC = SWQB
      ELSE
        VELOC = SWFLOW
      ENDIF

      DO 102 IN = 1, NONUC
        SWCON(IN) = QSW(IN) * MIXR / VELOC * M3L * YRSEC
102  CONTINUE

C      Decay surface water for transit time to irrigation withdrawal
```

ENV

```
C      location--
      IF (QSW(1) .GT. 0.0) THEN
        T = SWTT * YRHR
        CALL CHAIN (T, DUMMY, SWCON, SWIRR, 0)
      ENDIF

      RETURN
```

C---- Error Messages -----

```
91 WRITE (*,*) 'MIXRTO: DZXU = 0.0, invalid (divide by zero)'
   CALL EXIT (1)

92 WRITE (*,*) 'MIXRTO: DYXU = 0.0, invalid (divide by zero)'
   CALL EXIT (1)

93 MIXR=1.E-20

   WRITE (*,*) 'MIXRTO: The dilution calculation has failed;'
   WRITE (*, '(2A)') '          A value of 1E-20 will be returned for ',
   .               'the mixing ratio.'
   RETURN
```

C-----

```
      END
```

ENV

```
C-----
C
C      SUBROUTINE TRNSPT (RELFLG)
C
C      This module controls calculation of yearly radionuclide transport
C      through the environment.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 2-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      RELFGL  - Flag set if during exposure period, false during prior
C               build-up period
C-----

      INCLUDE 'RAD.CMN'
      INCLUDE 'CONC.CMN'
      INCLUDE 'EXPALL.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'SWPAR.CMN'
      INCLUDE 'SOLPAR.CMN'
      INCLUDE 'TIMES.CMN'

      LOGICAL RELFLG

C      Waste package availability--
      IF (DOWAST .AND. BURWAS) CALL PACKAG

C      If this is the first year of the exposure period, do manual
C      redistribution--
      IF (RELFLG .AND. ITIME .EQ. 1) CALL REDIST

C      Decay soils/buried waste for previous year, harvest removal--
      IF (ITIMT .GT. 1) CALL DKHARV

C      Do all soils except for C14 and H3--
      IF (.NOT. C14 .AND. .NOT. H3) THEN

        IF (NONAG) THEN
          Non-agricultural soil--
          CALL EDRNON

        ELSE
```

ENV

```
C      Environmental deposition/removal to residential soil--  
      IF (AIREXT .OR. FINITE .OR. GROUND .OR. INHAL .OR. SLING)  
        CALL EDRRES  
  
C      Environmental deposition/removal to terrestrial food soils--  
      IF (TFOOD) CALL EDRCRP  
  
C      Environmental deposition/removal to animal food soils--  
      IF (ANFOOD) CALL EDRANM  
  
      ENDIF  
      ENDIF  
  
      RETURN  
C-----  
      END
```


ENV

```
C-----
C
C      SUBROUTINE XQCAL
C
C      This module controls reading of population, food production,
C      and chi/Q input files and then calculates total population,
C      food-effective population, and food export adjustment
C      factors.
C
C      Module of Program ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 6-Jun-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      AFRAC      - Fraction of grid area in current sector
C      AREAT      - Total area in grid
C      EFCON      - Effective consumption rate of current food pathway
C                  (kg person/yr)
C-----
C
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C      INCLUDE 'AQUPAR.CMN'
C      INCLUDE 'CONC.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'LABELS.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C
C      CHARACTER DUM*8
C      REAL EFCON
C
C---- Read or find chi/Q -----
C
C      IF (ACUTE) THEN
C
C          IF (AIR .AND. XOQOPT .NE. 1) THEN
C              POPT = TPOPS
C          ELSE
C              POPT = 1.0
C          ENDIF
C
C      ELSE
C          IF (POPDOS) THEN
```

ENV

```
C      Population exposure--
C      Read chi/Q input file--
      IF (AIR .AND. (XOQOPT .NE. 1 .OR. FOQOPT .EQ. 1))
        CALL XQIN ((1))
C      Read population input file, and total population for air paths--
      IF (POPOPT .EQ. 1) CALL XQIN ((2))
C      IF (XOQOPT .NE. 1) THEN
        Accumulate chi/Q total--
        XOQI = 0.0
        DO 131 IR = 1, NDIR
          DO 132 ID = 1, NDIST
            XOQI = XOQI + (XOQ(ID,IR) * POP(ID,IR))
132      CONTINUE
131      CONTINUE
        ENDIF
      ELSE
C      Maximum individual--
        IF (XOQOPT .EQ. 3) THEN
C      Read chi/Q and interpolate--
C      CALL XQIN ((1))
C      CALL INTPOL
        ELSEIF (XOQOPT .EQ. 2) THEN
C      Select greatest chi/Q value where there is population--
          CALL XQIN ((1))
          CALL XQIN ((4))
          XOQI = 0.0
          MIDIR = 0
          MIDIST = 0.0
          IDSAV = 0
          DO 121 IR = 1, NDIR
            DO 122 ID = 1, NDIST
              IF (POP(ID,IR) .GT. 0.0 .AND. XOQ(ID,IR) .GT. XOQI) THEN
                XOQI = XOQ(ID,IR)
                MIDIR = IR
                MIDIST = X(ID)
                IDSAV = ID
              ENDIF
122      CONTINUE
121      CONTINUE
```

ENV

```
      IF (MIDIR .EQ. 0 .OR. MIDIST .EQ. 0.0) GOTO 123
      IF (FINITE) THEN
        DO 124 IE = 1, 6
          DRFSAV(IE) = DRFOQ(MIDIR, IDSAV, IE)
124      CONTINUE
        ENDIF

      ENDIF

C      Set individual population--
      POPT = 1.0

      ENDIF
    ENDIF

    IF (TFOOD .OR. ANFOOD) THEN
C----- Set effective population to total -----
      IF (FOQOPT .LT. 2) THEN

        DO 140 ITF = 1, NTF
          IF (TFD(ITF)) EFPOP(ITF) = POPT
140      CONTINUE

        DO 150 IAN = 1, NAN
          IF (ANF(IAN)) EFPOPA(IAN) = POPT
150      CONTINUE

C----- Assume uniform production -----
      ELSEIF (FOQOPT .EQ. 2) THEN

C      Calculate total area in grid, production at each grid point--
      AREAT = P * X(NDIST)**2.0

      DO 410 ITF = 1, NTF
        IF (TFD(ITF)) THEN
          EFPOP(ITF) = 0.0
          DO 162 IX = 1, NDIST-1
            AFRAC = (P * X(IX+1)**2.0 - P * X(IX)**2.0)
            AFRAC = AFRAC / 16.0 / AREAT
            DO 146 IS = 1, 16
              FPRD(IX, IS, ITF) = AFRAC * TPRODT(ITF)
              EFPOP(ITF) = EFPOP(ITF) + FPRD(IX, IS, ITF) / CONS(ITF)
146          CONTINUE
            162      CONTINUE
          ENDIF
          410      CONTINUE
        
```

ENV

```
DO 440 IAN = 1, NAN
  IF (ANF(IAN)) THEN
    EFPOPA(IAN) = 0.0
    DO 144 IX = 1, NDIST-1
      AFRAC = (P * X(IX+1)**2.0 - P * X(IX)**2.0)
      AFRAC = AFRAC / 16.0 / AREAT
      DO 145 IS = 1, 16
        FPRDA(IX,IS,IAN) = AFRAC * TPROOA(IAN)
        EFPDPA(IAN) = EFPOPA(IAN) +
          FPRDA(IX,IS,IAN)/CONS2(IAN)
      145      CONTINUE
    144      CONTINUE
  ENDIF
440  CONTINUE

C----- Use chi/Q and production grids -----
ELSEIF (FOQOPT .EQ. 3) THEN

C      Read food production file and accumulate total production and
C      effective population--
      CALL XQIN ((3))

      ENDIF
    ENDIF

C---- Set export adjustment and write report -----

  IF ((POPDOS .AND. POPOPT .EQ. 2) .OR. (AIR .AND. XOQOPT .NE. 1)
    .OR. EXPORT .OR. IMPORT) THEN

    LUN = 28
    CALL OPNFIL (2,0,LUN)
    CALL HEADNG (LUN)

    IF (POPDOS .AND. POPOPT .EQ. 2) WRITE (LUN,105) POPT

    IF (AIR) THEN
      IF (ACUTE) THEN
        IF (POPDOS) THEN
          WRITE (LUN,110) XOQI
        ELSE
          WRITE (LUN,109) XOQI
        ENDIF
      ELSE
C      Chronic--
        IF (POPDOS) THEN
          WRITE (LUN,108) XOQI
        ELSE
          WRITE (LUN,107) XOQI
        ENDIF
      ENDIF
    ENDIF
  ENDIF
```

ENV

```
      IF (XOQOPT .EQ. 2) WRITE (LUN,106) MIDIST, MIDIR
    ENDIF
  ENDIF
ENDIF

IF (EXPORT .OR. IMPORT) THEN
  IF (TFOOD .OR. ANFODD .OR. AQFDOD) WRITE (LUN,12)
ENDIF

IF (TFDOD) THEN
  DO 700 ITF = 1, NTF
    IF (TFD(ITF)) THEN

      ADJEAT(ITF) = 1.0
      IF (.NOT. POPDOS) THEN
        EFPOP(ITF) = 1.0
        EFCON = CONS(ITF)
      ELSEIF (EXPORT) THEN
        EFCON = TPRODT(ITF)
      ELSE
        EFCON = EFPOP(ITF) * CONS(ITF)
      ENDIF
      IF (TPRODT(ITF) .GT. 0.0 .AND.
        TPRODT(ITF) .LT. EFCON) ADJEAT(ITF)=TPRODT(ITF)/EFCON
      IF (EXPORT .OR. IMPORT) THEN
        WRITE (LUN,20) PLTLAB(ITF), EFPOP(ITF), EFCON,
          TPRODT(ITF), ADJEAT(ITF)
      ENDIF
    ENDIF
  ENDIF
700 CONTINUE
ENDIF

IF (ANFOOD) THEN
  DO 710 IAN = 1, NAN
    IF (ANF(IAN)) THEN

      ADJET2(IAN) = 1.0

      IF (.NOT. POPDOS) THEN
        EFPOPA(IAN) = 1.0
        EFCON = CONS2(IAN)
      ELSEIF (EXPORT) THEN
        EFCON = TPRODA(IAN)
      ELSE
        EFCON = EFPOPA(IAN) * CONS2(IAN)
      ENDIF
      IF (TPRODA(IAN) .GT. 0.0 .AND.
        TPRODA(IAN) .LT. EFCON) ADJET2(IAN)=TPRODA(IAN)/EFCON
```

ENV

```
        IF (EXPORT .OR. IMPORT) THEN
            WRITE (LUN,20) ANMLAB(IAN), EFPOPA(IAN), EFCON,
                TPRODA(IAN), ADJET2(IAN)
        ENDIF
    ENDIF
710    CONTINUE
ENDIF

    IF (AQFOOD) THEN
        DO 720 IAQ = 1, NAQ
            IF (AQF(IAQ)) THEN
                ADJETQ(IAQ) = 1.0
                IF (.NOT. POPDOS) THEN
                    EFCON = USAG(IAQ)
                ELSE
                    EFCON = AQUPOP * USAG(IAQ)
                ENDIF
                IF (TPRODQ(IAQ) .GT. 0.0 .AND. TPRODQ(IAQ) .LT. EFCON)
                    ADJETQ(IAQ) = TPRODQ(IAQ) / EFCON

                    IF (EXPORT .OR. IMPORT) THEN
                        WRITE (LUN,20) AQFLAB(IAQ), AQUPOP, EFCON, TPRODQ(IAQ),
                            ADJETQ(IAQ)
                    ENDIF
                ENDIF
720    CONTINUE
ENDIF

    CLOSE (LUN)

ENDIF
RETURN
```

C---- Error Messages -----

```
98 CALL FILERR (3, LUN, 'In XQCAL')
99 CALL FILERR (2, LUN, 'In XQCAL')

123 WRITE (*,*) 'MI location selection error:'
    WRITE (*,*) ' Direction index:',MIDIR
    WRITE (*,*) ' Distance:',MIDIST
    CALL EXIT (1)
```

C---- Format Statements -----

```
1  FORMAT (A8)
11 FORMAT (A10/A10)
111 FORMAT (A10/A10/A10)
```

ENV

```

2 FORMAT (/6X,10(5X,I2,2X))
5 FORMAT (8X,10(F8.1,1X))
3 FORMAT (OPF6.0,10(1X,1PE8.2))
10 FORMAT (10E8.1)
12 FORMAT (//T12,'
.T12,'
.T12,'Path
.T12,'
.T12,'-----
Effective      Effective      Production      Total'//
Population    Consumption    (Input)        Export'//
(persons)      (kg/yr)         (kg/yr)        Adjustment'//
-----' )
20 FORMAT (T12,1X,A8,2X,1P,4(E10.1,2X))
105 FORMAT (///' ',1PE7.1,T12,'Total population'//)
106 FORMAT (///' ',1PE7.1,T12,'Maximum individual distance (m)'//
' ',OP,I7,T12,'Maximum individual sector index (I=S)')
107 FORMAT (' ',1PE7.1,T12,'Individual chi/Q'//)
109 FORMAT (' ',1PE7.1,T12,'Individual E/Q'//)
108 FORMAT (' ',1PE7.1,T12,'Population-weighted chi/Q'//)
110 FORMAT (' ',1PE7.1,T12,'Population-weighted E/Q'//)

```

C-----
 END

ENV

DOSE

C-----
C
C Program title: DOSE - A module of the GENII
C environmental dosimetry software
C package.
C
C Prepared for: U. S. Department of Energy under
C Contract DE-AC06-76RLO 1830
C
C Contact: Bruce Napier
C Pacific Northwest Laboratory
C Richland WA 99352
C (509) 375-3916
C
C Code developers: B. A. Napier, R. A. Peloquin,
C D. L. Streng, and J. V. Ramsdell
C Pacific Northwest Laboratory
C Richland WA 99352
C

C This code was prepared for an agency of the United States
C Government. Neither the United States Government or any agency
C thereof, or any of their employees, make any warranty, expressed
C or implied, or assumes any legal liability or responsibility for
C any third party's use, or the results of such use, of any portion
C of this program or represents that its use by such third party
C would not infringe privately owned rights.
C

C--- Program Information -----

C
C Problem description: To perform dosimetric calculations using
C the exposure calculation results calculated
C with the ENV code for individuals
C or population groups, acute or chronic,
C as required for near-field and
C far-field short-term scenarios.
C
C Results format: The output of DOSE is a report file
C called DOSE.OUT.
C
C Computer: This version is for the IBM PC/AT.
C
C Programming language: FORTRAN compiled using Lahey(tm)
C FORTRAN Compiler.
C
C Machine requirements: IBM PC/AT with a minimum of 640 Kbytes
C random access memory and 1 20-Mbyte fixed

DOSE

disk drive.

Reference: B. A. Napier, R. A. Peloquin, D. L. Strenge,
and J. V. Ramsdell. 1988. "GENII - The
Hanford Environmental Radiation Dosimetry
Software System." PNL-6584, Volumes 1, 2,
and 3. Pacific Northwest Laboratory,
Richland, WA 99352

PROGRAM DOSE

This module controls reading of the input files, initializing
parameters, and indexing of the radionuclide chain and time step
loops.

Program of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Version of 31-May-88 RAP
Reviewed and Approved: 12-Sept-88 BA Napier

ISEAS - Season index for acute cases, 1-winter...

INCLUDE 'LABELS.CMN'
INCLUDE 'OPT.CMN'
INCLUDE 'RADIN.CMN'
INCLUDE 'TIMES.CMN'
INCLUDE 'TITL.CMN'

CHARACTER DUM*80

Get system time and read file names--
CALL MAKDA2
CALL OPNFIL (3,0,1)

Open various input files--
CALL REDFIL

IF (ACUTE) THEN

Determine if seasons needed--

DOSE

```
NSEAS = 1
IF (TFOOD .OR. ANFOOD) NSEAS = 4

C      Reposition title to include season--
      IF (NSEAS .GT. 1) THEN
        DUM = TITLS(5) (1:70)
        WRITE (TITLS(5) (9:79), '(A70)') DUM
        TITLS(5) (7:8) = ': '
      ENDIF

C      Open workspace file--
      LUN2 = 7
      CALL OPNFIL (8,0,LUN2)

      DO 100 ISEAS = 1, NSEAS

C      Store season in title--
      IF (NSEAS .GT. 1) TITLS(5) (1:6) = SEALAB(ISEAS)

C      Calculate doses--
      CALL DOSCTL (LUN2, ISEAS)

C      Calculate totals, whole body effective dose equivalents
C      and set flags--
      CALL TOTCAL

C      Print dose summary report--
      CALL DOSSUM

C      Print dose by pathway report--
      IF (OUTPTH) CALL RITBYP

C      Print dose by radionuclide reports--
      IF (OUTRAD .AND. NUCTOT .GT. 1) CALL RITBYR
      IF (OUTEDE .AND. NUCTOT .GT. 1) CALL RITEDE

100    CONTINUE
      CLOSE (13)
      CLOSE (LUN2)

      ELSE

C      Calculate chronic doses--
      CALL DOSCTL (0,0)

C      Calculate totals, whole body effective dose equivalents and set
C      flags--
      CALL TOTCAL
```

DOSE

```
C      Print dose summary report--  
      CALL DOSSUM  
  
C      Print dose by pathway report--  
      IF (OUTPTH) CALL RITBYP  
  
C      Print dose by radionuclide report--  
      IF (OUTRAD .AND. NUCTOT .GT. 1) CALL RITBYR  
      IF (OUTEDE .AND. NUCTOT .GT. 1) CALL RITEDE  
  
      CLOSE (13)  
  
      ENDIF  
      CALL OPNFIL (9, 9, LUN)  
  
      STOP  
  
C-----  
      END
```

DOSE

```
C-----
C
C      SUBROUTINE DOSCAL (IN, INTDF)
C
C      This module calculates dose for each year for the given
C      environmental pathway and radionuclide, and then accumulates
C      dose by year, path, and radionuclide.
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 7-Jun-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      ADJUNT      - Dose unit adjustment factor for non-SI units,
C                   1.0 for Sv/Sv, 100.0 for rem/Sv
C      DOSINC      - Current dose increment, (Sv/Bq)
C      FIRST       - Flag cleared after first call to this subroutine
C      IDFIP       - Temporary parameter, IDF(IP)
C      IN          - Index of the current radionuclide in this case
C      IP          - Index of the current exposure pathway
C      NYRDC       - Number of years in dose commitment period, integer
C      NYRINT      - Integer value of the number of years of intake
C-----
C
C      INCLUDE 'TIMES.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'DOSALL.CMN'
C      INCLUDE 'DFPAR.CMN'
C      INCLUDE 'INVIN.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'SOLPAR.CMN'
C
C      REAL DOSINC, ADJUNT
C      INTEGER NYRDC, NYRINT
C      LOGICAL FIRST, INTDF(100)
C      DATA FIRST /.TRUE./
C
C      IF (FIRST) THEN
C
C          Initialize parameters--
C          NYRINT = INT (NTKEND)
C          NYRDC = INT (DCEND)
C
C          Set dose unit adjustment--
```

DOSE

```
C      IF (IUNIT .GT. 4) THEN
          Units: Bq and Sv
          ADJUNT = 1.0
      ELSE
C      Units: Ci and rem
          ADJUNT = 100.0
      ENDIF
      ADJUNT = ADJUNT * NVU(IUNIT)

      FIRST = .FALSE.
  ENDIF

C      For each year of the dose commitment period--
      DO 110 IY = 1, NYRDC

          DO 170 IP = 1, NPATH
              IF (PATH(IP)) THEN
                  IDFIP = IDF(IP)

C                  For internal paths--
                  IF (IDFIP .NE. 3) THEN
                      IF (INTDF(IN)) THEN

                          ID = IY
                          IEND = IY
                          IF (OUTEDE) IEND = 1

C                          For each year of intake--
                          DO 150 IE = 1, IEND

C                          For each organ in the master list considered for this
C                          radionuclide--

                              DO 120 IO = 1, MORG
                                  IF (IOR(IO)) THEN

                                      DOSINC = 0.0

                                      IF (IDFIP .EQ. 2) THEN
C                                      Ingestion--
                                          DF = DFG(ID, IO)
                                      ELSE
C                                      Inhalation--
                                          DF = DFH(ID, IO)
                                      ENDIF

C                                      Calculate dose increment--
                                      DOSINC = Q(IE, IP) * DF * ADJUNT
```

DOSE

```
C      Accumulate cumulative dose, "PABLM bits"--
      DOSV(IO,IP) = DOSV(IO,IP) + DOSINC
      DOSR(IO,IN) = DOSR(IO,IN) + DOSINC
      DOSO2(IO) = DOSO2(IO) + DOSINC
      CUMIOR(IO,IY) = CUMIOR(IO,IY) + DOSINC

C      Accumulate EDE "bits"--
      IF (IE .EQ. 1) THEN
        DOSCDR(IO,IN) = DOSCDR(IO,IN) + DOSINC
        DOSCDV(IO,IP) = DOSCDV(IO,IP) + DOSINC
        DOSO1(IO) = DOSO1(IO) + DOSINC
        IF (IDFIP .EQ. 1) THEN
C          Inhalation--
          DOSRP(IO,IN,1) = DOSRP(IO,IN,1) + DOSINC
          CDEINH(IO) = CDEINH(IO) + DOSINC
        ELSE
C          Ingestion--
          DOSRP(IO,IN,2) = DOSRP(IO,IN,2) + DOSINC
          CDEING(IO) = CDEING(IO) + DOSINC
        ENDIF
      ENDIF

C      Save yearly increment "bits" for summary report--
      IF (IY .LT. 4 .AND. IE .LT. 4)
        SAVORG(IO,IE,IY) = SAVORG(IO,IE,IY) + DOSINC

      ENDIF
120    CONTINUE

C      Next do the previous year--
      ID = ID - 1
150    CONTINUE
      ENDIF

ELSEIF (IY .LE. NYRINT) THEN

  DOSINC = 0.0

  IF (IP .EQ. 1) THEN

C      Air submersion--
      IF (FINITE) THEN
        DOSINC = Q(IY,IP) * NVU(IUNIT) * 1.0 / NVU(4)
      ELSE
C      Infinite plume--
        DOSINC = Q(IY,IP) * DAIT(IN) * ADJUNT
      ENDIF

    ELSEIF (IP .EQ. 3) THEN
```

DOSE

```
C      Surface soil exposure--
      DOSINC = Q(IY,IP) * DSIT(IN) * ADJUNT

      ELSEIF (IP .EQ. 14) THEN
C      Swimming exposure--
      DOSINC = Q(IY,IP) * DBIT(IN) * ADJUNT * SI2I

      ELSEIF (IP .EQ. 15) THEN
C      Boating exposure--
      DOSINC = Q(IY,IP) * DBIT(IN) * ADJUNT

      ELSEIF (IP .EQ. 16) THEN
C      Shoreline exposure--
      DOSINC = Q(IY,IP) * DSIT(IN) * ADJUNT

      ELSEIF (IP .EQ. 22) THEN
C      Deep soil exposure--
      DOSINC = Q(IY,IP) * DDIT(IN,INDW) * ADJUNT

      ELSEIF (IP .EQ. 23) THEN
C      Buried waste exposure--
      DOSINC = Q(IY,IP) * DDIT(IN,INDW) * ADJUNT

      ENDIF

C      External "PABLM bits"--
      DOSRE(IN) = DOSRE(IN) + DOSINC
      DOSVE(IP) = DOSVE(IP) + DOSINC

C      External "AEDE bits"--
      IF (IY .EQ. 1) THEN
        DEX1R(IN) = DEX1R(IN) + DOSINC
        DEX1V(IP) = DEX1V(IP) + DOSINC
      ENDIF

C      External by year--
      EXTDOS(IY) = EXTDOS(IY) + DOSINC

      ENDIF

      ENDIF
170  CONTINUE

110  CONTINUE

      RETURN
C-----
      END
```


DOSE

```
C-----
C
C      SUBROUTINE DOSCTL (LUN2, ISEAS)
C
C      This module controls calculation of dose.  Doses calculated are
C      one year dose, external dose, maximum annual dose, cumulative
C      dose, and whole body effective dose equivalent.
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 29-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      ALZERO   - Flag cleared if values in exposure array
C      FIRST    - Flag cleared after first season in an acute case,
C                 used to control reading of data sets
C      FOUND    - Flag set if dose factors are found for the current
C                 radionuclide in REDSET subroutine
C      IN       - Index of the current radionuclide in this case
C      IP       - Index of the current exposure pathway
C      LUN2     - Temporary file of unformatted dose rate factors,
C                 used for acute and summary cases
C-----
C
C      INCLUDE 'DFPAR.CMN'
C      INCLUDE 'DOSALL.CMN'
C      INCLUDE 'INVIN.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'TIMES.CMN'
C
C      LOGICAL FOUND, FIRST, INTDF(100)
C      DATA FIRST /.TRUE./
C
C      NYRINT = INT (NTKEND)
C
C      IF (ACUTE) THEN
C
C      Rewind dose factor work file--
C      REWIND (LUN2)
C
C      IF (.NOT. FIRST) THEN
```

DOSE

```
C      Reinitialize arrays--
      DO 152 IN = 1, NUCTOT
        DOSRE(IN) = 0.0
        DEX1R(IN) = 0.0
        DO 153 IO = 1, MORG
          DOSR(IO,IN) = 0.0
          DOSCDR(IO,IN) = 0.0
153      CONTINUE
152      CONTINUE

      DO 154 IP = 1, NPATH
        DOSVE(IP) = 0.0
        DEX1V(IP) = 0.0
        DO 155 IO = 1, MORG
          DOSV(IO,IP) = 0.0
          DOSCDV(IO,IP) = 0.0
155      CONTINUE
154      CONTINUE

      DO 156 IY = 1, 70
        EXTDOS(IY) = 0.0
        DO 157 IO = 1, MORG
          CUMIOR(IO,IY) = 0.0
157      CONTINUE
156      CONTINUE

      DO 158 IO = 1, MORG
        DOS01(IO) = 0.0
        DOS02(IO) = 0.0
        CDEINH(IO) = 0.0
        CDEING(IO) = 0.0
        DO 159 I = 1, 3
          DO 160 J = 1, 3
            SAVORG(IO,I,J) = 0.0
160          CONTINUE
159        CONTINUE
158      CONTINUE

      ENDIF

C      For each radionuclide considered in this case--
      DO 132 IN = 1, NUCTOT

C      IF (FIRST) THEN
        Read from external files--
        FOUND = .FALSE.
        CALL REDSET (IN, FOUND, LUN2)
        IF (FOUND) THEN
          INTDF(IN) = .TRUE.
```

DOSE

```
        ELSE
            INTDF(IN) = .FALSE.
        ENDIF
    ELSE
C       Read from work file--
        READ (LUN2) DFH, DFG, IOR
    ENDIF

C       Read over radionuclide name from ENV file--
        READ (13, '(A)') DUM

C       For each selected environmental pathway--
        DO 142 IP = 1, NPATH
            IF (PATH(IP) .OR. (IP .EQ. 1 .AND. FINITE)) THEN

C               Read environmental exposure for current pathway for
C               each year of intake--
                READ (13,12) (Q(IE,IP),IE=1, NYRINT)

                ENDIF
142      CONTINUE

C       Calculate dose--
        CALL DOSCAL (IN, INTDF)

132     CONTINUE
        FIRST = .FALSE.

    ELSE
C       Chronic exposure--

C       For each radionuclide considered in this case--
        DO 130 IN = 1, NUCTOT

C       Read data sets for this radionuclide--
        FOUND = .FALSE.

        IF (ELTI(IN) .EQ. 'KR' .OR. ELTI(IN) .EQ. 'XE'
            .OR. ELTI(IN) .EQ. 'RN' .OR. ELTI(IN) .EQ. 'AR') THEN
            INTDF(IN) = .FALSE.

        ELSE
            CALL REDSET (IN, FOUND, LUN2)
            IF (FOUND) THEN
                INTDF(IN) = .TRUE.
            ELSE
                INTDF(IN) = .FALSE.
            ENDIF
        ENDIF
    ENDIF
```

DOSE

```
C      Read over radionuclide name from ENV file--
      READ (13, '(A)') DUM

C      For each selected environmental pathway--
      DO 143 IP = 1, NPATH
        IF (PATH(IP) .OR. (IP .EQ. 1 .AND. FINITE)) THEN

C          Read environmental exposure for current pathway for
C          each year of intake--
          READ (13,12) (Q(IE,IP),IE=1, NYRINT)
        ENDIF
      143  CONTINUE

C      Calculate doses--
      CALL DOSCAL (IN,INTDF)

      130  CONTINUE

      ENDIF
      RETURN

C---- Format Statements -----
      12 FORMAT (9X, 8E8.1, / 9(9X, 8E8.1/))

C-----
      END
```

DOSE

```
C-----
C
C      SUBROUTINE DOSSUM
C
C      This module prints the dose summary and whole body EDE reports
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 2-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      IN          - Index of the current radionuclide in this case
C      IP          - Index of the current exposure pathway
C      L()         - Array of lines (78 characters each) containing
C                   text of dose summary report
C      NL          - Number of lines in dose summary text array
C      NIO         - Number of organs for which data is to be printed in
C                   the whole body EDE report, NIO <= 11
C      DOSMAX      - Largest organ contribution to EDE
C      IOMAX       - Index of organ with largest contribution to EDE
C-----
C
C      INCLUDE 'DAYPC.CMN'
C      INCLUDE 'DOSALL.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'TIMES.CMN'
C      INCLUDE 'TITL.CMN'
C
C      CHARACTER L(50)*78, DUM*3, DASH1*50, DASH2*50, UN1*1, UN2*3,
C                   UN3(4)*3, PORG*8
C      INTEGER NL, NIO
C
C      DATA UN3 /'Inh','Ing','Ext','  '/, PORG /'  '/
C      DATA DASH1 /'-----'/'/'
C      DATA DASH2 /'-----'/'/'
C      DATA NL /28/
C
C      IF (POPDOS) THEN
C         UN1 = 'P'
C      ELSE
C         UN1 = ' '
C      ENDIF
```

DOSE

```
IF (IUNIT .LT. 5) THEN
  UN2 = 'rem'
ELSE
  UN2 = 'Sv'
ENDIF
```

C---- Determine no. of organs to print, controlling organ-----

```
NIO = 0
MAXO = 0
OMAX = 0.0

DO 306 IO = 1, 11
  IF (ICDE(IO) .GT. 0) NIO = NIO + 1
  IF (CDE(IO) .GT. OMAX) THEN
    OMAX = CDE(IO)
    MAXO = IO
  ENDIF
306 CONTINUE

IF (MAXO .GT. 0) PORG = MASORG(ICDE(MAXO))
```

C---- Write quality assurance one-line report -----

```
CALL MAKDA2
LUN = 39
CALL OPNFIL (5, 0, LUN)
WRITE (LUN,5) TITLS(5) (1:18), EDEINH, EDEING, EXTDOS(1), EDE,
.          AEDEQ, UN1, UN2, PORG(1:3), UN3(MAXP),
.          ELTT(MAXR), AWT(MAXR)(1:4), TODAY(1:8), CLOCK(1:5),
.          NEAR, ACUTE, POPDOS, PATH, INT(NTKEND),
.          INT(RELEND), INT(DCEND)
CLOSE (LUN)
```

C---- Read DOSSUM text file -----

```
LUN = 12
CALL OPNFIL (1,0,LUN)
READ (LUN,'(A/A/A)') DUM, DUM, DUM

DO 100 I = 1, NL
  READ (LUN,'(A3,A77)') DUM, L(I)
  IF (DEBUG) WRITE (*,*) L(I)
C 100 CONTINUE
CLOSE (LUN)
```

C---- Write whole body EDE report -----

```
LUN = 14
```

DOSE

```
IF (EDE .GT. 0.0) THEN
  CALL SUBHED (1, ILINE)
  WRITE (LUN,1110) DASH1
  DO 304 IO = 1, NIO

    IF (IO .EQ. 1) THEN
      WRITE (LUN,1114) 'Gonads ', CDE(IO), WT(IO), WDE(IO)
    ELSEIF (IO .EQ. 2) THEN
      WRITE (LUN,1114) 'Breast ', CDE(IO), WT(IO), WDE(IO)
    ELSE
      WRITE (LUN,1114) MASORG(ICDE(IO)), CDE(IO), WT(IO), WDE(IO)
    ENDIF

304  CONTINUE
    WRITE (LUN,1112) DASH2, EDE, EXTDOS(1), DASH2, AEDEQ
    WRITE (LUN,1113) DASH2, MASORG(ICDE(MAXO)), UN3(MAXP),
      .           ELTT(MAXR), AWT(MAXR), EDEINH, EDEING,
      .           DASH2
    ENDIF

C---- Print grid report -----

C   Store internal dose increments into character array--
WRITE (L(10) (15:21), 1) SAVINC(1,1)
WRITE (L(10) (25:31), 1) SAVINC(1,2)
WRITE (L(10) (35:41), 1) SAVINC(1,3)
WRITE (L( 8) (25:31), 1) SAVINC(2,2)
WRITE (L( 8) (35:41), 1) SAVINC(2,3)
WRITE (L( 6) (35:41), 1) SAVINC(3,3)

C   Store internal annual dose into character array--
WRITE (L(14) (15:21), 1) CUMIYR(1)
WRITE (L(14) (25:31), 1) CUMIYR(2)
WRITE (L(14) (35:41), 1) CUMIYR(3)

C   Store external annual dose into character array--
WRITE (L(18) (15:21), 1) EXTDOS(1)
WRITE (L(18) (25:31), 1) EXTDOS(2)
WRITE (L(18) (35:41), 1) EXTDOS(3)

C   Store annual dose into character array--
WRITE (L(22) (15:21), 1) ANNULD(1)
WRITE (L(22) (25:31), 1) ANNULD(2)
WRITE (L(22) (35:41), 1) ANNULD(3)

C   Store effective dose equivalent--
WRITE (L(10) (53:59), 1) EDE
```

DOSE

```
C      Store cumulative internal dose--
      WRITE (L(14) (53:59), 1) CUMID

C      Store external dose--
      WRITE (L(18) (53:59), 1) EXTD

C      Store cumulative dose--
      WRITE (L(22) (53:59), 1) CUMD

C      Store maximum annual dose and year--
      WRITE (L(25) (53:59), 1) MAXD
      WRITE (L(27) (70:72), '(I3)') MAXYR

C      Write summary report--
      CALL SUBHED (2, ILINE)
      WRITE (LUN, '(///)')

      DO 200 I = 1, NL
        WRITE (LUN, '(1X,A)') L(I)
200    CONTINUE

      RETURN

C----- Format Statements -----
      1 FORMAT (1PE7.1)
      5 FORMAT (A18, ': ', 1P, 5E8.1, 0P, 1X, A1, A3, 1X, A3, 1X, A3, 1X,
        .      A2, A4, 1X, A8, 1X, A5, 1X, 3L1, 1X, 24L1, 3I2)
1004  FORMAT (' ', A1, I3, 1P, 15E8.1E2)
1110  FORMAT (///,
  .      T10, 'Committed Dose Equivalent',
  .      T10, 'Dose Weighting Factors',
  .      T10, 'Organ',
  .      T10, 'Weighted Dose Equivalent')
1112  FORMAT (' ', T10, A50/
  .      T10, 'Internal Effective Dose Equivalent', T48, 1P, E9.1E2/
  .      T10, 'External Dose', T48, E9.1E2/ ' ', T10, A50, /
  .      T10, 'Annual Effective Dose Equivalent',
  .      T48, E9.1E2/////////)
1113  FORMAT (' ', T10, A50/
  .      T10, 'Controlling Organ:', T50, A8/
  .      T10, 'Controlling Pathway:', T50, A3/
  .      T10, 'Controlling Radionuclide:', T50, A2, A6//
  .      T10, 'Inhalation EDE:', T48, 1P, E9.1/
  .      T10, 'Ingestion EDE: ', T48, E9.1/
  .      T10, A50)
1114  FORMAT (' ', T10, A12, 4X, 1P, 3(E9.1E2, 2X))

C-----
      END
```


DOSE

```
C-----
C
C      SUBROUTINE REDFIL
C
C      This module controls reading of the environmental exposure and dose
C      rate factors yearly increments from input files.
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Aug-88 RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C-----
C
C      E      - Input element symbol
C      A      - Input isotopic number plus optional metastable spec-
C              ification
C      DAIN    - Input external dose rate factor for air submersion
C      DBIN    - Input external dose factor for immersion in water
C      DSIN    - Input external dose factor for exposure to contaminated
C              surface soil
C      DD15IN  - Input external dose factor for exposure to contaminated
C              soil or waste with a 15 cm overburden of soil
C      DD50IN  - Input external dose factor for exposure to contaminated
C              soil or waste with a 50 cm overburden of soil
C      DD100I  - Input external dose factor for exposure to contaminated
C              soil or waste with a 100 cm overburden of soil
C      DUM     - Dummy input variable
C      DUM2    - Character input checking for 'ORGAN' in default parameter
C              input file
C      IN      - Index of the current radionuclide in this case
C      IP      - Index of the current exposure pathway
C      LUN2    - Logical unit number of the default parameter input file
C      RTEMP   - Temporary REAL input parameter
C      TEMP()  - Temporary REAL input parameter array
C      0.15    - m3/m2 conversion
C-----
C
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'DFPAR.CMN'
C      INCLUDE 'FILES.CMN'
C      INCLUDE 'LABELS.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'SOLPAR.CMN'
```

DOSE

```
INCLUDE 'TIMES.CMN'  
INCLUDE 'TITL.CMN'
```

```
CHARACTER DUM*1, E*2, A*6, DUM2*5  
REAL DAIN, DBIN, DSIN, DD15IN, DD50IN, DD100I, RTEMP, TEMP(11)
```

C----- Read options from ENV input file -----

```
LUN = 11  
CALL OPNFIL (4, 0, LUN)  
READ (LUN, '(A)', ERR=98, END=99) DUM  
READ (LUN, *) OUTEDE, OUTRAD, OUTPTH, DEBUG,  
      .      NEAR, POPDOS, ACUTE, ONEDOS, AEDE, MAXDOS, CUMDOS,  
      .      DOSTYP, RELTRM, BASIC, DERIVE, AIRCN, DEEP, FINITE  
  
READ (LUN, *) NCHAIN, IUNIT, SOLUNT, NUCTOT, POPOPT, POPT  
READ (LUN, *) (IOFNUC(I), I=1, NCHAIN)  
READ (LUN, 72) (ELTT(IN), AWT(IN), IN=1, NUCTOT)  
72 FORMAT (9(A2, A6) / )  
  
READ (LUN, *) AIR, SWAT, BIOT, BURWAS  
READ (LUN, *) PATH, RECRE, AQFOOD, TFOOD, ANFOOD  
READ (LUN, *) NTKEND, DCEND, RELEND, BEFAIR, BEFIRR  
IF (NEAR) READ (LUN, *) BEFORE, LOIC, RF1, RF2, MANULR  
  
READ (LUN, *) NDIST  
BACKSPACE (LUN)  
IF (NDIST .GT. 5) THEN  
  READ (LUN, *) ITEM, (X(I), I=1, 5)  
  READ (LUN, *) (X(I), I=6, NDIST)  
ELSE  
  READ (LUN, *) ITEM, (X(I), I=1, NDIST)  
  READ (LUN, '(A)') DUM  
ENDIF  
  
IF (AIR) THEN  
  READ (LUN, *) STACK, XOQOPT, SHITE, SFLOW, XOQI, SRAD  
  READ (LUN, *) ETEMP, MIDIST, MIDIR, EFFSTK, JFIN, TTAIRI, MIUBAR  
  READ (LUN, *) TPOPS, (TTAIR(I), I=1, NDIST)  
  IF (.NOT. POPDOS) THEN  
    IF (FINITE) READ (LUN, *) (DRFSAV(J), J=1, 6)  
  ELSEIF (XOQOPT .GT. 1) THEN  
    IF (FINITE) THEN  
      READ (LUN, *) ((PWTX(I, J), J=1, 6), I=1, 10)  
    ELSE  
      READ (LUN, *) (PWT(I), I=1, NDIST)  
    ENDIF  
  ENDIF  
ENDIF  
ENDIF
```

DOSE

```
      IF (SWAT) THEN
        READ (LUN,*) MIXFLG, MIXR, SWFLOW, SWTT
        IF (MIXFLG .GT. 0) READ (LUN,*)
          SWQB, SWLSX, SWOSY, SWDPH, SWIDTH, SWDZ
      ENDIF

      IF (BURWAS .OR. BIOT .OR. DEEP)
        READ (LUN,*) PACKHL, WASDEP, OVRBRD

      CLOSE (11)

C      Set overburden index--
      CALL BIOCAL
      IF (INDW .GT. 3) INDW = 3

C      Set plume flag if finite plume--
      IF (FINITE) PATH(1) = .TRUE.

C      Set times--
      NTIME = INT(DCEND)

C----- Open environmental exposure rate file, store and read over -----
C      headings--

      LUN = 13
      CALL OPNFIL (4,0,LUN)

C      If files do not match, stop--
      IF (TITLS(11) .NE. TITLS(13)) GOTO 91

C----- Open internal dose rate factor file and store title -----

C      CALL OPNFIL (4,0,37)
C      CLOSE (37)
      CALL OPNFIL (6,0,40)

C----- Read external exposure dose rate factors -----
C

      NC=1
      IFLG1=0

150 CONTINUE
      LUN = 10
      CLOSE (LUN)
      CALL OPNFIL (4,0,LUN)
      READ (LUN,111,ERR=98,END=99) DUM, DUM, DUM
```

DOSE

151 CONTINUE

READ(LUN,3,ERR=98,END=153) E, A, DAIN, DBIN, DSIN, DD15IN,
DD50IN, DD100I

IF (E .EQ. ELTT(NC) .AND. A .EQ. AWT(NC)) THEN

DAIT(NC) = DAIN

DBIT(NC) = DBIN

DSIT(NC) = DSIN / 0.15

DDIT(NC,1) = DD15IN

DDIT(NC,2) = DD50IN

DDIT(NC,3) = DD100I

NC = NC+1

IF (NC .GT. NUCTOT) GOTO 155

ENDIF

GOTO 151

153 CONTINUE

IF (IFLG1 .EQ. 0) THEN

IFLG1 = 1

ELSE

C No information this radionuclide

IFLG1 = 0

NC = NC + 1

ENDIF

IF (NC .LE. NUCTOT) GOTO 150

155 CLOSE (LUN)

C---- Open output file -----

LUN = 14

CALL OPNFIL (2,0,LUN)

C---- Read from default parameter file -----

LUN2 = 22

OPEN (LUN2, FILE=FILN(LUN2), STATUS='OLD', IOSTAT=IOS)

IF (IOS .NE. 0) GOTO 97

301 CONTINUE

READ (LUN2,1,ERR=98,END=99) DUM2

IF (DUM2 .NE. 'DOSE ') GOTO 301

READ (LUN2,*,ERR=98,END=99) (TEMP(I), I=1,11)

DO 302 I = 1, 11

IF (TEMP(I) .NE. WT(I)) THEN

WRITE (LUN,10) WT(I), TEMP(I), I

WT(I) = TEMP(I)

DOSE

```
ENDIF  
302 CONTINUE
```

```
READ (LUN2,*) RTEMP  
IF (RTEMP .NE. SI2I) THEN  
  WRITE (LUN,20) SI2I, RTEMP, 'SI2I'  
  SI2I = RTEMP  
ENDIF  
CLOSE (LUN2)
```

```
RETURN
```

C---- Format Statements -----

```
1 FORMAT (A5)  
3 FORMAT (A2, A6, E8.2, 5( 2X, E8.2))  
10 FORMAT (' Default weight changed from ',1P,E9.1,' to ',E9.1,  
  ' for organ ',I2)  
20 FORMAT (' Default value changed from ',1P,E9.1,' to ',E9.1,  
  ' for parameter ',A10)  
111 FORMAT (A1/A1/A1)
```

C---- Error Messages -----

```
91 WRITE (*,*) 'File titles do not match, LUN 11 and 13.'  
  WRITE (*,*) ' Assumed to be invalid case.'  
  CALL EXIT (1)  
  
97 CALL FILERR (1, LUN2, 'In REDFIL  ' )  
98 CALL FILERR (2, LUN,  'In REDFIL  ' )  
99 CALL FILERR (3, LUN,  'In REDFIL  ' )
```

C-----
END

DOSE

```
C-----
C
C      SUBROUTINE REDSET (IN, FOUND, LUN2)
C
C      This module reads a data sets of inhalation and ingestion dose rate
C      factor yearly increments and exposure by year of intake and
C      pathway for the current radionuclide.
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 18-Apr-88 RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      FOUND      - Flag set if data set was found for the current
C                  radionuclide
C      IN          - Index of the current radionuclide in this case
C      NGORG()     - Number of years of ingestion df's for each organ
C      NHORG()     - Number of years of inhalation df's for each organ
C-----
C
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'DFPAR.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'TIMES.CMN'
C
C      INTEGER NGORG(25), NHORG(25), LUN2, NYRINT
C      REAL DFGIN(70,25), DFHIN(70,25)
C      CHARACTER E*2, A*6
C      LOGICAL FOUND, FIRST, CHKNEXT
C
C      DATA FIRST /.TRUE./
C      LUN = 40
C      CHKNEXT = .TRUE.
C
C      Initialize dose factor arrays--
C      DO 402 IO = 1, MORG
C          DO 400 IY = 1, 70
C              DFG(IY,IO) = 0.0
C              DFH(IY,IO) = 0.0
C      400  CONTINUE
C      402  CONTINUE
C
C      Check for noble gases, no internal dose factors--
```

DOSE

```
      IF (ELTT(IN) .EQ. "KR" .OR. ELTT(IN) .EQ. "XE" .OR.  
      .   ELTT(IN) .EQ. "AR" .OR. ELTT(IN) .EQ. "RN") GOTO 701  
  
151 CONTINUE  
  
      READ (LUN,END=700) E, A,  
      .   (NGORG(IO),IO=1,23), (NHORG(IO),IO=1,23),  
      .   ((DFGIN(IY,IO),IY=1,NGORG(IO)),IO=1,23),  
      .   ((DFHIN(IY,IO),IY=1,NHORG(IO)),IO=1,23)  
  
      IF (E .EQ. ELTT(IN) .AND. A .EQ. AWT(IN)) THEN  
  
        FOUND = .TRUE.  
  
        DO 200 IO = 1, 23  
          DO 201 IY = 1, NGORG(IO)  
            DFG(IY,IO) = DFGIN(IY,IO)  
201      CONTINUE  
          DO 202 IY = 1, NHORG(IO)  
            DFH(IY,IO) = DFHIN(IY,IO)  
202      CONTINUE  
200      CONTINUE  
  
        IF (DEBUG) THEN  
          WRITE (*,'(3A)') 'Dose factors for:',E, A  
          WRITE (*,*) (NGORG(IO),IO=1,23)  
          WRITE (*,*) (NHORG(IO),IO=1,23)  
          DO 155 IO = 1, 23  
            IF (NGORG(IO) .GT. 0)  
              WRITE (*,*) 'Ing:',IO, (DFG(IY,IO),IY=1,NGORG(IO))  
            IF (NHORG(IO) .GT. 0)  
              WRITE (*,*) 'Inh:',IO, (DFH(IY,IO),IY=1,NHORG(IO))  
155      CONTINUE  
        ENDIF  
  
C      Set organ flags and initialize maximum year arrays--  
      DO 132 IO = 1, MORG  
        IF (NGORG(IO) .GT. 0 .OR. NHORG(IO) .GT. 0) THEN  
          IOR(IO) = .TRUE.  
        ELSE  
          IOR(IO) = .FALSE.  
        ENDIF  
132      CONTINUE  
  
C      Set remaining organs to "Other"--  
      DO 300 IO = 15, 22  
        IF (DFG(1,IO) .EQ. 0.0) THEN  
          DO 302 IY = 1, NGORG(23)  
            DFG(IY,IO) = DFG(IY,23)
```

DOSE

```
302      CONTINUE
        DO 304 IY = 1, NHORG(23)
          DFH(IY,IO) = DFH(IY,23)
304      CONTINUE
        ENDIF
300      CONTINUE

        GOTO 135
      ELSE

C        If current radionuclide not next data set, rewind file--
        IF (CHKNEXT) THEN
          REWIND LUN
          CHKNEXT = .FALSE.
        ENDIF

        ENDIF
        GOTO 151

C      Data set not found--
700 CONTINUE
      REWIND LUN
      IF (CHKNEXT) THEN
        CHKNEXT = .FALSE.
        GOTO 151
      ENDIF

701 CONTINUE
C      Data set not found, or noble gas--
      DO 134 IO = 1, MORG
        IOR(IO) = .FALSE.
134 CONTINUE

        WRITE (*,*) 'Internal dose factors not found for ',
          .          ELTT(IN),AWT(IN)

135 CONTINUE
C      Read exposure file--

      IF (FIRST) THEN
C      Read over heading in quantity file--
        REWIND (13)
        READ (13, '(A)') DUM
        READ (13, '(A)') DUM
        DO 136 IP = 1, NPATH
          IF (PATH(IP) .OR. (IP .EQ. 1 .AND. FINITE))
            READ (13, '(A)') DUM
136 CONTINUE
        NYRINT = INT (NTKEND)
```


DOSE

FIRST = .FALSE.
ENDIF

IF (ACUTE .AND. (TFOOD .OR. ANFOOD)) WRITE (LUN2) DFH, DFG, IOR

RETURN

C-----
END

DOSE

```
C-----
C
C      SUBROUTINE RITBYP
C
C      This module writes a report of dose by exposure pathway.
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 31-May-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      DOEXT      - Flag set if any external pathways are considered
C      IEND       - Loop terminating index, used to print only CDE reports
C                  if only AEDE was requested
C      ILINE      - Number of data lines this page
C      IP         - Index of the current exposure pathway
C      NA         - Number of organs to be printed this data set, used to
C                  control printing of dashes
C      NL         - Intermediate organ index for printing
C-----
C
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'TIMES.CMN'
C      INCLUDE 'DOSALL.CMN'
C      INCLUDE 'LABELS.CMN'
C
C      INTEGER NL, ILINE, IEND
C      LOGICAL DOEXT
C
C      IF (OUTEDE) THEN
C        IEND = 1
C      ELSE
C        IEND = 2
C      ENDIF
C
C---- Loop through subroutine for each dose type -----
C
C      DO 100 ITYP = 1, IEND
C
C      External dose only--
C      IF (NORGS .EQ. 0) GOTO 201
C
C      CALL SUBHED (2, ILINE)
```

DOSE

C Write internal dose report--

```
IF (ITYP .EQ. 1) THEN
  WRITE (LUN,1021)
ELSEIF (ITYP .EQ. 2) THEN
  WRITE (LUN,1022)
ENDIF

WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=1,8)
WRITE (LUN,1002) DASHES
DO 141 IP = 1, NPATH
  IF (PATH(IP) .AND. IDF(IP) .LT. 3) THEN
    IF (ITYP .EQ. 1) THEN
      WRITE (LUN,1006) EXPLAB(IP), (DOSCDV(ICLN(IO),IP),IO = 1, 8)
    ELSEIF (ITYP .EQ. 2) THEN
      WRITE (LUN,1006) EXPLAB(IP), (DOSV(ICLN(IO),IP),IO = 1, 8)
    ENDIF
    ILINE = ILINE + 1
  ENDIF
141 CONTINUE
```

```
WRITE (LUN,1002) DASHES
IF (ITYP .EQ. 1) THEN
  WRITE (LUN,1007) (DOS01(ICLN(IO)),IO=1,8)
ELSEIF (ITYP .EQ. 2) THEN
  WRITE (LUN,1007) (DOS02(ICLN(IO)),IO=1,8)
ENDIF
```

```
NL = 16
IF (NORGS .LT. NL) NL = NORGS
NA = NORGS-6
IF (NA .GT. 10) NA = 10
```

```
WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=9,NL)
WRITE (LUN,1002) (DASHES(I),I=1,NA)
DO 142 IP = 1, NPATH
  IF (PATH(IP) .AND. IDF(IP) .LT. 3) THEN
    IF (ITYP .EQ. 1) THEN
      WRITE (LUN,1006) EXPLAB(IP), (DOSCDV(ICLN(IO),IP),IO=9,NL)
    ELSEIF (ITYP .EQ. 2) THEN
      WRITE (LUN,1006) EXPLAB(IP), (DOSV(ICLN(IO),IP),IO=9,NL)
    ENDIF
    ILINE = ILINE + 1
  ENDIF
142 CONTINUE
```

```
WRITE (LUN,1002) (DASHES(I),I=1,NA)
IF (ITYP .EQ. 1) THEN
  WRITE (LUN,1007) (DOS01(ICLN(IO)),IO=9,NL)
ELSEIF (ITYP .EQ. 2) THEN
```

DOSE

```
WRITE (LUN,1007) (DOS02(ICLN(IO)),IO=9,NL)
ENDIF
```

```
IF (NL .GT. 16) THEN
  IF (ILINE .GT. 24) CALL SUBHED (2, ILINE)
  NL = 24
  IF (NORGS .LT. NL) NL = NORGS
  NA = NORGS - 14

  WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=17,NL)
  WRITE (LUN,1002) (DASHES(I),I=1,NA)
  DO 143 IP = 1, NPATH
    IF (PATH(IP) .AND. IDF(IP) .LT. 3) THEN
      IF (ITYP .EQ. 1) THEN
        WRITE (LUN,1006) EXPLAB(IP),
                     (DOSCDV(ICLN(IO),IP),IO=17,NL)
      ELSEIF (ITYP .EQ. 2) THEN
        WRITE (LUN,1006) EXPLAB(IP), (DOSV(ICLN(IO),IP),IO=17,NL)
      ENDIF
      ILINE = ILINE + 1
    ENDIF
143  CONTINUE
```

```
WRITE (LUN,1002) (DASHES(I),I=1,NA)
IF (ITYP .EQ. 1) THEN
  WRITE (LUN,1007) (DOS01(ICLN(IO)),IO=17,NL)
ELSEIF (ITYP .EQ. 2) THEN
  WRITE (LUN,1007) (DOS02(ICLN(IO)),IO=17,NL)
ENDIF
```

```
IF (NORGS .GT. 24) WRITE (LUN,'(2A)')
      'Data not printed for organ ',MASORG(ICLN(NORGS))
ENDIF
```

```
IF (ILINE .GT. 30) THEN
  CALL SUBHED (2, ILINE)
```

```
  ILINE = 0
ENDIF
```

```
C  Write external dose report--
201 CONTINUE
```

```
C  Check if external exposure considered--
DOEXT = .FALSE.
DO 151 IP = 1, NPATH
  IF (IDF(IP) .EQ. 3) DOEXT = .TRUE.
151 CONTINUE
```

DOSE

```
IF (DOEXT) THEN
  WRITE (LUN,1011)
  WRITE (LUN,1003)
  WRITE (LUN,1002) (DASHES(I),I=1,3)
  ILINE = ILINE + 8

  DO 150 IP = 1, NPATH
    IF (PATH(IP) .AND. IDF(IP) .EQ. 3) THEN

      IF (ITYP .EQ. 1) THEN
        WRITE (LUN,1006) EXPLAB(IP), DEX1V(IP)
      ELSEIF (ITYP .EQ. 2) THEN
        WRITE (LUN,1006) EXPLAB(IP), DOSVE(IP)
      ENDIF
    ENDIF
150  CONTINUE

    WRITE (LUN,1002) (DASHES(I),I=1,3)
    IF (ITYP .EQ. 1) THEN
      WRITE (LUN,1007) EXTDOSE(1)
    ELSEIF (ITYP .EQ. 2) THEN
      WRITE (LUN,1007) EXTDOSE
    ENDIF

  ENDIF

100 CONTINUE

RETURN
```

C----- Format Statements -----

```
1002 FORMAT (' ',10A8)
1003 FORMAT (' Pathway          ',8(A7,1X))
1004 FORMAT (// ' Pathway          ',25I3/)
1005 FORMAT (' ',A8,8X,25I3)
1006 FORMAT (' ',A8,8X,1P, 8E8.1E2)
1007 FORMAT (' Total          ',8X,1P, 8E8.1//)
1009 FORMAT (' Total internal ',1P, 8E8.1)
1011 FORMAT (////,T25,'External Dose by Exposure Pathway',/)
1012 FORMAT (' External dose  ',1P, 8E8.1)

1021 FORMAT (//,T20,'Committed Dose Equivalent by Exposure Pathway',/)
1022 FORMAT (//,T14,'Cumulative Internal Dose to Organs by Exposure ',
            ' Pathway',/)
```

C-----
END

DOSE

```
C-----
C
C      SUBROUTINE RITBYR
C
C      This module writes a report of dose by radionuclide.
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 31-May-88  RAP
C      Reviewed and Approved: 12-Sept-B8  BA Napier
C-----
C
C      IN      - Index of the current radionuclide
C      NL      - Intermediate organ index for printing
C      ILINE   - Number of data lines this page
C      NA      - Number of organs to be printed this data set, used to
C               control printing of dashes
C      IEND    - Loop terminating index, used to print only CDE reports
C               if only AEDE was requested
C-----
C
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'TIMES.CMN'
C      INCLUDE 'DOSALL.CMN'
C      INCLUDE 'LABELS.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RADIN.CMN'
C
C      INTEGER NL, ILINE, IEND, NSET, ISET, ISTART, ISTOP, MAXLIN
C
C      IF (OUTEDE) THEN
C        IEND = 1
C      ELSE
C        IEND = 2
C      ENDIF
C
C      MAXLIN = 38
C      NSET = NUCTOT / MAXLIN
C      IDD = MOD (NUCTOT, MAXLIN)
C      IF (IDD .GT. 0) NSET = NSET + 1
C
C      Break radionuclides into pages--
C      DO 200 ISET = 1, NSET
C
C        ISTART = (ISET - 1) * MAXLIN + 1
C        ISTOP = ISET * MAXLIN
```

DOSE

```
      IF (ISTOP .GT. NUCTOT) ISTOP = NUCTOT

C----- Loop through subroutine for each dose type -----
      DO 110 ITYP = 1, IEND

C      External dose only--
      IF (NORGS .EQ. 0) GOTO 100

      CALL SUBHED (2, ILINE)

C      Write internal report--

      IF (ITYP .EQ. 1) THEN
        WRITE (LUN,1021)
      ELSEIF (ITYP .EQ. 2) THEN
        WRITE (LUN,1022)
      ENDIF

      WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=1,8)
      WRITE (LUN,1002) DASHES

      DO 141 IN = ISTART, ISTOP
        IF (ITYP .EQ. 1) THEN
          WRITE (LUN,1006) ELTT(IN), AWT(IN),
            (DOSCDR(ICLN(IO),IN),IO=1,8)
        ELSEIF (ITYP .EQ. 2) THEN
          WRITE (LUN,1006) ELTT(IN), AWT(IN),
            (DOSR(ICLN(IO),IN),IO=1,8)
        ENDIF
141    CONTINUE

      WRITE (LUN,1002) DASHES
      IF (ISET .EQ. NSET) THEN
        IF (ITYP .EQ. 1) THEN
          WRITE (LUN,1007) (DOS01(ICLN(IO)),IO=1,8)
        ELSEIF (ITYP .EQ. 2) THEN
          WRITE (LUN,1007) (DOS02(ICLN(IO)),IO=1,8)
        ENDIF
      ENDIF

      NL = 16
      IF (NORGS .LT. NL) NL = NORGS
      NA = NORGS-6
      IF (NA .GT. 10) NA = 10

      IF (NUCTOT .GT. 15) THEN
        CALL SUBHED (2, ILINE)
        IF (ITYP .EQ. 1) THEN
```

DOSE

```
      WRITE (LUN,1021)
    ELSEIF (ITYP .EQ. 2) THEN
      WRITE (LUN,1022)
    ENDIF
  ENDIF

  WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=9,NL)
  WRITE (LUN,1002) (DASHES(I),I=1,NA)

  DO 142 IN = ISTART, ISTOP
    IF (ITYP .EQ. 1) THEN
      WRITE (LUN,1006) ELTT(IN), AWT(IN),
        (DOSCDR(ICLN(IO),IN),IO=9,NL)
    ELSEIF (ITYP .EQ. 2) THEN
      WRITE (LUN,1006) ELTT(IN), AWT(IN),
        (DOSR(ICLN(IO),IN),IO=9,NL)
    ENDIF
142  CONTINUE

  WRITE (LUN,1002) (DASHES(I),I=1,NA)
  IF (ISET .EQ. NSET) THEN
    IF (ITYP .EQ. 1) THEN
      WRITE (LUN,1007) (DOS01(ICLN(IO)),IO=9,NL)
    ELSEIF (ITYP .EQ. 2) THEN
      WRITE (LUN,1007) (DOS02(ICLN(IO)),IO=9,NL)
    ENDIF
  ENDIF

  IF (NL .GT. 16) THEN
    IF (NUCTOT .GT. 15) THEN
      CALL SUBHED (2, ILINE)
      IF (ITYP .EQ. 1) THEN
        WRITE (LUN,1021)
      ELSEIF (ITYP .EQ. 2) THEN
        WRITE (LUN,1022)
      ENDIF
    ENDIF

    NL = 24
    IF (NORGS .LT. NL) NL = NORGS
    NA = NORGS - 14

    WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=17,NL)
    WRITE (LUN,1002) (DASHES(I),I=1,NA)

    DO 143 IN = ISTART, ISTOP
      IF (ITYP .EQ. 1) THEN
        WRITE (LUN,1006) ELTT(IN), AWT(IN),
          (DOSCDR(ICLN(IO),IN),IO=17,NL)
```


DOSE

```

      ELSEIF (ITYP .EQ. 2) THEN
        WRITE (LUN,1006) ELTT(IN), AWT(IN),
          (DOSR(ICLN(IO),IN),IO=17,NL)
      ENDIF
143  CONTINUE

      WRITE (LUN,1002) (DASHES(I),I=1,NA)
      IF (ISET .EQ. NSET) THEN
        IF (ITYP .EQ. 1) THEN
          WRITE (LUN,1007) (DOS01(ICLN(IO)),IO=17,NL)
        ELSEIF (ITYP .EQ. 2) THEN
          WRITE (LUN,1007) (DOS02(ICLN(IO)),IO=17,NL)
        ENDIF
      ENDIF

      IF (NORGS .GT. 24) WRITE (LUN,'(2A)')
        'Data not printed for organ ',MASORG(ICLN(NORGS))
      ENDIF

C----- Write external report -----
100  CONTINUE
      IF (OUTEDE) GOTO 110

      WRITE (LUN,1011)
      WRITE (LUN,1003)
      WRITE (LUN,1002) (DASHES(I),I=1,3)

      DO 144 IN = ISTART, ISTOP
        IF (ITYP .EQ. 1) THEN
          WRITE (LUN,1006) ELTT(IN), AWT(IN), DEX1R(IN)
        ELSEIF (ITYP .EQ. 2) THEN
          WRITE (LUN,1006) ELTT(IN), AWT(IN), DOSRE(IN)
        ENDIF
144  CONTINUE

      WRITE (LUN,1002) (DASHES(I),I=1,3)
      IF (ITYP .EQ. 1) THEN
        WRITE (LUN,1007) EXTDOS(1)
      ELSEIF (ITYP .EQ. 2) THEN
        WRITE (LUN,1007) EXTD
      ENDIF

110  CONTINUE
200  CONTINUE

      RETURN

C---- Format Statements -----
```

DOSE

```
1001 FORMAT (/T25,'Internal Dose To Organ by Radionuclide',/)
1002 FORMAT (' ',10A8)
1003 FORMAT (' Radionuclide      ',8(A7,1X))
1004 FORMAT (/ ' Radionuclide      ',25I3/)
1005 FORMAT (' ',A2,1X,A6,7X,25I3)
1006 FORMAT (' ',A2,1X,A6, 7X,1P, 8E8.1E2)
1007 FORMAT (' Total      ',8X,1P, 8E8.1E2//)
1008 FORMAT (' Maximum year ', 8I8)
1009 FORMAT (' Total internal ',1P, 8E8.1)
1011 FORMAT (/T25,'External Dose by Radionuclide',/)
1012 FORMAT (' External dose ',1P, 8E8.1)
1021 FORMAT (/T25,'Committed Dose Equivalent by Radionuclide',/)
1022 FORMAT (/T15,'Cumulative Internal Dose to Organs by ',
.          'Radionuclide',/)
```

C-----
END

DOSE

```
C-----
C
C      SUBROUTINE RITEDE
C
C      This module prints the EDE by radionuclide report
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 13-Jun-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      IN          - Index of the current radionuclide in this case
C-----

      INCLUDE 'DOSALL.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'ORGMAS.CMN'
      INCLUDE 'RADIN.CMN'
      INCLUDE 'TIMES.CMN'

      INTEGER NSET, ISET, ISTART, ISTOP, MAXLIN
      CHARACTER DASH1*68
      DATA DASH1 /'-----'
      .---'

      MAXLIN = 37
      NSET = NUCTOT / MAXLIN
      IDD = MOD (NUCTOT, MAXLIN)
      IF (IDD .GT. 0) NSET = NSET + 1

C      Break radionuclides into pages--
      DO 200 ISET = 1, NSET

          ISTART = (ISET - 1) * MAXLIN + 1
          ISTOP = ISET * MAXLIN
          IF (ISTOP .GT. NUCTOT) ISTOP = NUCTOT

          CALL SUBHED (1, ILINE)
          WRITE (LUN,1110) DASH1

          DO 300 IN = ISTART, ISTOP

              WRITE (LUN,1114) ELTT(IN), AWT(IN), EDERH(IN), EDERG(IN),
              .           DEX1R(IN), RADEDE(IN),
              .           RADEDE(IN) + DEX1R(IN)
```

DOSE

```
300  CONTINUE
      WRITE (LUN,1111) DASH1
```

```
200  CONTINUE
```

```
      RETURN
```

C---- Format Statements -----

```
1  FORMAT (1PE7.1)
```

```
1004 FORMAT (' ',A1,I3,1P, 15E8.1E2)
```

```
1110 FORMAT (//,
.          T5,'          Inhalation Ingestion          ',
.          'Internal    Annual'/
.          T5,'          Effective Effective          ',
.          'Effective Effective'/
.          T5,'Radio-    Dose      Dose      External  ',
.          'Dose      Dose'/
.          T5,'nuclide  Equivalent Equivalent  Dose    ',
.          'Equivalent Equivalent'/
.          T5,A68)
```

```
1111 FORMAT (T5,A68)
```

```
1114 FORMAT (' ',T5,A2,1X,A6,1X,1P,5(E9.1,3X))
```

C-----

```
      END
```

DOSE

```
C-----
C
C   SUBROUTINE TOTCAL
C
C   This module totals doses and sets flags for report writing.
C
C   Module of Program DOSE of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 2-Aug-88  RAP
C   Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C   IN      - Index of the current radionuclide in this case
C   IP      - Index of the current exposure pathway
C-----

C   INCLUDE 'DOSALL.CMN'
C   INCLUDE 'OPT.CMN'
C   INCLUDE 'ORGMAS.CMN'
C   INCLUDE 'RADIN.CMN'
C   INCLUDE 'TIMES.CMN'

C   Determine dose units--
C   IF (IUNIT .LT. 5) THEN
C     IF (POPDOS) THEN
C       DOSUNT = 'Person rem'
C     ELSE
C       DOSUNT = 'Rem'
C     ENDIF
C   ELSE
C     IF (POPDOS) THEN
C       DOSUNT = 'Person Sv'
C     ELSE
C       DOSUNT = 'Sv'
C     ENDIF
C   ENDIF

C   Set organ column indices and number of organs to print--

C   NORGS = 0
C   Set organ print index--
C   DO 300 IO = 1, MORG
C     IF (DOS01(IO) .GT. 0.0 .OR. DOS02(IO) .GT. 0.0) THEN
C       NORGS = NORGS + 1
C       ICLN(NORGS) = IO
C     ENDIF
C   ENDIF
```

DOSE

300 CONTINUE

C Calculate whole body dose equivalent for first three years for
C summary report--

DO 310 IY = 1, 3

DO 320 IE = 1, 3

CALL WBEDE(SAVORG(1,IE,IY), EDE, CDE, WDE, NCDE, ICDE)

SAVINC(IE,IY) = EDE

320 CONTINUE

310 CONTINUE

C Cumulative EDE yearly increment--

DO 330 IY = 1, INT(DCEND)

CALL WBEDE(CUMIOR(1,IY), EDE, CDE, WDE, NCDE, ICDE)

CUMIYR(IY) = EDE

330 CONTINUE

C Inhalation EDE--

CALL WBEDE(CDEINH, EDE, CDE, WDE, NCDE, ICDE)

EDEINH = EDE

C Ingestion EDE--

CALL WBEDE(CDEING, EDE, CDE, WDE, NCDE, ICDE)

EDEING = EDE

C Determine controlling pathway--

MAXP = 4

PMAX = 0.0

IF (EDEINH .GT. PMAX) THEN

PMAX = EDEINH

MAXP = 1

ENDIF

IF (EDEING .GT. PMAX) THEN

PMAX = EDEING

MAXP = 2

ENDIF

IF (EXTDOS(1) .GT. PMAX) THEN

PMAX = EXTDOS(1)

MAXP = 3

ENDIF

RMAX = 0.0

MAXR = 1

DO 331 IN = 1, NUCTDT

RADEDE(IN) = 0.0

EDERH(IN) = 0.0

EDERG(IN) = 0.0

331 CONTINUE

DOSE

```
IF (NUCTOT .GT. 1) THEN
  DO 332 IN = 1, NUCTOT

C    EDE by radionuclide--
    CALL WBEDE (DOSR(1,IN), EDE, CDE, WDE, NCDE, ICDE)
    RADEDE(IN) = EDE

C    Inhalation EDE by radionuclide--
    CALL WBEDE (DOSRP(1,IN,1), EDE, CDE, WDE, NCDE, ICDE)
    EDERH(IN) = EDE

C    Ingestion EDE by radionuclide--
    CALL WBEDE (DOSRP(1,IN,2), EDE, CDE, WDE, NCDE, ICDE)
    EDERG(IN) = EDE

C    Determine controlling radionuclide--
    IF (RADEDE(IN) + DEX1R(IN) .GT. RMAX) THEN
      RMAX = RADEDE(IN) + DEX1R(IN)
      MAXR = IN
    ENDIF

332  CONTINUE
    ENDIF

C    Calculate whole body dose equivalent--
    CALL WBEDE (DOS01, EDE, CDE, WDE, NCDE, ICDE)
    AEDEQ = EDE + EXTDOS(1)

C    Accumulate dose totals--
    CUMID = 0.0
    EXTD = 0.0
    MAXYR = 0
    MAXD = 0.0

    DO 220 IY = 1, INT(DCEND)

C    Total external dose--
    EXTD = EXTD + EXTDOS(IY)

C    Cumulative internal dose--
    CUMID = CUMID + CUMIYR(IY)

C    Annual dose--
    ANNULD(IY) = CUMIYR(IY) + EXTDOS(IY)

C    Check for maximum annual dose--
    IF (ANNULD(IY) .GT. MAXD) THEN
```

DOSE

```
      MAXYR = IY  
      MAXD = ANNULD(IY)  
    ENDIF  
220 CONTINUE  
  
C      Cumulative dose--  
      CUMD = CUMID + EXTD  
  
      RETURN  
C-----  
      END
```


DOSE

```
C-----
C
C      SUBROUTINE SUBHED (ITAB, ILINE)
C
C      This module prints a subheading on dose reports
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 8-Jan-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      ITAB      - Flag indicating tab settings to use; 1-set 1, 2-set2
C      ILINE     - Line number on page returned to calling program
C-----

      INCLUDE 'OPT.CMN'
      INCLUDE 'TIMES.CMN'

      INTEGER ITAB, ILINE

      CALL HEADNG (LUN)
      WRITE (LUN, '(A)') ' '
      ILINE = 9

      IF (ITAB .EQ. 1) THEN

        IF (ACUTE) THEN
          WRITE (LUN,2)
          ILINE = ILINE + 1
        ELSEIF (RELTRM) THEN
          WRITE (LUN,3) RELEND
          ILINE = ILINE + 1
        ENDIF

        IF (OUTEDE) NTKEND = 1
        WRITE (LUN,4) NTKEND, DCEND, DOSUNT
        ILINE = ILINE + 2

      ELSE

        IF (ACUTE) THEN
          WRITE (LUN,12)
          ILINE = ILINE + 1
        ELSEIF (RELTRM) THEN
          WRITE (LUN,13) RELEND
```

DOSE

```
      ILINE = ILINE + 1  
ENDIF
```

```
      IF (OUTEDE) NTKEND = 1  
      WRITE (LUN,14) NTKEND, DCEND, DOSUNT  
      ILINE = ILINE + 2
```

```
ENDIF  
RETURN
```

C----- Format Statements -----

```
2 FORMAT (T15,'Acute release')  
3 FORMAT (T15,'Release period:',T45,F8.1)  
4 FORMAT (T15,'Uptake/exposure period:',T45,F8.1,  
      .      ,T15,'Dose commitment period:',T45,F8.1/  
      .      ,T15,'Dose units:',T45,A10)  
  
12 FORMAT (' Acute release')  
13 FORMAT (' Release period:',T60,F8.1)  
14 FORMAT (' Uptake/exposure period:',T60,F8.1,  
      .      , ' Dose commitment period:',T60,F8.1/  
      .      , ' Dose units:',T60,A10)
```

C-----
 END

DOSE

```
C-----
C
C      SUBROUTINE WBEDE (DOSIN, EDE, CDE, WDE, NCDE, ICDE)
C
C      Subroutine WBEDE calculates the whole body effective dose
C      equivalent (EDE) from the current case
C
C      Module of Program DOSE of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-B8 RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      CDE()      - Committed dose equivalent to the top eleven organs, (Sv
C                  or rem), returned
C      DOSEMO()   - Dose to each organ in the master list, work array
C      DOSIN      - Dose to each organ in the master list, passed in
C      EDE        - Effective dose equivalent, (Sv or rem) returned
C      FLAG       - Flag set in bubble sort to indicate that a switch was
C                  made this pass
C      ICDE()     - Master organ index of each of the top eleven organs,
C                  returned
C      IREMAN()   - Index in organ list corresponding to the organ dose
C                  in array REMAN
C      ITEMP      - Workspace for sort
C      NCDE       - Number of organs in the CDE and WDE arrays, 11 or less,
C                  returned
C      NREM       - Index of the current position in the REMAN and IREMAN
C                  arrays
C      REMAN()    - Work array for ordering remaining organ doses by
C                  highest dose
C      RTEMP      - Workspace for sort
C      WDE()      - Weighted dose equivalent to the top eleven organs, (sv
C                  or rem), returned
C-----
C
C      INCLUDE 'TIMES.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'ORGMAS.CMN'
C
C      REAL RTEMP, REMAN(25), DOSMO(25), DOSIN(25), CDE(11), WDE(11), EDE
C      INTEGER ITEMP, IREMAN(25), NREM, NCDE, FLAG, ICDE(11)
C
C      Transfer doses to work array--
C      DO 401 IO = 1, MORG
C          DOSMO(IO) = DOSIN(IO)
```

DOSE

```
401 CONTINUE

C   Move whole body organs to CDE array--

C   Gonads--
   IF (DOSMO(12) .GT. DOSMO(11)) THEN
     CDE(1) = DOSMO(12)
     ICDE(1) = 12
   ELSE
     CDE(1) = DOSMO(11)
     ICDE(1) = 11
   ENDIF

C   Breast (muscle)--
   CDE(2) = DOSMO(13)
   ICDE(2) = 13

C   Red blood marrow--
   CDE(3) = DOSMO(8)
   ICDE(3) = 8

C   Lung (and lymph) --
   CDE(4) = DOSMO(1)
   ICDE(4) = 1

C   Thyroid--
   CDE(5) = DOSMO(14)
   ICDE(5) = 14

C   Bone surface--
   CDE(6) = DOSMO(7)
   ICDE(6) = 7

C   Move remaining organs into REMAN array for sorting--

   NREM = 0

C   Gastro-intestinal tract--
   DO 100 IO = 3, 6
     NREM = NREM + 1
     REMAN(NREM) = DOSMO(IO)
     IREMAN(NREM) = IO
100 CONTINUE

C   Specified organs--
   DO 110 IO = 15, MORG
     IF (IO .EQ. 22) THEN
C   Add stomach wall to gut--
       REMAN(3) = REMAN(3) + DOSMO(IO)
```

DOSE

```
      ELSEIF (DOSMO(IO) .GT. 0.0) THEN
C      WRITE (*,'(3A)') ' ',MASORG(IO),' added'
      NREM = NREM + 1
      REMAN(NREM) = DOSMO(IO)
      IREMAN(NREM) = IO
      ENDIF
110 CONTINUE

C      Order remaining organs by highest dose--

      N = NREM - 1
200 CONTINUE
      FLAG = 0
      J = 1
201 CONTINUE
      IF (REMAN(J) .LT. REMAN(J+1)) THEN
      RTEMP = REMAN(J)
      ITEMP = IREMAN(J)
      REMAN(J) = REMAN(J+1)
      IREMAN(J) = IREMAN(J+1)
      REMAN(J+1) = RTEMP
      IREMAN(J+1) = ITEMP
      FLAG = 1
      ENDIF
      J = J + 1
      IF (J .LE. N) GOTO 201
      IF (FLAG .GT. 0) THEN
      N = N - 1
      IF (N .GT. 0) GOTO 200
      ENDIF

C      IF (DEBUG) THEN
C      WRITE (*,*) 'Ordered list of remaining organs'
C      DO 210 I = 1, NREM
C      WRITE (*,*) IREMAN(I), REMAN(I)
C 210 CONTINUE
C      ENDIF

C      Move top 5 remaining organs into CDE array--

      NCDE = 6
      N2 = MIN (NREM, 5)

      DO 300 I = 1, N2
      NCDE = NCDE + 1
      CDE(NCDE) = REMAN(I)
      ICDE(NCDE) = IREMAN(I)
      IF (ICDE(NCDE) .LT. 1 .OR. ICDE(NCDE) .GT. MORG) THEN
      WRITE (*,*) 'Invalid master organ index in WBEDE',
```

DOSE

```
      NCDE, ICDE(NCDE)
      CALL EXIT (1)
    ENDIF
300 CONTINUE

C    Calculate WDE and EDE--
      EDE = 0.0

      DO 302 IO = 1, NCDE
        WDE(IO) = CDE(IO) * WT(IO)
        EDE = EDE + WDE(IO)
302 CONTINUE

      RETURN
C-----
      END
```

DITTY

C-----
C
C Program title: DITTY -- A Computer Program for
C Calculating Population Dose
C Integrated Over Ten Thousand
C Years
C
C Prepared for: U. S. Department of Energy under
C Contract DE-AC06-76RLO 1830
C
C Contact: Bruce Napier
C Pacific Northwest Laboratory
C Richland WA 99352
C (509) 375-3916
C
C Code developers: B. A. Napier, R. A. Peloquin,
C and D. L. Streng,
C Pacific Northwest Laboratory
C Richland WA 99352
C

C This code was prepared for an agency of the United States
C Government. Neither the United States Government or any agency
C thereof, or any of their employees, make any warranty, expressed
C or implied, or assumes any legal liability or responsibility for
C any third party's use, or the results of such use, of any portion
C of this program or represents that its use by such third party
C would not infringe privately owned rights.
C

C--- Program Information -----

C
C Problem description: To determine the collective dose from
C long term nuclear waste disposal sites.
C
C Solution method: DITTY estimates the time integral of
C collective dose over a ten-thousand-year
C period for time-variant radionuclide
C releases to surface waters, wells, or the
C atmosphere.
C
C The time frame for the calculation is any
C 10,000 year period. This period is broken
C into 143 periods of 70 years each. The
C average release in each of these periods is
C calculated from source-term data provided,
C and the total population dose
C is determined for each period. The
C activity present during any period is the
C

DITTY

C sum of material release during that period
C and residual material in the environment
C from releases in previous periods.
C
C Results format: The dose is calculated for all contributing
C pathways of exposure, including external
C exposure, inhalation, and ingestion of
C contaminated water and foods. The doses are
C calculated as the population dose received
C in each 70-year time period from material
C releases to the environment during that
C period plus all previous periods.
C
C Computer: This version is for the IBM PC/AT as a
C portion of the GENII Environmental Dosimetry
C Software Package. Earlier versions of
C DITTY are also available in VAX-11/780
C Versions.
C
C Programming language: FORTRAN compiled using LAHEY compiler (tm).
C
C Machine requirements: IBM PC/AT with a minimum of 640 Kbytes
C random access memory and 2 360-Kbyte floppy
C disk drives or the equivalent storage on
C a hard disk drive.
C
C Original Reference: B. A. Napier, R. A. Peloquin, and D. L.
C Streng. 1986. "DITTY -- A Computer Program
C for Calculating Population Dose Integrated
C Over Ten Thousand Years." PNL-4456. Pacific
C Northwest Laboratory, Richland, WA .
C Available from National Technical Information
C Service. 5285 Port Royal Road, Springfield
C Virginia. 22161
C
C Current Reference: B. A. Napier, R. A. Peloquin, D. L. Streng,
C and J. V. Ramsdell. 1988. "GENII - The
C Hanford Environmental Radiation Dosimetry
C Software System." PNL-6584, Volumes 1, 2,
C and 3. Pacific Northwest Laboratory, C
C Richland, WA 99352
C
C
C PROGRAM DITTY
C

DITTY

```
C--- Module Information -----
C
C
C   MAIN CONTROLS INPUT OF DATA AND CASE ITERATION
C
C-----
C
C   SUBORDINATE ROUTINES-- RLIBIN, SETNUC, ORGCHK, AIRLIN, BIOLIN,
C                           FOOLIN, GRDLIN, CASEIN, POPLIN, ACTIN,
C                           QAPAGE, CONTRL, REPORT, GETDAT, GETTIM
C
C   INPUTS-- NONE
C   INPUT COMMONS-- DKAY
C   OUTPUTS-- NONE
C   OUTPUT COMMONS-- BEGEND, BIODAT, DECAY, DISPSN, DKAY, NAMLIST,
C                   OPTION, ORGID, PATHIN, SOURCE, TIMES2, TITLES,
C                   VARYBL, FODATA
C
C   Module of Program DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 11-Apr-88  RAP
C   Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C   INCLUDE 'BIODAT.CMN'
C   INCLUDE 'DISPSN.CMN'
C   INCLUDE 'DKAY.CMN'
C   INCLUDE 'FODATA.CMN'
C   INCLUDE 'NAMLIST.CMN'
C   INCLUDE 'OPTION.CMN'
C   INCLUDE 'PATHIN.CMN'
C   INCLUDE 'SOURCE.CMN'
C   INCLUDE 'TIMES2.CMN'
C   INCLUDE 'TITL.CMN'
C   INCLUDE 'VARYBL.CMN'
C
C   DIMENSION IBEGA(100), IBEGW(100), IENDA(100), IENDW(100)
C
C   Get system time and date--
C   CALL MAKDA2
C
C   Read file names--
C   CALL OPNFIL ((3),(0),(1))
C
C   Open input and output files, set default values for LUNs--
C
C   IUN = 33
```

DITTY

```
CALL OPNFIL ((4),(0),IUN)

ION = 17
CALL OPNFIL ((2),(0),ION)

CALL RLIBIN
TO READ MASTER RADIONUCLIDE DATA LIBRARY RMDLIB.

C
C
C READ MASTER RADIONUCLIDE NAME LIST--
C
C READ NUMBER OF RADIONUCLIDES - RECORD TYPE 2
C READ (IUN,2000,ERR=800,END=900) NIN
C
C READ NAMES OF RADIONUCLIDES - RECORD TYPE 3
C READ (IUN,3000,ERR=800,END=900) (E(I), A(I), I = 1, NIN)
C
C CALL SETNUC
C TO ESTABLISH MASTER RADIONUCLIDE LIST FOR THIS RUN.
C
C CALL AIRLIN
C TO READ AIR SUBMERSION/INHALATION AND INGESTION DOSE FACTORS.
C
C CALL FOOLIN
C TO READ FOOD TRANSFER FACTOR DATA.
C
C CALL GRDLIN
C TO READ GROUND AND WATER EXTERNAL EXPOSURE FACTORS.
C
C
C SET AB TO SUM OF RADIOLOGICAL AND NON-RAD REMOVAL CONSTANTS
C DO 456 I = 1, INUC
C   AB(I) = AB(I) + AR(I)
C 456 CONTINUE
C
C LOOP UNTIL END-OF-FILE ENCOUNTERED ON INPUT--
C 100 CONTINUE
C
C CALL CASE2
C TO READ DATA FOR ONE CASE.
C
C IF DIFFERENT FROM PREVIOUS CASE--
C IF (ISALT .NE. IOSALT) THEN
C
C CALL BIOLIN
C TO READ IN BIOACCUMULATION FACTORS.
C
C STORE VALUE OF ISALT FOR COMPARISON IN NEXT CASE--
C IOSALT = ISALT
C
```

DITTY

```
      ENDIF
C
C
C      IF AIRBORNE RELEASE IS CONSIDERED--
      IF (IAIR .GT. 0)      CALL ACTIN (1, LUA, ITAX, ITAM,
                                IBEGA, IENDA)
C      TO GENERATE NEW RELEASE RATE DATA FOR ATMOSPHERIC PATHWAYS.
C
C      IF WATERBORNE RELEASE IS CONSIDERED--
C      IF (IWAT .GT. 0)      CALL ACTIN (2, LUW, ITWX, ITWM,
                                IBEGW, IENDW)
C
C      TO GENERATE NEW RELEASE RATE DATA FOR AQUATIC PATHWAYS.
C
C      CALL QAPAGE
C      TO WRITE INPUT SUMMARY REPORT.
C
C      CALL CONTRL (IAC, IPATH, ITAM, ITAX, ITWM, ITWX)
C      TO CONTROL DOSE RESULT CALCULATIONS.
C
C      CALL REPORT
C      TO WRITE RESULT REPORTS.
C
C      READ TITLE CARD FOR NEXT CASE--
      READ (IUN,'(A)',ERR=800,END=999) TITLS(IUN)
C
      GO TO 100

C---- Error Conditions -----
      800 CALL FILERR (3, IUN, 'In DITTY')
      900 CALL FILERR (2, IUN, 'In DITTY')

C---- Format Statements -----
      2000 FORMAT (I5)
      3000 FORMAT (A2, A6 )
      4000 FORMAT (I5)
      5000 FORMAT (10I3)

C-----
      999 CONTINUE
      WRITE (*,*) ' Normal termination of DITTY'
      STOP
C
C-----
      END
```

DITTY

```
C-----
C
C   SUBROUTINE ACTIN (IP, IAW, ITX, ITM, IBEG, IEND)
C
C   This module reads the release activity time history data
C
C   Module of DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 3-Aug-88 RAP
C   Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C   IP          - PATHWAY SELECTION INDEX: 1- AIRBORNE
C                RELEASE, 2- WATERBORNE RELEASE
C   IAW         - CONTROL FOR INPUT FILE SPECIFICATIONS:
C                1- FOR CARD INPUT, 2- FOR PERMANENT FILE
C                INPUT ON UNIT 26 OR UNIT 24
C   ITX         - MAXIMUM TIME INCREMENT INDEX DURING WHICH
C                ANY RELEASE WAS MADE FOR THIS MODE
C   ITM         - MINIMUM TIME INCREMENT INDEX DURING WHICH
C                ANY RELEASES WAS MADE FOR THIS MODE
C   IBEG(100)   - 1ST TIME INCRMENT DURING WHICH EACH
C                RADIONUCLIDE IS RELEASED 1<=IBEG(I)<=144
C   IEND(100)   - LAST TIME INCREMENT DURING WHICH EACH
C                RADIONUCLIDE IS RELEASED 1<=IEND(I)<=144
C                IBEG(I) <= IEND(I)
C   CIN(100)   - Double precision input concentration array
C   ACTSET      - Flag set if activity was set into air or water
C                activity array, (ACTA or ACTW). Warning printed
C                to screen if not set.
C-----
C
C   INTEGER IBEG(100), IEND(100)
C   REAL T(450), C(450)
C   REAL*8 CIN(100)
C   LOGICAL ACTSET
C
C   INCLUDE 'NUCNAM.CMN'
C   INCLUDE 'OPTION.CMN'
C   INCLUDE 'VARYBL.CMN'
C   INCLUDE 'TITL.CMN'
C
C   CHARACTER A*6, E*2
C
C   INITIALIZE ARRAYS AND CONTROL PARAMETERS--
C   DO 102 I = 1, NUCTOT
```

DITTY

```

      IBEG(I) = 0.0
      IEND(I) = 0.0
      DO 104 J = 1, 144
        ACTA(J,I) = 0.0
        ACTW(J,I) = 0.0
104   CONTINUE
102 CONTINUE

      ITX = 0
      ITM = 999
C
C   IF AIRBORNE RELEASE, SET LOGICAL UNIT DEVICE AND READ TITLE--
      IF (IP .EQ. 1) THEN
        IF (IAW .EQ. 1) THEN
          IUN = 33
        ELSE
          IUN = 32
          CALL OPNFIL ((4), (0), IUN)
        ENDIF
C
      ELSE
C   IF WATERBORNE RELEASE, SET LOGICAL UNIT DEVICE AND READ TITLE--
      IF (IAW .EQ. 1) THEN
        IUN = 33
      ELSE
        IUN = 31
        CALL OPNFIL ((4), (0), IUN)
      ENDIF
      ENOIF
C
C   READ IN NO. OF NUCLIDES DATA SUPPLIED FOR AND LOOP ON--
      READ (IUN,2001,ERR=804,END=900) NNACT
C
      DO 400 INN = 1, NNACT
C
C   READ NAME OF RADIONUCLIDE AND NO. OF TIME PERIODS--
      READ (IUN,1000,ERR=806,END=900) E, A, NT
C
C   CHECK IF NT IS WITHIN LIMITS--
      IF (NT .GT. 0) THEN
        IF (NT .LE. 450) THEN
C
          IN = 1
C
          ELSE
            GOTO 801
          ENDIF
C

```

DITTY

```
C
C      READ NT DATA RECORDS--
      READ (IUN,3001,ERR=800,END=900) (T(I), CIN(I), I = 1, NT)
      LNUC = 0

C      Store input concentrations--
      DO 202 I = 1, NT
        IF (CIN(I) .LT. 1.0D-30) CIN(I) = 0.0D0
        C(I) = CIN(I)
202    CONTINUE

C
C      LOOP UNTIL IN > NUCTOT OR LNUC > 0--
200    CONTINUE

C      IF RADIONUCLIDE IS IN MASTER LIBRARY--
      IF (E .EQ. ELT(IN)) THEN
        IF (A .EQ. AW(IN)) THEN

C          LNUC = IN

C          ACTSET = .FALSE.
          IF (IP .EQ. 2) THEN
            CALL CONSET (ACTSET, T, C, NT, IBEG(IN), IEND(IN),
              .      ACTW(1,IN))
          ELSE
            CALL CONSET (ACTSET, T, C, NT, IBEG(IN), IEND(IN),
              .      ACTA(1,IN))
          .      ENDIF

          IF (.NOT. ACTSET) WRITE (*,'(4A)') ' Inventory for ',
            .      E,A, ' was outside 10,000-year time period.'

C
C          ENDIF
        ENDIF

C      IN = IN + 1

C      IF (IN .GT. NUCTOT .AND. LNUC .LE. 0) WRITE (*,'(4A)')
      .      ' Radionuclide ',E,A,
      .      ' in release file not included in master list.'

      IF (IN .LE. NUCTOT .AND. LNUC .LE. 0) GO TO 200
C      JUMP OUT OF LOOP IF MATCH FOUND OR LIBRARY EXHAUSTED--
C
C      ENDIF

C      READ RELEASE DATA FOR NEXT RADIONUCLIDE--
```

DITTY

```
400 CONTINUE
C
C
C   SET EARLIEST AND LATEST RELEASE INDEX OF ALL RADIONUCLIDES--
C
C   DO 300 I = 1, NUCTOT
C
C       IF (IBEG(I) .GT. 0) THEN
C           IF (IBEG(I) .LT. ITM) ITM = IBEG(I)
C       ENDIF
C
C       IF (IEND(I) .GT. ITX) ITX = IEND(I)
C
300 CONTINUE
C   Close release files if open--
C   IF (IUN .EQ. 31 .OR. IUN .EQ. 32) CLOSE (IUN)
C
C   RETURN
C---- Error Conditions -----
C
C   800 WRITE (*,8000) NT, T(I), C(I)
C   8000 FORMAT ('O Read error encountered in ACTIN'/
C       .      '      N: ',I7,' T(N): ',1PG10.3, ' C(N): ',1PG10.3)
C       CALL EXIT (1)
C
C   801 WRITE (*,8001) NT, E, A
C   8001 FORMAT ('O NT for radionuclide ', A2, A6, ' is too large, = ',I5)
C       CALL EXIT (1)
C
C   804 WRITE (*,8004) NNACT
C   8004 FORMAT ('O ERROR: Number of radionuclides in ACTIN, NNACT=',I5)
C       CALL EXIT (1)
C
C   806 WRITE(*,8006) E, A, NT
C   8006 FORMAT ('O ERROR: Number of time periods in ACTIN'/
C       .      ' Radionuclide : ',A2,A6,' Times: ',I6)
C       CALL EXIT (1)
C
C   900 CALL FILERR (2, IUN, 'In ACTIN')
C---- Format Statements -----
C
C   1000 FORMAT (A2, A6, 2X, I5)
C   2000 FORMAT (20A4)
C   3000 FORMAT (2E10.0)
C   3001 FORMAT (E10.0,D10.0)
C   2001 FORMAT (I5)
```

DITTY

C-----
999 RETURN
END

DITTY

```
C-----
C
C      SUBROUTINE AIRLIN
C
C      This module reads internal dose conversion factor data
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 1B-Aug-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      INCLUDE 'RMD.CMN'
C      INCLUDE 'FLAGS.CMN'
C      INCLUDE 'DOSFAC.CMN'
C      INCLUDE 'DAYPC.CMN'
C      INCLUDE 'NUCNAM.CMN'
C      INCLUDE 'ORGID.CMN'
C      INCLUDE 'TITL.CMN'
C      INCLUDE 'DRGMAS.CMN'
C
C      CHARACTER AA*6, EE*2, DUM*8
C
C      DIMENSION MO(25), DH1(25), DH2(25), DG1(25), DG2(25)
C
C      ASSIGN LOGICAL UNIT DEVICE--
C      IUN = 30
C      CALL OPNFIL ((4), (0), IUN)
C
C      INITIALIZE ARRAYS--
C      CALL ZEROR (2500, DFH)
C      CALL ZEROR (2500, DFG)
C      CALL ZEROI (100, INFLG)
C      DO 120 IO = 1, MORG
C          IOFLG(IO) = .FALSE.
120  CONTINUE
C
C      NC = 1
C      IFLG1 = 0
C
150  CONTINUE
C      REWIND (IUN)
C      READ (IUN, '(A)') DUM
C
151  CONTINUE
```

DITTY

```
      READ (IUN,2,END=153) EE, AA
      IF (EE .EQ. ELT(NC) .AND. AA .EQ. AW(NC) ) THEN

        READ (IUN,*,END=153) LORG, (MO(IO), IO = 1, LORG)
        READ (IUN, '(A)',END=153) DUM
        READ (IUN,3,END=153) (DG2(IO), IO = 1, LORG)
        READ (IUN,3,END=153) (DH2(IO), IO = 1, LORG)

        DO 152 IO = 1, LORG
          IOFLG(MO(IO)) = .TRUE.
          DFH(1,MO(IO),NC) = DH2(IO)
          DFG(1,MO(IO),NC) = DG2(IO)
          DFH(2,MO(IO),NC) = DH2(IO)
          DFG(2,MO(IO),NC) = DG2(IO)
152      CONTINUE

        INFLG(NC) = 1
        NC = NC + 1
        IFLG1 = 0
        IF (NC .GT. NUCTOT) GOTO 155

      ELSE
C      Read past data set--
        READ (IUN,'(A)') DUM
        READ (IUN,'(A)') DUM
        READ (IUN,'(A)') DUM
        READ (IUN,'(A)') DUM

      ENDIF
      GOTO 151

153  CONTINUE
      IF (IFLG1 .EQ. 0) THEN
        IFLG1 = 1
      ELSE
C      No dose factors for this radionuclide--
        WRITE (*,*) 'No internal dose factors for ',ELT(NC),AW(NC)
        NC = NC + 1
        IFLG1 = 0
      ENDIF
      IF (NC .LE. NUCTOT) GOTO 150

155  CONTINUE

C      Set additional organs to "Other" if not set--
      DO 160 IN = 1, NUCTOT
        DO 162 IO = 15, 22
```

DITTY

```
      IF (DFG(2,IO,IN) .EQ. 0.0) THEN
        DFG(1,IO,IN) = DFG(1,23,IN)
        DFG(2,IO,IN) = DFG(2,23,IN)
        DFH(1,IO,IN) = DFH(1,23,IN)
        DFH(2,IO,IN) = DFH(2,23,IN)
      ENDIF
162  CONTINUE
160  CONTINUE

      CLOSE (IUN)
      RETURN
```

C---- Format Statements -----

```
2  FORMAT (A2, A6)
3  FORMAT (4X, 20E8.1)
```

C-----
 END

DITTY

```
C-----
C
C      SUBROUTINE APATHS (ITIM, ITAX)
C
C      This module calculates the environmental concentrations from
C      atmospheric deposition.
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 13-Jul-88 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      INCLUDE 'DKAY.CMN'
C      INCLUDE 'EDCN.CMN'
C      INCLUDE 'FODATA.CMN'
C      INCLUDE 'NUCNAM.CMN'
C      INCLUDE 'PATHIN.CMN'
C      INCLUDE 'VARYBL.CMN'
C
C      CHARACTER*2 CONSTC, CONSTH
C
C      DIMENSION TRNL(7), ANCONS(7), RATE(100), DUMMY(100)
C      DATA TRNL / 1.0, 0.1, 0.1, 1.0, 0.1, 0.1, 0.1/
C      DATA ANCONS /0., 0., 0.12, 55., 68., 4.2, 0.12/
C      DATA DUMMY /100 * 0./
C      DATA DUMMY1 /0./
C
C      DATA CONST1 /3.169E-8/
C
C      CONST2 = 224. / 3.156E+7
C      DATA CONST2 /7.098E-6/
C
C      CONST3 = 0.69315 / 14. * 365.25
C      DATA CONST3 /18.0838/
C
C      DATA CONST4 /0.25/
C      DATA CONST5 /3.156E+07/
C      DATA CONST6 /365.25/
C
C      CONST7 /1.09E-09 * 224. / 15.
C      DATA CONST7 /1.4933E-08/
C
C      DATA ONE /1./
C      DATA CONSTC /'C '/
C      DATA CONSTH /'H '/
C
```

DITTY

```
      JNUC = 0
C
C
C   FOR EACH DECAY CHAIN--
C   DO 100 ICH = 1, ICHN
C
C       J = NOFN(ICH)
C       IST = JNUC + 1
C       JNUC = JNUC + J
C       K = IST + J - 1
C
C
C   FOR EACH NUCLIDE IN THE CHAIN--
C   DO 200 I = IST, K
C
C       CALCULATE AIR CONCENTRATION OF NUCLIDE I, WEIGHTED BY POP-
C       ULATION AND RADIOLOGICAL DECAY CONSTANT, PERSON-CI-YR/M**3
C
C       IF (AR(I) .GT. 0.0) THEN
C           AIRCON(I) = PM(ITIM) * ACTA(ITIM,I) * CONST1 / AR(I)
C       ELSE
C           AIRCON(I) = 0.0
C       ENDIF
C
200  CONTINUE
C
C   IF THIS ELEMENT IS 'H '--
C   IF (ELT(IST) .EQ. CONSTH) THEN
C
C       CALL TRITUM (IST, 1, DUMMY1, AIRCON(IST), ANCONS, DUMMY,
C       .           SLCON(IST), EDBCON(1,IST), DUMMY, RIRR, MOPYR)
C
C   ELSE
C       IF THIS ELEMENT IS 'C '--
C       IF (ELT(IST) .EQ. CONSTC) THEN
C
C           CALL CARBON(IST, 1, DUMMY1, AIRCON(IST), ANCONS, DUMMY,
C           .           SLCON(IST), EDBCON(1,IST), DUMMY,
C           .           RIRR, MOPYR)
C
C       ELSE
C
C           SKIP OVER IF ACUTE RELEASE, FIRST YEAR--
C           IF (ITIM .NE. 1) THEN
C
C               DECAY PREVIOUS SOIL ACCUMULATION--
C               CALL BCHAIN (J, 70., DK2(1,IST), IFR2(1,IST), AR(IST),
C               .           AB(IST), SLCON(IST), SLCON(IST), 0)
C
C
```

DITTY

```
C
C      IF THERE IS A RELEASE--
C      IF (ITIM .LE. ITAX) THEN
C
C          ADD IN INTEGRATED CONTRIBUTION FROM THIS 70-YR PERIOD--
C          DO 300 I = IST, K
C
C              CALCULATE DEPOSITION RATE, WEIGHTED BY POPULATION AND
C              DECAY CONSTANT, PERSON-CI-YR / KG-YR
C              RATE(I) = AIRCON(I) * DVEL(I) / CONST2
C
C          300 CONTINUE
C
C          CALL BCHAIN (J, 70., DK2(1,IST), IFR2(1,IST), AR(IST),
C                      AB(IST), RATE(IST), RATE(IST), 1)
C
C          SUM PREVIOUS AND CURRENT DEPOSTIONS--
C          The following was added to correct population included in
C          SLCON
C          PMT = 1.0
C          IF (ITIM .GT. 1) THEN
C              IF (PM(ITIM-1) .GT. 0. .AND. PM(ITIM) .GT. 0.0) THEN
C                  PMT = PM(ITIM) / PM(ITIM-1)
C              ENDIF
C          ENDIF
C
C          DO 400 I = IST, K
C              SLCON(I) = SLCON(I) * PMT + RATE(I)
C          400 CONTINUE
C
C          ENDIF
C      ELSE
C          FOR ACUTE FIRST YEAR RELEASE--
C
C          DO 500 I = IST, K
C              CALCULATE ACUTE DEPOSITION ON SOIL--
C              SLCON(I) = AIRCON(I) * DVEL(I) / CONST2
C          500 CONTINUE
C
C          CALL BCHAIN (J, 1.0, DK2(1,IST), IFR2(1,IST), AR(IST),
C                      AB(IST), SLCON(IST), SLCON(IST), 0)
C
C      ENDIF
C
C      CALCULATE PLANT AND ANIMAL CONCENTRATIONS--
C
C      FOR EACH NUCLIDE IN CHAIN--
C      DO 600 I = IST, K
```

DITTY

```
C
C      CALCULATE ENVIRONMENTAL REMOVAL CONSTANT--
C      ENVLAM = AR(I) + CONST3
C
C      FOR EACH TERRESTRIAL PATHWAY--
C      DO 700 IP = 1, 7
C
C          IF (YELD(IP) .GT. 0.0) THEN
C
C              IF (ITIM .EQ. 1) THEN
C                  ACUTE LEAF CONCENTRATION--
C                  RLFCN = CONST4 * AIRCON(I) * DVEL(I) * CONST5
C                      / YELD(IP)
C              ELSE
C                  CHRONIC LEAF CONCENTRATION--
C                  RLFC1 = CONST4 * (AIRCON(I)+SLCON(I)*CONST7)
C                      * DVEL(I)
C                  RLFC2 = ONE - EXP (-ENVLAM * GRWP(IP)/CONST6)
C                  RLFCN = RLFC1 * RLFC2 / ENVLAM/YELD(IP)*CONST5
C              ENDIF
C
C          ELSE
C              RLFCN = 0.0
C          ENDIF
C
C          PLTCN = RLFCN* TRNL(IP) + SLCON(I) * CRATIO(1,I)
C
C          IF VEGATABLE PATHWAY--
C          IF (IP .LE. 2) THEN
C
C              EDBCON(IP,I) = PLTCN
C
C          ELSE
C
C              EDBCON(IP,I) = PLTCN*ANCONS(IP)*CRATIO(IP-1,I)
C
C          ENDIF
C
C      700 CONTINUE
C      600 CONTINUE
C      ENDIF
C      ENDIF
C      100 CONTINUE
C
C      RETURN
C-----
C      END
```

DITTY

```
C-----
C
C   SUBROUTINE BCHAIN (NUC, T, DK, IFRM, AL, AB, AM, AO, INTGRL)
C
C   This module calculates decay for one chain
C
C   Module of DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 22-Aug-88 RAP
C   Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C
C   REAL*8 A(45), SUMPR, ASUM, AMD, EXPO(9), ABD(9)
C   REAL*8 ARG, TERM
C   DIMENSION DK(2,9), IFRM(2,9), AL(9), AM(9), AO(9),
C   .           AB(9)
C
C   CHANGE TO QUAD PRECISION
C   DO 113 IJK = 1, 9
C     ABD(IJK) = AB(IJK)
C 113 CONTINUE
C
C   INITIALIZE COEFFICIENT ARRAY TO ZERO--
C   N2N = NUC * (NUC-1) / 2 + NUC
C
C   CALL ZEROR (N2N, A)
C   DO 100 IJK = 1, N2N
C     A(IJK) = 0.0D0
C 100 CONTINUE
C
C   DO LOOP ON CHAIN MEMBERS, MAX = NUC--
C   DO 5 J = 1, NUC
C
C     CALCULATE EXPONENTIAL FOR CURRENT NUCLIDE--
C     ARG=-ABD(J) * T
C
C     IF (INTGRL .GT. 0) THEN
C       IF (ARG .GT. 0.0) THEN
C         WRITE (*,111) ARG
C 111     FORMAT (' ERROR IN EXMO OF ACHAIN, POS ARG= '
C   .           1PE10.3)
C       ELSE
C         FORM IS: (1 - DEXP (ARG) ) / AB   FOR INTGRL > 0
C         EXPO(J) = EXMO (ARG, AB(J) )
C         IF (-ARG .GT. 3.0D1) THEN
C           EXPO(J) = 1.0D0 / ABD(J)
```


DITTY

```
ELSEIF (-ARG .GT. 0.001) THEN
  EXPO(J) = (1.000 - DEXP(ARG)) / ABD(J)
ELSE
  FX = -(DLOG10(-ARG))
  I = 10 - IFIX(FX)
  IF (I .LT. 2) I=2
  TERM = - ARG
  EXPO(J) = - ARG / ABD(J)
DO 13 IT = 2, I
  TERM = (TERM*ARG) /DBLE(IT)
  EXPO(J) = EXPO(J) + TERM/ABD(J)
13 CONTINUE
ENDIF
ENDIF
ELSE
C FORM IS EXP(ARG) FOR INTGRL = 0
  IF (-ARG .GT. 3.001) THEN
    EXPO(J) = 0.000
  ELSE
    EXPO(J) = DEXP (ARG)
  ENDIF
ENDIF
C
C SET STARTING INDEX FOR TERM ARRAY A--
JJ = J * (J-1) / 2
C
C SET CHAIN POSITION MINUS ONE--
J1 = J - 1
C
C IF(J1 .GT. 0) THEN
C
  IMAX = MIN0 (J1, 2)
  DO 3 M = 1, J1
    DO 2 L = M, J1
      DO 1 I = 1, IMAX
C
        IF (IFRM(I,J) .EQ. L) THEN
          A(M+JJ) = A(M+JJ) + DK(I,J) * AL(L) * A(M+L * (L-1)/2)
        ENDIF
C
1      CONTINUE
2      CONTINUE
C
        A(M+JJ) = A(M+JJ) / (ABD(J) - ABD(M))
C
3      CONTINUE
C
  ENDIF
C
```

DITTY

```
C
      ASUM = 0.0D0
      IF (J1 .EQ. 0) GO TO 11
      DO 12 IRAP = 1, J1
        JK = JJ + IRAP
        ASUM = ASUM + A(JK)
12     CONTINUE
11    CONTINUE

C
C      A(J + JJ) = AM(J) - ASUM (J1, A(JJ+1) )
C
C      AMD = AM(J)
C      A(J+JJ) = AMD - ASUM

C
C      AO(J)= SUMPRD (J, EXPO, A(JJ + 1) )
C
      SUMPR = 0.0D0
      DO 8884 IN = 1, J
        JK = JJ + IN
        SUMPR = SUMPR + EXPO(IN) * A(JK)
8884    CONTINUE
      AO(J) = SUMPR

C
      5 CONTINUE
C
      RETURN
      END
```

DITTY

```
C-----
C
C      SUBROUTINE BIOLIN
C
C      This module reads the values of the bioaccumulation factor for
C      fish, molluscs, crustaceans, and water plants, as well as drinking
C      water cleanup factors from the library file
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      INCLUDE 'BIODAT.CMN'
C      INCLUDE 'NUCNAM.CMN'
C
C      CHARACTER E*2, DUM*8
C
C      DIMENSION 8F(8)
C
C      ASSIGN LOGICAL UNIT DEVICE NUMBERS, open file and read title--
C      IUN = 9
C      CALL OPNFIL ((4), (0), IUN)
C      READ (IUN, '(A)') DUM
C
C      FRESH OR SALT WATER DOSE FACTORS TO BE USED?--
C      IF (ISALT .EQ. 1) THEN
C          KSLT = 4
C      ELSE
C          KSLT = 0
C      ENDIF
C
C      LOOP UNTIL END OF FILE--
C 100 CONTINUE
C
C      READ DATA RECORD--
C      READ (IUN,2000,ERR=800,END=999) E, (BF(I), I=1,8), DW
C
C      IF RADIONUCLIDE FOUND IN MASTER LIST, SET BIOACCUMULATION FACTORS--
C      DO 200 J = 1, NUCTOT
C
C          IF (E .EQ. ELT(J) ) THEN
C
C              DWCF(J) = DW
C              DO 300 K = 1, 4
C                  BIOACF(K,J) = 8F(K+KSLT)
```

DITTY

```
      300      CONTINUE
C
      ENDIF
      200      CONTINUE
C
      GO TO 100
C      IF NOT END-OF-FILE, READ NEXT RECORD--
C      NORMAL TERMINATION POINT--
      999      CLOSE (IUN)
              RETURN

C---- Error Conditions -----
      800      CALL FILERR (3, IUN, 'In BIOLIN')

C---- Format Statements -----
      1000     FORMAT (20A4)
      2000     FORMAT (A2, 8F9.1, F6.1)

C-----
      END
```

DITTY

```
C-----
      BLOCK DATA BLOCK2
C
C      This module initializes common block data variables.
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 17-Aug-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----

      INCLUDE 'BIODAT.CMN'
      INCLUDE 'DECAY.CMN'
      INCLUDE 'DISPSN.CMN'
      INCLUDE 'DKAY.CMN'
      INCLUDE 'FODATA.CMN'
      INCLUDE 'NAMLST.CMN'
      INCLUDE 'OPTION.CMN'
      INCLUDE 'PATHIN.CMN'
      INCLUDE 'SOURCE.CMN'
      INCLUDE 'TIMES2.CMN'
      INCLUDE 'TITL.CMN'
      INCLUDE 'VARYBL.CMN'
      INCLUDE 'PLOT.CMN'
      INCLUDE 'RESULT.CMN'
      INCLUDE 'FILES.CMN'
C
C      SET PREVIOUS CASE VALUE OF ISALT TO ENSURE BIOACCUMULATION
C      LIBRARY IS READ IN FOR FIRST CASE--
C      DATA IOSALT /-1/
C
C      SET NAMELIST DEFAULT VALUES--
C      DATA IAC /0/
C      DATA IAIR /0/
C      DATA IWAT /0/
C      DATA LUA /1/
C      DATA LUW /1/
C      DATA ISALT /0/
C      DATA ISPEC /0/
C
C      DATA TZ /2000./
C      DATA TZR /2000./
C
C      DATA NDIST /0/
C      DATA NSECT /16/
C
```

DITTY

```
DATA IEQQ /0/
DATA HS /0./
DATA NMET /6/
DATA NUBAR /0/
DATA MET /1,2,3,4,5,6,7/
DATA UBAR /8 * 0./
C
DATA IPA /1/
DATA IPL /1/
DATA IPOP /4/
DATA IPOPL /2/
DATA NTA /1/
DATA NTL /1/
DATA PL /144 * 0./
DATA PL1 /20 * 0./
DATA PMA /0./
DATA PPL /0./
DATA TL /20 * 0./
DATA POPT /20 * 0./
C
DATA RECON /1.0/
DATA RM /1.0/
C
DATA IGRPOP /0/
DATA IGRPM /0/
DATA IGRPL /0/
DATA IGRTNU /0/
DATA IGRNUC /0/
DATA IGRDOS /0/
DATA IREDE /1/
C
DATA TICKX /73*' '/
DATA TICKY(1) /'.'/
DATA TICKY(9) /'.'/
DATA TICKY(17) /'.'/
DATA TICKY(25) /'.'/
DATA TICKY(33) /'.'/
DATA TICKX(1), TICKX(36), TICKX(73) /3 * '|'/
C
DATA LABELX /'TIME ---->'/
C
DATA FILN /'FILENAME.DAT', 49*' '/
C-----
END
```

DITTY

```
C-----
C
C      SUBROUTINE CARBON (IST, IAW, WATCHN, AIRCN, ANCONS, ANDRNK, CSOIL,
C      .                  EDIBL, AQUA, RIRR, MOPYR)
C
C      This module calculates environmental concentrations of C-14 using
C      a simplified specific-activity model
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 13-Jul-88 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      IST
C      IAW
C      WATCHN
C      AIRCN
C      ANCONS(7)
C      ANDRNK(7)
C      CSOIL
C      EDIBL(7)
C      AQUA(5)
C-----
C
C      INCLUDE 'BIODAT.CMN'
C
C      DIMENSION ANCONS(7), ANDRNK(7), EDIBL(7), AQUA(5)
C
C      REAL MOPYR
C
C      DATA C0 /2.0E-5/
C      DATA C1 /1.6E-4/
C      DATA C2 /0.09/
C      DATA C3 /0.4/
C      DATA C4 /0.09/
C      DATA C5 /0.07/
C      DATA C6 /0.24/
C      DATA C7 /0.33/
C      DATA C8 /0.20/
C      DATA C9 /0.15/
C
C      DATA Z1 /0.1/
C      DATA Z2 /0.03/
C      DATA SDEN /224./
```

DITTY

```
DATA SKG /0.01/
DATA PKG /0.1/
DATA RMV /1.25/
C
C
CWAT = WATCH*RIRR*MOPYR*PKG*RMV/(SDEN*SKG)
CAIR = AIRCN / C1
CLEAF = CAIR + CWAT
IF (RIRR .EQ. 0.0 .OR. MOPYR .EQ. 0.0) THEN
  CSOIL = 0.0
ELSE
  CSOIL = (CAIR + WATCH/CO) * Z2
ENDIF
C
EDIBL(1) = CLEAF * C2
EDIBL(2) = EDIBL(1)
EDIBL(3) = C9 * CLEAF
EDIBL(4) = C5 * CLEAF
EDIBL(5) = C6 * CLEAF
EDIBL(6) = C7 * CLEAF
EDIBL(7) = C8 * CLEAF
C
IF (IAW .EQ. 2) THEN
C
  DO 100 I = 1, 4
    AQUA(I) = BIOACF(I,IST) * WATCH
100  CONTINUE
C
  AQUA(5) = WATCH * DWCF(IST)
C
ENDIF
C
RETURN
END
```


DITTY

```
C-----
C
C      SUBROUTINE CASE2
C
C      This module controls data input
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 15-Jul-88 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      INCLUDE 'AIRCON.CMN'
C      INCLUDE '8IODAT.CMN'
C      INCLUDE 'DISPSN.CMN'
C      INCLUDE 'NAMLST.CMN'
C      INCLUDE 'OPTION.CMN'
C      INCLUDE 'PATHIN.CMN'
C      INCLUDE 'POPU.CMN'
C      INCLUDE 'TIMES2.CMN'
C      INCLUDE 'TITL.CMN'
C      INCLUDE 'VARYBL.CMN'
C
C      CHARACTER DUM*8
C      INTEGER IEND
C      REAL RTEMP
C
C      NAMELIST /INPUT/ IAC, IAIR, IPATH, IWAT, LUA, LUW, ISALT, TZ, TZR,
C      .                DIST, NDIST, NSECT, IEOQ, HS,
C      .                IPA, IPL, IPOP, NTA, NTL, PL, PL1, PM1, PM,
C      .                IPOPL, PMA, POPT, PPL, T, TL, CFLO, RECON, RM,
C      .                USAGE, CONSUM, EXTIM, GRWP, MOPYR, RIRR, YELD,
C      .                IGRPOP, IGRPM, IGRPL, IGRGNU, IGRNUC, IGRDOS,
C      .                IREDE
C
C      DATA TEN4 /10000./
C
C      ASSIGN LOGICAL UNIT DEVICE NUMBER OF INPUT FILE--
C      IUN = 33
C
C      READ A NAMELIST INPUT DATA SET--
C      READ (IUN,INPUT,ERR=91,END=9)
C
C      IF AIRBORNE RELEASES ARE TO BE CONSIDERED--
C      IF (IPATH .LE. 1) THEN
C
C          IF (IEOQ .EQ. 1) THEN
```

DITTY

```
C      READ E/Q FOR EACH DISTANCE AND DIRECTION--
      CALL ZEROR (160, EQQ)

      LUN = 24
      CALL OPNFIL (4, 0, LUN)
      READ (LUN,111,ERR=98,END=99) DUM, DUM, DUM

C      Read EQQ data set for first eight directions, followed by 9-16--
      IEND = (NSECT + 1) / 2

C      Read over effective average windspeed--
      READ (LUN,'(A8)') DUM

C      Read distance, EQQ--
      DO 100 ID = 1, NDIST
        READ (LUN,*) RTEMP, (EQQ(ID,IS), IS=1,IEND)
100    CONTINUE

C      Repeat--
      READ (LUN,111) DUM, DUM, DUM
      DO 101 ID = 1, NDIST
        READ (LUN,*) RTEMP, (EQQ(ID,IS), IS=IEND+1,NSECT)
101    CONTINUE

C      ELSE
C
C      IF (IEQQ .EQ. 2) THEN
C        READ JOINT FREQUENCY DATA--
C
C        CALL ZEROR (896,F)
C
C        LUN = 23
C        CALL OPNFIL (4,0,LUN)
C        READ (LUN,'(A8)') DUM
C        READ (LUN,*) NUBAR, NMET
C        READ (LUN,*) (UBAR(IU), IU=1,NUBAR)
C
C        DO 200 IU = 1, NUBAR
C          DO 300 IM = 1, NMET
C            READ (LUN,*) (F(IU,IM,IT), IT=1,16)
300          CONTINUE
200        CONTINUE

C        CALL EOVRQ
C        TO GENERATE E/Q.
C
C      ELSE
C
```

DITTY

```

      IF (IEOQ .EQ. 3) THEN
        CALL EOVRQ
        TO GENERATE E/Q.
      ENDIF

    ENDIF
  ENDIF

C
C
C
C  IF REQUIRED--
C  IF (IPOP .EQ. 2) THEN
C
C    CALL ZEROR (160, POP)
C    POPT(1) = 0.
C
C    TRANSFER INPUT TOTAL POPULATION--
C    IF (NTA .GT. 0) THEN
C      DO 602 I = 2, NTA
C        POPT(I) = PM1(I)
602    CONTINUE
C    ENDIF
C
C    Read times in NAMELIST--
C    LUN = 27
C    CALL OPNFIL (4,0,LUN)
C    READ (LUN,11) DUM, DUM
C
C    READ POPULATION DATA FOR TIME(1)--
C    DO 400 IS = 1, 16
C      READ (LUN,1000,ERR=98,END=99) (POP(I,IS), I=1,NDIST)
C      DO 401 I = 1, NDIST
C        POPT(1) = POPT(1) + POP(I,IS)
401    CONTINUE
400  CONTINUE
C
C    CALCULATE FIRST PM1 VALUE--
C    CALL PMEQ (NDIST, PM1(1) )
C
C    IF (NTA .GT. 1) CALL PMSET (NTA, POPT, PM1)
C
C  ELSE
C
C
C    IF (IPOP .EQ. 3) THEN
C
C      NTAT = 0
C      CALL ZEROR (20, POPT)
C
C    Open file, read population file title--

```

DITTY

```

      LUN = 27
      CALL OPNFIL (4,0,LUN)
      READ (LUN,11) DUM, DUM
C
C
500  LOOP UNTIL NTAT = 20 OR T(NTAT) > TZ+10000 OR NTAT-1 = NTA
      CONTINUE
C
      NTAT = NTAT + 1
C
C
      READ POPULATION DATA FOR TIME NTAT FROM LIBRARY FILE 22--
      DO 600 IS = 1, 16
        READ (LUN,1000,ERR=98,END=99) (POP(I,IS), I=1,NDIST)
        DO 601 I = 1, NDIST
          POPT(NTAT) = POPT(NTAT) + POP(I,IS)
601    CONTINUE
600    CONTINUE
        CLOSE (LUN)
C
        CALL PMEQ (NDIST, PM1(NTAT) )
C
        IF (NTAT .LT. 20 .AND. T(NTAT) .LE. (TZ + TEN4)
          .AND. NTAT .LT. NTA) GO TO 500
C
        ELSE
          IF (IPOP .EQ. 5) THEN
C
            CALL PMEQ (NDIST, PM1(1) )
            IF (NTA .GT. 1) CALL PMSET (NTA, POPT, PM1)
C
          ELSE
            IF (IPOP .EQ. 6) THEN
              DO 612 I = 2, 144
                PM(I) = 0.0
612          CONTINUE
              ENDIF
C
            ENDIF
          ENDIF
        ENDIF
C
      IF (IPDP .GT. 1 .AND. IPOP .LT. 6) THEN
        CALL PMINT (NTA, TZ, T, PM1, PM(2) )
      ENDIF
C
C
      IF (IAC .GT. 0) THEN
C
```

DITTY

```
      IF (IPA .EQ. 1) PM(1) = PMA
      IF (IPA .GT. 1) CALL PMAC (NTA, PM1, T, TZ, PM(1) )
C
      ENDIF
C
      ENDIF
C
C
C
C
      IF WATERBORNE RELEASES ARE TO BE CONSIDERED, TOTAL POPULATION IN
      EACH 70 YEAR PERIOD IS SET IF NECESSARY--
C
      IF (IPATH .NE. 1) THEN
        IF (IPOP1 .EQ. 2) THEN
          CALL PMINT (NTL, TZ, TL, PL1, PL(2) )
        ENDIF
C
        IF (IAC .GT. 0) THEN
C
          IF (IPL .EQ. 1) PL(1) = PPL
          IF (IPL .GT. 1) CALL PMAC (NTL, PL1, TL, TZ, PL(1) )
C
        ENDIF
C
      ENDIF
      RETURN

9 CONTINUE
  WRITE (*,*) 'Normal termination of DITTY'
  STOP

C  ERROR CONDITIONS--

91 WRITE (*,*) 'NAMELIST READ ERROR ENCOUNTERED IN CASE2'
  STOP

98 CALL FILERR (2, LUN, 'In CASE2      ')
99 CALL FILERR (3, LUN, 'In CASE2      ')

C  FORMAT STATEMENTS--

11 FORMAT (A8/A8)
111 FORMAT (A8/A8/A8)
1000 FORMAT (10E8.0)
2000 FORMAT (16F5.0)
3000 FORMAT (E10.0)
4000 FORMAT (20A4)

      END
```

DITTY

```
C-----
C
C   SUBROUTINE CONSET (ACTSET, T, C, NT, IBEG, IEND, CONS)
C
C   This module establishes release data for one radionuclide for the
C   seventy year increment
C
C   Module of DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 3-Aug-88  RAP
C   Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C   T(450)      - TIME POINTS FOR SPECIFYING ACTIVITY RELEASE
C                RATES, YEARS SINCE START OF CALCULATION
C   C(450)      - ACTIVITY RELEASED PER YEAR AT EACH TIME
C                POINT, CI/YR
C   NT          - NO. OF TIME POINTS DATA SUPPLIED FOR IN
C                ARRAYS T & C,  $2 \leq NT \leq 300$ 
C   IBEG        - 1ST 70-YR INCREMENT WITH A NON-ZERO RELEASE
C                ACTIVITY FOR THE CURRENT RADIONUCLIDE
C   IEND        - LAST 70-YR INCREMENT THAT HAS A NON-ZERO
C                RELEASE ACTIVITY FOR THE CURRENT NUCLIDE
C   CONS(143)   - TOTAL ACTIVITY RELEASED IN EACH OF THE 143
C                70-YR INCREMENTS, CI
C   ACTSET      - Flag set if activity was set into air or water
C                activity array, (ACTA or ACTW). Warning printed
C                to screen if not set.
C-----
C
C   INCLUDE 'TIMES2.CMN'
C   INCLUDE 'OPTION.CMN'
C
C   REAL T(450), C(450), CONS(144)
C   LOGICAL ACTSET
C
C   INITIALIZE VARIABLES--
C   IR = 1
C   IRS = 0
C   IEND = 0
C   IBEG = 0
C
C   S70 = 70.
C   S35 = 35.
C
C   IF ACUTE RELEASE, SET CONS AND SKIP TO END OF SUBROUTINE--
```

DITTY

```
IF (T(1) .EQ. 0.0 .AND. T(2) .EQ. 1.0) THEN
  CONS(1) = C(1)
  IBEG = 0
  IEND = 1
  ACTSET = .TRUE.
  GO TO 500
ENDIF

C
C
C 100 LOOP UNTIL IRS IS GREATER THAN 0 OR IR IS GREATER THAN NT--
      IF (TZ .LT. T(IR) + TZR) THEN
        IRS = IR
        IF (TZ+70. .GE. T(IR)+TZR) IBEG = 1
      ELSE
        IR = IR + 1
      ENDIF
      IF (IRS .LE. 0 .AND. IR .LE. NT) GO TO 100

C
C
C  IF (IR .LE. NT) THEN
      IR = IRS
      IN = 1
      TIR = TZR + T(IR)
      IF (IBEG .LT. 1) IBEG = IN

C
C  LOOP UNTIL IN IS GREATER THAN 143 OR IR IS GREATER THAN NT--
C 200  T7B = TZ + 70. * FLOAT (IN - 1)
      T7E = T7B + 70.
      R = 0.

C
C  IF (T7E .LE. TIR) THEN
C
C    IF (IR .GT. 1) THEN
C
C      CIR = C(IR)
      TIR = T(IR) + TZR

C
C    SLOPE = (CIR -C(IR-1)) / (TIR - T(IR-1)-TZR)

C
C    CONS(IN+1) = S35 * SLOPE * (T7E+ T7B) + S70 * CIR
      - S70 * SLOPE * TIR
      ACTSET = .TRUE.

C
C    ENDIF

C
C    IN = IN + 1
```

DITTY

```
C
C      ELSE
C
C      IF (IR .GT. 1)      THEN
C
C          TIR = TZR + T(IR)
C          C1 = C(IR-1)
C          C2 = C(IR)
C          T1 = TZR + T(IR-1)
C          C7 = (C2 - C1) * (T7B - T1) / (TIR - T1) + C1
C          R = (C2 + C7) * (TIR - T7B) / 2.
C
C      ENDIF
C
C      IR = IR + 1
C
C      IF (IR .LE. NT)      THEN
C
C          KEND = 0
C
C          LOOP UNTIL END IS GREATER THAN 0 OR IR IS GREATER THAN NT--
C
C      300      TIR = TZR + T(IR)
C
C          IF (T7E .LE. TIR)      THEN
C
C              KEND = 1
C              C1 = C(IR-1)
C              C2 = C(IR)
C              T1 = TZR + T(IR-1)
C              C7 = (C2 - C1) * (T7E - T1) / (TIR - T1) + C1
C              R = R + (C1 + C7) * (T7E - T1) / 2.
C
C          ELSE
C
C              R = R + (C(IR) + C(IR-1)) * (T(IR) - T(IR-1)) / 2.
C              IR = IR + 1
C
C          ENDIF
C
C      IF (KEND .GT. 0) GO TO 400
C      IF (NT .LT. IR) GO TO 400
C      GO TO 300
C
C      400 CONTINUE
C
C      ENDIF
C
C      CONS(IN+1) = R
C      ACTSET = .TRUE.
```


DITTY

```
      IN = IN + 1
      IEND = IN
C
      ENDIF
C
      IF (IN .LE. 143 .AND. IR .LE. NT) GO TO 200
C
      ENDIF
C
500 CONTINUE
C
C
      RETURN
      END
```

DITTY

```
C-----
C
C      SUBROUTINE CONTRL (IAC, IPATH, ITAM, ITAX, ITWM, ITWX)
C
C      This module controls the calling of the routines calculating
C      environmental accumulation and decay of radionuclides and
C      the accumulation and summation of resulting doses
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 17-Aug-88 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      IAC      -  IF > 0, CONSIDER AN ACUTE RELEASE PERIOD
C                  AT BEGINNING OF 70-YR PERIOD
C      IPATH    -  PATHWAY SELECTION: BOTH = 0, AIR = 1,
C                  WATER = 2
C-----
C
C      INCLUDE 'EDCN.CMN'
C      INCLUDE 'RESULT.CMN'
C      INCLUDE 'NUCNAM.CMN'
C
C      INITIALIZE CONCENTRATION ARRAYS--
C
C      DO 200 IN = 1, NUCTOT
C          SLCON(IN) = 0.0
C          AIRCON(IN) = 0.0
C          WATCON(IN) = 0.0
C          SCONW(IN) = 0.0
C          SEDCON(IN) = 0.0
C          POPSUB(IN) = 0.0
C          POPEXT(IN) = 0.0
C          DO 204 IO = 1, 25
C              POPINT(IO,IN) = 0.0
204      CONTINUE
C          DO 201 IN2 = 1, 7
C              EDBCON(IN2,IN) = 0.0
C              EDBCW(IN2,IN) = 0.0
201      CONTINUE
C          DO 202 IN2 = 1, 5
C              AQUATC(IN2,IN) = 0.0
202      CONTINUE
200 CONTINUE
C
```

DITTY

```
DO 203 IT = 1, 144
  DTOTAL(IT) = 0.0
  DOSSUB(IT) = 0.0
  DOSEXT(IT) = 0.0
203 CONTINUE
C
C
  HIAEDE = 0.0
  HIEXT = 0.0
  HISUB = 0.0
  HIEDE = 0.0
  MAXTIM = 0

  IF (IAC .GT. 0) THEN
C
C    IF (IPATH .LE. 1) CALL APATHS (1, ITAX)
C    TO CALCULATE CONCENTRATIONS FROM ATMOSPHERIC DEPOSITION.
C
C    IF (IPATH .NE. 1) CALL WPATHS (1, ITWX)
C    TO CALCULATE CONCENTRATIONS FROM AQUATIC PATHWAYS.
C
C    Third parameter added to call list to indicate acute/chronic case--
C    CALL DOSADD (1, 1, IAC)
C    TO ACCUMULATE 70-YR INCREMENTAL DOSES.
C
  ENDIF
C
C
  FOR EACH 70-YR TIME STEP FOR 10,000 YEARS--
  DO 100 ITT = 2, 144
C
C    IF (IPATH .LE. 1 .AND. (ITT .GE. ITAM .OR. IAC .GT. 0)) THEN
C      CALL APATHS (ITT, ITAX)
C    ENDIF
C
C    IF (IPATH .NE. 1 .AND. (ITT .GE. ITWM .OR. IAC .GT. 0)) THEN
C      CALL WPATHS (ITT, ITWX)
C    ENDIF
C
C    CALL DOSADD (2, ITT, IAC)
C
  100 CONTINUE

  RETURN
  END
```

DITTY

```
C-----
C
C      SUBROUTINE DITBYP
C
C      This module writes a report of dose by exposure pathway.
C
C      Module of Program DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 18-Aug-88  RAP
C      Reviewed and Approved: 13-Sept-88  8A Napier
C-----
C
C      IP      - Index of the current exposure pathway
C      NL      - Intermediate organ index for printing
C      ILINE   - Number of data lines this page
C      NA      - Number of organs to be printed this data set, used to
C               control printing of dashes
C-----
C
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'RESULT.CMN'
C      INCLUDE 'NUCNAM.CMN'
C      INCLUDE 'TIMES2.CMN'
C
C      INTEGER NL, ILINE, NPATH, LUN, NA
C      CHARACTER DASHES*8(10), EXPLAB*16(4)
C
C      DATA NPATH /4/
C      DATA DASHES /'-----','-----  ',8* '-----'/
C      DATA EXPLAB /'Inhalation',
C      .             'Ingestion (Terr)',
C      .             'Ingestion (Aqua)',
C      .             'Drinking Water'/
C
C      NA = 10
C      LUN = 17
C      CALL HEADIT (LUN)
C
C      Write internal dose report--
C
C      WRITE (LUN,1021)
C      WRITE (LUN,1111) MAXTIM*70 + TZ, MAXTIM
C
C      WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=1,8)
C      WRITE (LUN,1002) DASHES
C      DO 141 IP = 1, NPATH
```

DITTY

```
      WRITE (LUN,1006) EXPLAB(IP), (HIDOSV(ICLN(IO),IP),IO = 1, 8)
141 CONTINUE

      WRITE (LUN,1002) DASHES
      WRITE (LUN,1009) (DOSINT(ICLN(IO),MAXTIM),IO=1,8)

      NL = 16
      IF (NORGS .LT. NL) THEN
        NL = NORGS
        NA = NORGS-6
      ENDIF

      WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=9,NL)
      WRITE (LUN,1002) (DASHES(I),I=1,NA)
      DO 142 IP = 1, NPATH
        WRITE (LUN,1006) EXPLAB(IP), (HIDOSV(ICLN(IO),IP),IO=9,NL)
142 CONTINUE
      WRITE (LUN,1002) (DASHES(I),I=1,NA)
      WRITE (LUN,1009) (DOSINT(ICLN(IO),MAXTIM),IO=9,NL)

      IF (NL .GT. 16) THEN
        NL = 24
        IF (NORGS .LT. NL) THEN
          NL = NORGS
          NA = NORGS - 14
        ENDIF

        WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=17,NL)
        WRITE (LUN,1002) (DASHES(I),I=1,NA)
        DO 143 IP = 1, NPATH
          WRITE (LUN,1006) EXPLAB(IP), (HIDOSV(ICLN(IO),IP),IO=17,NL)
143 CONTINUE
        WRITE (LUN,1002) (DASHES(I),I=1,NA)
        WRITE (LUN,1009) (DOSINT(ICLN(IO),MAXTIM),IO=17,NL)

        IF (NORGS .GT. 24) WRITE (LUN,'(2A)')
          'Data not printed for organ ',MASORG(ICLN(NORGS))
        ENDIF

      WRITE (LUN,2004)

      RETURN
```

C---- Format Statements -----

```
1002 FORMAT (' ',10A8)
1003 FORMAT (' Pathway           ',8(A7,1X))
1006 FORMAT (' ',A16,1P, 8E8.1E2)
1008 FORMAT (' ',A2, A6, 8X,1P, 8E8.1E2)
```

DITTY

```
1009 FORMAT (' Total internal ',1P, 8E8.1/)
1021 FORMAT (//,T16,'Population Internal Dose To Organ by Exposure ',
.          'Pathway')
1111 FORMAT (//, T13,'In Year ',I5,
.          ' (70-yr Time Period Number No:',I4,')'//)
2004 FORMAT (//,' Dose in units of person-rem;'/
.          ' that is the cumulative population dose received by ',
.          'the local population '/
.          ' with an assumed 70-yr individual lifetime.')
```

C-----
END

DITTY

```
C-----
C
C      SUBROUTINE DITBYR
C
C      This module writes a report of dose by radionuclide.
C
C      Module of Program DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 18-Aug-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      IN      - Index of the current radionuclide
C      NL      - Intermediate organ index for printing
C      ILINE   - Number of data lines this page
C      NA      - Number of organs to be printed this data set, used to
C                control printing of dashes
C-----
C
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'RESULT.CMN'
C      INCLUDE 'NUCNAM.CMN'
C      INCLUDE 'TIMES2.CMN'
C
C      INTEGER NL, ILINE, LUN, NA
C
C      CHARACTER DASHES*8(10)
C      DATA DASHES /'-----','----- ','8*' -----'/
C      NA = 10
C
C      LUN = 17
C      MAXLIN = 38
C      NSET = NUCTOT / MAXLIN
C      IDD = MOD (NUCTOT, MAXLIN)
C      IF (IDD .GT. 0) NSET = NSET + 1
C
C      Break radionuclides into pages--
C      DO 200 ISET = 1, NSET
C
C          ISTART = (ISET - 1) * MAXLIN + 1
C          ISTOP = ISET * MAXLIN
C          IF (ISTOP .GT. NUCTOT) ISTOP = NUCTOT
C
C          CALL HEADIT (LUN)
C
C      Write internal report--
```

DITTY

```
WRITE (LUN,1021)
WRITE (LUN,1111) MAXTIM*70 + TZ, MAXTIM
WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=1,8)
WRITE (LUN,1002) DASHES

DO 141 IN = ISTART, ISTOP
  WRITE (LUN,1006) ELT(IN), AW(IN),
    (HIDOSR(ICLN(IO),IN),IO=1,8)
141 CONTINUE

WRITE (LUN,1002) DASHES
WRITE (LUN,1009) (DOSINT(ICLN(IO),MAXTIM),IO=1,8)

NL = 16
IF (NORGS .LT. NL) THEN
  NL = NORGS
  NA = NORGS-6
ENDIF

IF (NUCTOT. GT. 15) THEN
  WRITE (LUN,2004)
  CALL HEADIT (LUN)
  WRITE (LUN,1021)
  WRITE (LUN,1111) MAXTIM*70 + TZ, MAXTIM
ENDIF

WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=9,NL)
WRITE (LUN,1002) (DASHES(I),I=1,NA)

DO 142 IN = ISTART, ISTOP
  WRITE (LUN,1006) ELT(IN), AW(IN),
    (HIDOSR(ICLN(IO),IN),IO=9,NL)
142 CONTINUE

WRITE (LUN,1002) (DASHES(I),I=1,NA)
WRITE (LUN,1009) (DOSINT(ICLN(IO),MAXTIM),IO=9,NL)

IF (NL .GT. 16) THEN
  NL = 24
  IF (NORGS .LT. NL) THEN
    NL = NORGS
    NA = NORGS - 14
  ENDIF

  WRITE (LUN,1003) (MASORG(ICLN(IO)),IO=17,NL)
  WRITE (LUN,1002) (DASHES(I),I=1,NA)

  DO 143 IN = 1, ISTART, ISTOP
```


DITTY

```
        WRITE (LUN,1006) ELT(IN), AW(IN),  
                                (HIDOSR(ICLN(IO),IN),IO=17,NL)  
143    CONTINUE  
  
        WRITE (LUN,1002) (DASHES(I),I=1,NA)  
        WRITE (LUN,1009) (DOSINT(ICLN(IO),MAXTIM),IO=17,NL)  
  
        IF (NORGS .GT. 24) WRITE (LUN,'(2A)')  
        .   'Data not printed for organ ',MASORG(ICLN(NORGS))  
        ENDIF
```

C----- Write external report -----

```
        IF (NUCTOT. GT. 15) THEN  
            WRITE (LUN,2004)  
            CALL HEADIT (LUN)  
        ENDIF  
        WRITE (LUN,1011)  
        WRITE (LUN,1111) MAXTIM*70 + TZ, MAXTIM  
        WRITE (LUN,1004)  
        WRITE (LUN,1002) (DASHES(I),I=1,4)  
        ILINE = ILINE + 8  
  
        DO 144 IN = ISTART, ISTOP  
            WRITE (LUN,1006) ELT(IN), AW(IN), HISU8R(IN), HIEXTR(IN)  
            ILINE = ILINE + 1  
144    CONTINUE  
  
        WRITE (LUN,1002) (DASHES(I),I=1,4)  
        WRITE (LUN,1007) HISUB, HIEXT  
        WRITE (LUN,2004)  
  
200 CONTINUE  
  
        RETURN
```

C---- Format Statements -----

```
1002 FORMAT (' ',10A8)  
1003 FORMAT (/' Radionuclide      ',8(A7,1X))  
1004 FORMAT (/'                Air'/  
        .   '                Submer- Exter-'/  
        .   ' Radionuclide      sion    nal')  
1006 FORMAT (' ',A2,1X,A6, 7X,1P, 8E8.1E2)  
1007 FORMAT (' Total external  ',1P, 8E8.1E2//)  
1009 FORMAT (' Total internal  ',1P, 8E8.1)  
1011 FORMAT (//,T8,'Population Air Submersion and External ',  
        .   'Incremental Dose by Radionuclide')
```

DITTY

```
1021 FORMAT (//,T17,'Population Internal Dose To Organ by ',  
      .      'Radionuclide')  
1111 FORMAT (T17,'In Year ',I5,  
      .      ' (70-yr Time Period Number No:',I4,')'//)  
  
2004 FORMAT (//,' Dose in units of person-rem;'/  
      .      ' that is the cumulative population dose received by ',  
      .      'the local population '/  
      .      ' with an assumed 70-yr individual lifetime.')
```

C-----
 END

DITTY

```
C-----
C
C      SUBROUTINE DOSADD (ICUTE, ITT, IAC)
C
C      This module calculates 70-year incremental population doses
C      from exposure to contaminated environmental media
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 17-Aug-88 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      CONST4 - Internal dose factor conversion unit; from person Sv
C              per 70 8q/70 yr to person rem per Ci/70 yr
C      CONST5 - Breathing rate (m3/sec)
C      DEXTR() - External dose by radionuclide
C      DOSCDR() - Dose commitment to each organ by radionuclide
C      DOSCDV() - Dose commitment to each organ by pathway
C      DSUBR() - Air submersion dose by radionuclide
C      ICUTE - INDICATES IF ACUTE OR CHRONIC DOSE FACTORS ARE TO BE
C             USED IN CALCULATIONS
C      ITT - INDEX OF 70-YR INCREMENTS
C      IAC - ACUTE/CHRONIC INDEX
C      RADEDE() - Effective dose equivalent by radionuclide
C-----
C
C      INCLUDE 'PATHIN.CMN'
C      INCLUDE 'EDCN.CMN'
C      INCLUDE 'DKAY.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'DOSFAC.CMN'
C      INCLUDE 'GRDDAT.CMN'
C      INCLUDE 'RESULT.CMN'
C      INCLUDE 'FLAGS.CMN'
C
C      REAL DOSINC, DOSCDR(25,100), DOSCDV(25,4),
C      .      DSUBR(100), DEXTR(100)
C
C      DATA CONST1 /3.15E+07/
C      DATA CONST2 /1.49E-8/
C      DATA CONST3 /224./
C      DATA CONST4 /5.29E+10/
C      DATA CONST5 /2.66E-4/
C
C      IF (ITT .EQ. 1 .OR. (ITT .EQ. 2 .AND. IAC .EQ. 0)) HIAEDE = 0.
```

DITTY

```
C      CALL ZEROR (2500, DOSCDR)
      CALL ZEROR (100, DOSCDV)
      CALL ZEROR (100, DSUBR)
      CALL ZEROR (100, DEXTR)

C
C
C      FOR EACH RADIONUCLIDE--
      DO 100 I = 1, INUC
C
      ARI = AR(I)
C
      Internal dose--
C
      FOR EACH ORGAN--
      DO 200 IO = 1, 22
        IF (IOFLG(IO)) THEN
C
          ADD INHALATION DOSE--
          DOSINC = DFH(ICUTE,IO,I) * CONST4 * CONST5 * CONST1 *
            ARI *
            (AIRCON(I) + CONST2 * (SLCON(I) + SCONW(I)) )
          DOSCDR(IO,I) = DOSCDR(IO,I) + DOSINC
          DOSCDV(IO,1) = DOSCDV(IO,1) + DOSINC
C
          ADD TERRESTRIAL PATHWAY DOSES--
          DO 300 IP = 1, 7
            DOSINC = ARI * CONSUM(IP) * DFG(ICUTE,IO,I) * CONST4
              * (EDBCON(IP,I) + EDBCNW(IP,I) )
            DOSCDR(IO,I) = DOSCDR(IO,I) + DOSINC
            DOSCDV(IO,2) = DOSCDV(IO,2) + DOSINC
C
          300    CONTINUE
C
          ADD AQUATIC PATHWAY DOSES--
          DO 400 IWP = 1, 4
            DOSINC = ARI * USAGE(IWP) * DFG(ICUTE,IO,I) * CONST4
              * AQUATC(IWP,I)
            DOSCDR(IO,I) = DOSCDR(IO,I) + DOSINC
            DOSCDV(IO,3) = DOSCDV(IO,3) + DOSINC
C
          400    CONTINUE
C
          ADD DRINKING WATER--
          DOSINC = ARI * USAGE(5) * DFG(ICUTE,IO,I) * CONST4
            * AQUATC(5,I)
          DOSCDR(IO,I) = DOSCDR(IO,I) + DOSINC
          DOSCDV(IO,4) = DOSCDV(IO,4) + DOSINC
C
          Total CDE to each organ this time period--
```

DITTY

```

      DOSINT(IO,ITT) = DOSCDV(IO,1) + DOSCDV(IO,2) +
      DOSCDV(IO,3) + DOSCDV(IO,4)
C
      ENDIF
200  CONTINUE

C      External dose--

C      ADD AIR SUBMERSION DOSE--
      DOSINC = EDA(I) * ARI * CONST1 *
      (AIRCON(I) + CONST2 * (SLCON(I) + SCONW(I)) )
      DSUBR(I) = DOSINC
      DOSSUB(ITT) = DOSSUB(ITT) + DOSINC

C      ADD SWIMMING AND SHORELINE--
      IF (SW .EQ. 0.0) SW = 0.2
      DOSINC = (USAGE(6) * SEDCON(I) * SW * EDS(I) +
      USAGE(7) * WATCON(I) * EDW(I) ) * ARI
      DEXTR(I) = DOSINC
      DOSEXT(ITT) = DOSEXT(ITT) + DOSINC

C
C      ADD SOIL EXTERNAL--
      DOSINC = EXTIM * ARI * EDS(I) *
      (SLCON(I) + SCONW(I)) * CONST3
      DEXTR(I) = DEXTR(I) + DOSINC
      DOSEXT(ITT) = DOSEXT(ITT) + DOSINC

C
100 CONTINUE

C
C      Calculate whole body effective dose equivalent--
      CALL WBEDE2 (ITT)

C      ADD PREVIOUS DOSE TO TOTAL--
      IF (ITT .EQ. 1) THEN
        DTOTAL(1) = AEDE2(ITT)
      ELSE
        DTOTAL(ITT) = AEDE2(ITT) + DTOTAL(ITT-1)
      ENDIF

C
C      Accumulate total dose by radionuclide--
      DO 704 I = 1, INUC
        POPSUB(I) = POPSUB(I) + DSUBR(I)
        POPEXT(I) = POPEXT(I) + DEXTR(I)
      DO 702 IO = 1, MORG
        POPINT(IO,I) = POPINT(IO,I) + DOSCDR(IO,I)
702  CONTINUE
704 CONTINUE
```

DITTY

```
C      CAPTURE PERIOD WITH HIGHEST DOSE RATE--
      IF (AEDE2(ITT) .GT. HIAEDE) THEN

C      Save maximum internal dose by radionuclide and pathway--
      MAXTIM = ITT
      HIAEDE = AEDE2(ITT)
      HIEXT = DOSEXT(ITT)
      HISUB = DOSSUB(ITT)

      DO 600 IO = 1, MORG
        DO 500 I = 1, INUC
          HIDOSR(IO,I) = DOSCDR(IO,I)
500      CONTINUE
        DO 510 IP = 1, 4
          HIDOSV(IO,IP) = DOSCDV(IO,IP)
510      CONTINUE
600      CONTINUE

C
C      Save external/air submersion doses--
      DO 610 I = 1, INUC
        HISUBR(I) = DSUBR(I)
        HIEXTR(I) = DEXTR(I)
610      CONTINUE

      ENDIF

C
C      RETURN
      END
```

DITTY

```
C-----
C
C      SUBROUTINE EOVRQ
C
C      This module calculates annual average air concentration at each
C      spatial interval midpoint
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      INCLUDE 'DISPSN.CMN'
C      INCLUDE 'AIRCON.CMN'
C
C      MESSAGE IS USED TO OUTPUT ERROR MESSAGES--
C      CHARACTER MESSAGE*6
C
C      DATA ZERO /0./
C      DATA ONE /1./
C      DATA IONE /1/
C      DATA TWO /2./
C      DATA ITWO /2/
C      CALL ZEROR (160,EOQ)
C      CONST1 = 0.02032
C
C      IF (NUBAR .LT. 1 .OR. NUBAR .GT. 8) THEN
C          MESSAGE = 'NUBAR'
C          WRITE (*,1000) MESSAGE, NUBAR
C          IER = 1
C      ELSE
C          IER = 0
C      ENDIF
C
C      IF (NDIST .LT. 1 .OR. NDIST .GT. 10) THEN
C          MESSAGE = 'NDIST'
C          IER = IER + 1
C          WRITE (*, 1000) MESSAGE, NDIST
C      ENDIF
C
C      IF (NMET .LT. 1 .OR. NMET .GT. 7) THEN
C          MESSAGE = 'NMET'
C          IER = IER + 1
C          WRITE (*, 1000) MESSAGE, NMET
C      ENDIF
```

DITTY

```
IF (IER .GT. 0) CALL EXIT (1)

C   FOR EACH DISTANCE--
DO 100 IX = 1, NDIST
C
C   X = DIST(IX)
C
C   FOR EACH STABILITY CATEGORY--
DO 200 IS = 1, NMET
C
C   IP = MET(IS)
C
C   CALL SIGMA (X, IP, SZ, SY)
C   TO INTERPOLATE PASQUILL CURVES FOR SY AND SZ FOR DISTANCE X
C   AND STABILITY IP.
C
C   XSZ = X * SZ
C
C   IF (HS .GT. ONE) THEN
C     EX = EXP( -HS * HS / (TWO * SZ * SZ) )
C   ELSE
C     EX = 1.0
C   ENDIF
C
C
C   FOR EACH WINDSPEED--
DO 300 IU = 1, NUBAR
C
C   EQX = CONST1* EX / (UBAR (IU) * XSZ)
C
C   FOR EACH DIRECTION--
DO 400 IT = 1, 16
C
C   FF = F(IU,IS,IT)
C   IF (FF .GT. ZERO) EQQ(IX,IT) = EQQ(IX,IT) + EQX * FF
C
C   400    CONTINUE
C
C   300    CONTINUE
C   200    CONTINUE
C   100    CONTINUE
C
C   RETURN
C
C   FORMAT STATMENTS--
C
C   1000  FORMAT (10X, A6, ' IS OUT OF RANGE; ', I5)
C   END
```


DITTY

```
C-----
C
C      SUBROUTINE FILLUP (FOFX, YINC, IN, NOAVE)
C
C      This module plots points of FOFX in the graphics array
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 9-Feb-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      FOFX   -  FUNCTION OF TIME ARRAY
C      YINC   -  Y PLOTTING INCREMENT
C      IN     -  INDEX OF FUNCTIONS TO BE PLACED IN PRINTING
C              ARRAY
C      NOAVE  -  IF SET TO 1, DO NOT AVERAGE ZEROS INTO ARRAY
C-----
C
C      INCLUDE 'PLOT.CMN'
C      INCLUDE 'NUCNAM.CMN'
C
C      REAL FOFX(144,8)
C      LOGICAL NOFIND
C      CHARACTER*1 THIS1, BLANK, POINT(8), MULT(9), AST
C      CHARACTER*3 DASH
C
C      DASH = ' - '
C      AST = ' .'
C      BLANK = ' '
C      POINT(1) = 'X'
C      POINT(2) = 'O'
C      POINT(3) = '+'
C      POINT(4) = '='
C      POINT(5) = '@'
C      POINT(6) = '-'
C      POINT(7) = '#'
C      POINT(8) = '$'
C
C      MULT(1) = '1'
C      MULT(2) = '2'
C      MULT(3) = '3'
C      MULT(4) = '4'
C      MULT(5) = '5'
C      MULT(6) = '6'
C      MULT(7) = '7'
```

DITTY

```
C      MULT(8) = '8'
C      MULT(9) = '9'
C
C      IY = 40
C      IX = 73
C
C      PLOT EACH POINT IN ARRAY--
C
C      DO 100 I = 1, IX
C
C          I2 = (I - 1) * 2
C
C          IF ( I .EQ. 1)      THEN
C
C              FIRST VALUE OF ARRAY--
C              R1 = FOFX(1,IN) / YINC
C
C          ELSE
C
C              IF ( I .EQ. IX)      THEN
C
C                  LAST VALUE OF ARRAY--
C                  R1 = FOFX(144,IN) / YINC
C
C              ELSE
C
C                  FOR ALL OTHER POINTS--
C
C                  F1 = FOFX(I2,IN)
C                  F2 = FOFX(I2+1,IN)
C
C                  R1 = (F1 + F2) / YINC
C
C                  IF (NOAVE .GT. 0)      THEN
C
C                      AVERAGE IF NEITHER POINT IS EQUAL TO ZERO--
C                      IF (F1 .GT. 0. .AND. F2 .GT. 0.) THEN
C                          R1 = R1 * 0.5
C                      ENDIF
C
C                  ELSE
C
C                      R1 = R1 * 0.5
C
C                  ENDIF
C              ENDIF
C          ENDIF
```

DITTY

```
ENDIF
C
C
IR2 = IFIX (R1)
R2 = FLOAT (IR2)
C
IF (ABS(R1 - R2) .GT. .5) IR2 = IR2 + 1
IP = IY - IR2
IF (IP .LT. 1) IP = 1
IF (IP .GT. 40) IP = 40
C
THIS1 = ARRAY(IP,I)
C
IF (THIS1 .EQ. BLANK .OR. THIS1 .EQ. AST) THEN
C
    ARRAY(IP,I) = POINT(IN)
C
ELSE
C
    NOFIND = .TRUE.
C
    DO 200 K = 2, 9
        IF (THIS1 .EQ. MULT(K)) THEN
C
            ARRAY(IP,I) = MULT(K+1)
            NOFIND = .FALSE.
C
        ENDIF
200    CONTINUE
C
    IF (NOFIND) ARRAY(IP,I) = MULT(1)
C
ENDIF
C
100 CONTINUE
C
LEGEND(IN + 30) = MULT(IN) & DASH & ELT(IN) & AW(IN)
RETURN
END
```

DITTY

```
C-----
C
C      SUBROUTINE FOOLIN
C
C      This module reads in crop and animal food concentration ratios,
C      deposition velocities and soil percolation constants from
C      a library file
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 17-Aug-88 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      INCLUDE 'FODATA.CMN'
C      INCLUDE 'NUCNAM.CMN'
C
C      CHARACTER E*2, DUM*8
C      REAL CR(8)
C
C      INITIALIZE LOGICAL UNIT DEVICES, and open file--
C      IUN = 8
C      CALL OPNFIL ((4), (0), IUN)
C      READ (IUN, '(A)') DUM
C      READ (IUN, '(A)') DUM
C
C      LOOP UNTIL END-OF-FILE ENCOUNTERED--
300 CONTINUE
C
C      READ DATA CARD--
C      READ (IUN,2001,ERR=800,END=999) E, DVL, (CR(I),I=1,8), PERC
C
C      SEARCH FOR MATCHING RADIONUCLIDE IN MASTER LIBRARY--
C      DO 100 J = 1, NUCTOT
C
C          IF (E .EQ. ELT(J)) THEN
C
C              TRANSFER DATA INTO ARRAYS--
C              DVEL(J) = DVL
C              AB(J) = PERC
C
C              Leafy and other vegetables--
C              CRATIO(1,J) = CR(1) / 4.0
C
C              Eggs-
C              CRATIO(2,J) = CR(8)
```

DITTY

```
C      Milk--  
      CRATIO(3,J) = CR(7)  
  
C      Beef--  
      CRATIO(4,J) = CR(5)  
  
C      Poultry--  
      CRATIO(6,J) = CR(6)  
  
      ENDIF  
100  CONTINUE  
C  
C  
C      IF NOT END-OF-FILE, READ NEXT CARD--  
      GO TO 300  
  
C      NORMAL TERMINATION--  
999  CLOSE (IUN)  
      RETURN  
  
C---- Error Conditions -----  
  
      800 CALL FILERR (3, IUN, 'In FOOLIN')  
  
C---- Format Statements -----  
  
1000 FORMAT (20A4)  
2000 FORMAT (A2, 8E9.2)  
2001 FORMAT (A2, 1X, 10E8.0)  
  
C-----  
      END
```

DITTY

SUBROUTINE GRAPH (IYL, FOFX, NGRF, IORNUC, IFROM, NOAVE, IGRW)

This module controls the printing of graphs of functions in
relation to time

Module of DITTY of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last Modification: 9-Feb-88 RAP
Reviewed and Approved: 13-Sept-88 BA Napier

ARGUMENT LIST PARAMETER DESCRIPTIONS

PARAMETER	TYPE	DESCRIPTION
IYL	INTEGER	INDEX OF FUNCTION LABEL ARRAY
FOFX	REAL	FUNCTION OF TIME ARRAY
NGRF	INTEGER	NUMBER OF FUNCTIONS TO BE SUPERIMPOSED ON THIS GRAPH
IORNUC	INTEGER	INDEX OF RADIONULIDE OR ORGAN TO BE GRAPHED
IFROM	INTEGER	CALLED FROM: 0 = QAPAGE, 1 = REPORT
NOAVE	INTEGER	IF SET TO 1, DO NOT AVERAGE IN ZERO VALUES
IGRAW	INTEGER	RELEASE MESSAGE FLAG; 0 = NO MESSAGE, 1 = AIR MESSAGE, 2 = WATER MESSAGE

INCLUDE 'NUCNAM.CMN'
INCLUDE 'PLOT.CMN'
INCLUDE 'TIMES2.CMN'

CHARACTER ZERO*10, AST*1
CHARACTER YLA*40(7)
CHARACTER YLABEL*1(40,7), YLAB5*1(21), YLAB7*1(5)
CHARACTER YL5*21, YL7*5
CHARACTER*1 ELTM1(2,100), AWM1(6,100)

EQUIVALENCE (YLABEL(1,1), YLA(1))
EQUIVALENCE (YLAB5(1), YL5)
EQUIVALENCE (YLAB7(1), YL7)
EQUIVALENCE (ELTM1(1,1), ELT(1))
EQUIVALENCE (AWM1(1,1), AW(1))

DIMENSION NYL(7), TY(5), FOFX(144,8)

DITTY

```
C      YLA(1) = 'TOTAL POPULATION           '
      YLA(2) = 'POPULATION DISPERSION FACTOR - AIR '
      YLA(3) = 'POPULATION - WATER           '
      YLA(4) = 'TOTAL CURIES PER PERIOD       '
      YLA(5) = '                             '
      YLA(6) = 'TOTAL ORGAN DOSE             '
      YLA(7) = '                             '

C      YL5 = 'CURIES PER PERIOD OF '
      YL7 = ' DOSE'
      AST = ' .'
      IY = 40
      IX = 73
      ZERO = 'ZERO'

C      DATA NYL /16, 34, 18, 23, 29, 16, 15/

C
C      Output file--
C      LUN = 17

      IF (IYL .EQ. 5) THEN
        DO 510 I = 1,21
          YLABEL(I,5) = YLAB5(I)
510    CONTINUE
        DO 511 I = 1,2
          YLABEL(I+21,5) = ELTM1(I,IORNUC)
511    CONTINUE
        DO 512 I = 1,6
          YLABEL(I+23,5) = AWM1(I,IORNUC)
512    CONTINUE
      ENDIF

C
C      CALL SETUP (YLABEL(1,IYL), NYL(IYL))
C      TO STORE LABELS IN ARRAYS.
C
C      FIND MAXIMUM VALUE OF FOFX ARRAY--
      YMAX = 0.
      DO 300 IN = 1, NGRF
        DO 301 I = 1, 144
          IF (FOFX(I,IN) .GT. YMAX) YMAX = FOFX(I,IN)
301    CONTINUE
300  CONTINUE

C
C
C      CALCULATE INCREMENT--
      YINC = YMAX / 40.

C
```

DITTY

```
C      CHECK IF YINC IS ZERO OR VERY SMALL AND SKIP--
      IF (YINC .LT. 1.0E-30) THEN
        WRITE (LUN,1000) (YLABEL(I,IYL),I=1,40)
      ELSE
C      FILL TICK VALUE ARRAY--
        DO 200 I = 1, 5
          J = I - 1
          TY(I) = YMAX - (8 * YINC * J)
200    CONTINUE
C
C
C      FOR EACH FUNCTION--
        DO 400 IN = 1, NGRF
          CALL FILLUP (FOFX, YINC, IN, NOAVE)
          TO PLOT FOFX FUNCTION IN ARRAY.
C      400 CONTINUE
C
        TZ5 = TZ + 5000.
        TZ10 = TZ + 10000.
        CALL HEADIT (IFROM)

C      PRINT INCREMENT INFORMATION
        WRITE (LUN,4000) YINC
C
C      PRINT AIR OR WATER RELEASE MESSAGE IF APPLICABLE--
        IF (IGRAW .GT. 0) THEN
          IF (IGRAW .EQ. 1) THEN
            WRITE (LUN,5000)
          ELSE
            WRITE (LUN,5001)
          ENDIF
        ENDIF
C
C      PRINT UPPER BORDER--
        WRITE (LUN,1001)
C
C      PRINT Y-AXIS INFORMATION AND ARRAY--
C
        K = 1
        DO 101 I = 1, IY
          IF (TICKY(I) .EQ. AST) THEN
            WRITE (LUN,2000) LABELY(I), TY(K), TICKY(I),
              (ARRAY(I,J), J = 1, IX)
            K = K + 1
          ELSE
            WRITE (LUN,2001) LABELY(I), TICKY(I),
              (ARRAY(I,J), J = 1, IX)
          ENDIF
101    CONTINUE
```


DITTY

```
C
C      PRINT LOWER BORDER, X-AXIS INFORMATION--
      WRITE (LUN,3000) ZERO
      WRITE (LUN,3001) (TICKX(J), J = 1, IX)
      WRITE (LUN,3002) TZ, TZ5, TZ10
      WRITE (LUN,3003) LABELX
C
C
C      ENDIF
C
C      RETURN
C
C----- FORMAT STATEMENTS -----
C
1000 FORMAT (1X,A40, 'NOT PRINTED BECAUSE ALL ZERO.')
1001 FORMAT (10X,73('.'))
2000 FORMAT (1X, A1, 1PE8.1, 75A1)
2001 FORMAT (1X, A1, 9X,      75A1)
C
3000 FORMAT (2X,A8, 73('.'))
3001 FORMAT (10X, 73A1)
3002 FORMAT (6X, F10.0, 25X, F10.0, 25X, F10.0)
3003 FORMAT (40X, A40)
C
4000 FORMAT (/ ' Y-AXIS INCREMENT = ', 1PE10.2 /
.          ' X-AXIS INCREMENT = 70 YEARS')
C
5000 FORMAT (' AIR RELEASE'/)
5001 FORMAT (' WATER RELEASE'/)
C
      END
```

DITTY

```
C-----
C
C      SUBROUTINE GRDLIN
C
C      This module reads in dose factors for external exposure to soil
C      and water and air
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 29-Sep-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      INCLUDE 'GRDDAT.CMN'
C      INCLUDE 'NUCNAM.CMN'
C
C      CHARACTER A*6, E*2
C
C      Bq/Ci times yr/sec times rem/Sv
C      DATA CONST1 /4.22E+8/
C
C      Bq/Ci times yr/hr times rem/sv
C      DATA CONST2 /1.17E+5/
C
C      Finite to infinite conversion factor (water surface to immersion)--
C      DATA TWO /2.0/
C
C      NC=1
C      IFLG1=0
C
150 CONTINUE
    LUN = 10
    CLOSE (LUN)
    CALL OPNFIL (4,0,LUN)
    READ (LUN,111,ERR=98,END=99) DUM, DUM, DUM
C
151 CONTINUE
    READ(LUN,1020,ERR=98,END=153) E, A, DAIN, DBIN, DSIN
C
    IF (E .EQ. ELT(NC) .AND. A .EQ. AW(NC)) THEN
      EDA(NC) = DAIN * CONST2
      EDW(NC) = DBIN * CONST1 * TWO
      EDS(NC) = DSIN * CONST1
      NC = NC+1
      IF (NC .GT. NUCTOT) GOTO 155
    
```

DITTY

```
      ENDIF
      GOTO 151

153  CONTINUE
      IF (IFLG1 .EQ. 0) THEN
        IFLG1 = 1
      ELSE
C      No information this radionuclide
        IFLG1 = 0
        NC = NC + 1
      ENDIF

      IF (NC .LE. NUCTOT) GOTO 150
155  CLOSE (LUN)

      RETURN

C---- Format Statements -----

      111 FORMAT (A1/A1/A1)
      1020 FORMAT (A2, A6, E8.2, 5( 2X, E8.2))

C---- Error Messages -----

      98 CALL FILERR (2, LUN, 'In GRDLIN')
      99 CALL FILERR (3, LUN, 'In GRDLIN')

C-----
      END
```

DITTY

```
C-----
C
C      SUBROUTINE GRFIL (IT, Y20, FOFX, NT)
C
C      This module transfers values in a 20-position array to be plotted
C      vs. time into corresponding positions in a 144-position array
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Aug-87  MDT
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      IT(20)      -  CROSS-INDEX OF SUBSCRIPTS CORRESPONDING
C                    TO A 144-POSITION ARRAY
C      Y20(20)     -  INPUT ARRAY TO BE PLOTTED VS TIME
C      FOFX(144)   -  OUTPUT ARRAY CORRESPONDING TO THE 144-
C                    POSITION TIME ARRAY
C      NT          -  NO. OF TIME PERIODS IN ARRAYS IT AND Y20
C-----
C
C      DIMENSION IT(20), Y20(20), FOFX(144)
C
C      INITIALIZE FLAG WHICH INDICATES IF MORE THAN ONE POINT IS TO BE
C      PLOTTED IN EACH TIME PERIOD--
C      K = 0
C
C      LOOP ON NO. OF DATA POINTS IN INPUT ARRAY--
C      DO 100 I = 2, NT
C
C          IF (IT(I) .GT. IT(I-1)) THEN
C
C              IF (K .EQ. 0) THEN
C
C                  FOFX(IT(I-1)) = Y20(I-1)
C
C              ELSE
C
C                  TSUM = 0.
C
C                  DO 200 L = 1, K
C                      TSUM = TSUM + Y20(I-L)
C200      CONTINUE
C
C                  FOFX(IT(I-1)) = TSUM / K
```

DITTY

```
C
      K = 0
C
      ENDIF
C
      ELSE
C
      K = K + 1
C
      ENDIF
C
100 CONTINUE
C
      TAKE CARE OF LAST POINT--
C
      IF (K .EQ. 0) THEN
C
      FOFX(IT(NT)) = Y20(NT)
C
      ELSE
C
      DO 300 L = 1, K
        TSUM = TSUM + Y20(I-L+1)
300 CONTINUE
      FOFX(IT(NT)) = TSUM / K
C
      ENDIF
C
      RETURN
C
      END
```

DITTY

```
C-----
C
C      SUBROUTINE HEADIT (IFROM)
C
C      This module outputs page headings for quality assurance page and
C      reports
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 30-Aug-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      LUN      - Logical unit device
C      IOS      - Control integer set to a positive number if a file
C                  error occurs
C      IPN      - Page number counter of primary output file
C-----
C
C      INCLUDE 'TIMES2.CMN'
C      INCLUDE 'TITL.CMN'
C      INCLUDE 'DAYPC.CMN'
C      INCLUDE 'DAY.CMN'
C
C      INTEGER LUN, IOS, IPN
C      CHARACTER*1 FF
C      DATA IPN /0/
C      IPN = IPN + 1
C      FF = CHAR(12)
C
C      LUN = 17
C      WRITE (LUN,1,ERR=98,IOSTAT=IOS) FF, CHIA, CHIPAT, TZ, TITLS(33)
C      WRITE (LUN,2,ERR=98) TODAY, CLOCK, IPN
C      WRITE (LUN,3,ERR=98)
C
C      RETURN
C-----
C---- Error Messages -----
C
C      98 CALL FILERR (2, LUN, 'In HEADIT')
C-----
C---- Format Statements -----
C
C      1 FORMAT(A1,1X,78('-',),/,T25,
C      . 'DITTY Dose Calculation Program'/, T25,
C      . '(GENII Version 1.351 30-Aug-88)',//,
```

DITTY

```
. ' Integrated population dose calculated for ',A7, 1X, A30/  
. ' Release from time ',F5.0, ' A.D. onward for 10,000 years'/  
. ' Case title: ',A70)  
2 FORMAT(' Executed on: ',A10,' at ',A10,30X,'Page',I4)  
3 FORMAT (1X,78('-'))
```

C-----
END

DITTY

```
C-----
C
C      SUBROUTINE NUCTST
C
C      This module tests the input radionuclide list for unidentified
C      radionuclides
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88 RAP
C      Reviewed and Approved: 13-Sept-88 8A Napier
C-----
C
C      NIN - NO. OF RADIONUCLIDES INPUT FOR MASTER LIST
C-----

      INCLUDE 'FLAGS.CMN'
      INCLUDE 'NUCNAM.CMN'
      INCLUDE 'SOURCE.CMN'

C      INITIALIZE ERROR COUNTER--
      NUM = 0
C
C      FOR EACH INPUT RADIONUCLIDE--
      DO 100 IN = 1, NIN
C
C      CHECK IF NOT FOUND IN MASTER DATA LIBRARY--
      IF (INFLG(IN) .LE. 0) THEN
C
C      NUM = NUM + 1
      WRITE (*, 1000) IN, E(IN), A(IN)
C
      ENDIF
100 CONTINUE

C---- Check for Error Conditions -----
      IF (NUCTOT .GT. 100) THEN
        WRITE (*, 2000) NUCTOT
2000  FORMAT ('0 Too many radionuclides in this case (Max=100):', I5)
        CALL EXIT (1)
      ENDIF

C      Stop if there are unidentified radionuclides--
      IF (NUM .GT. 0) CALL EXIT (1)
```


DITTY

C---- Format Statements -----

1000 FORMAT (' Radionuclide ', I3, ' not found, ', A2, A6)

C-----

RETURN
END

DITTY

```
C-----
C
C   SUBROUTINE PMAC  (NT, P, T, TZ, P1)
C
C   This module interpolates population data at one time
C
C   Module of DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 12-Aug-87  MDT
C   Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C   NT - NO. OF POPULATION VALUES CONSIDERED
C   P  - POPULATION DATA ARRAY
C   T  - TIME POINTS CORRESPONDING TO PM1
C   TZ - THE TIME AT START OF 10,000 INTEGRATION
C       PERIOD, YEARS A.D.
C   P1 -
C-----
C
C   DIMENSION P(20), T(20)
C
C   IF ONLY 1 POPULATION CONSIDERED OR TZ <= TO FIRST TIME--
C   IF (NT .LE. 1 .OR. TZ .LE. T(1) ) THEN
C
C       P1 = P(1)
C
C   ELSE
C
C       IF TZ GREATER THAN LAST VALUE--
C       IF (TZ .GE. T(NT)) THEN
C
C           P1 = P(NT)
C
C       ELSE
C
C           N = 1
C           IEND = 0
C
C       LOOP UNTIL IEND > 0--
100  CONTINUE
C
C       IF (TZ .LT. T(N) ) THEN
C
C           P1 = P(N-1) + (P(N)-P(N-1)) * (TZ-T(N-1)) / (T(N) - T(N-1))
C           IEND = 1
```

DITTY

```
C      ELSE
C      N = N + 1
C      ENDIF
C
C      IF (IEND .LE. 0) GO TO 100
C      END OF IEND LOOP.
C
C      ENDIF
C      ENDIF
C      RETURN
C      END
```

DITTY

```
C-----
C
C      SUBROUTINE PMEQ  (NDIST, PM)
C
C      This module calculates a population dispersion factor from air
C      concentrations and a population distribution
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Aug-87  MDT
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      NDIST  -  NO. OF DISTANCE INTERVALS
C      PM      -  POPULATION DISPERSION FACTOR
C-----
C
C      INCLUDE 'AIRCON.CMN'
C      INCLUDE 'POPU.CMN'
C
C      PM = 0.
C
C      FOR EACH DISTANCE--
C      DO 100 IX = 1, NDIST
C
C      FOR EACH DIRECTION--
C      DO 200 IT = 1, 16
C
C      PM = PM + EQQ(IX,IT) * POP(IX,IT)
C
C      200  CONTINUE
C      100  CONTINUE
C
C      RETURN
C      END
```

DITTY

```
C-----
C
C      SUBROUTINE PMINT (NT, TZ, T, PM1, PM)
C
C      This module interpolates time vs. population dispersion factor
C      arrays to determine population dispersion factors at each 70 year
C      increment midpoint
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Aug-87  MDT
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      NT      - NO. OF TIME PERIODS FOR WHICH DATA IS
C                SUPPLIED IN ARRAYS T AND PM1.
C      TZ      - TIME (YEARS A.D.) AT THE START OF THE
C                10,000 YEAR INTEGRATION PERIOD.
C      T(20)   - TIME POINTS CORRESPONDING TO DEFINITION
C                OF DATA IN ARRAY PM1, YEARS A.D.
C      PM1(20) - POPULATION DISPERSION FACTOR ARRAY TO
C                BE INTERPOLATED, PERSON-SEC/M**3
C      PM(144) - POPULATION DISPERSION FACTOR ARRAY FOR
C                EACH 70-YR PERIOD OF THE 10,000 YR. PER.
C-----
C
C      DIMENSION PM1(20), PM(143), T(20)
C
C      IF (NT .LE. 1) THEN
C
C          USE FIRST VALUE OF PM1 FOR ALL INCREMENTS--
C          DO 100 I = 1, 143
C              PM(I) = PM1(1)
C100    CONTINUE
C
C      ELSE
C
C          CALCULATE MIDPOINT--
C          TT = TZ + 35.
C
C          INITIALIZE INDEXING VARIABLES--
C          IT = 1
C          II = 1
C
C          LOOP UNTIL IT > NT OR II > 143--
C200    CONTINUE
```

DITTY

```
C      IF (TT .LE. T(IT)) THEN
C      IF (TT .EQ. T(IT)) THEN
C      PM(II) = PM1(IT)
C      ELSE
C      IF (IT .EQ. 1) THEN
C      PM(II) = PM1(1)
C      ELSE
C      PM(II) = PM1(IT-1) + (TT - T(IT-1)) /
C      (T(IT) - T(IT-1)) * (PM1(IT) - PM1(IT-1))
C      .
C      ENDIF
C      ENDIF
C      II = II + 1
C      TT = TT + 70.
C      ELSE
C      IT = IT + 1
C      ENDIF
C      IF (IT .LE. NT .AND. II .LE. 143) GO TO 200
C      END OF LOOP.
C      IF (IT .GT. NT .AND. II .LE. 143) THEN
C      SET TO MAXIMUM VALUE--
C      DO 300 I = II, 143
C      PM(I) = PM1(NT)
300 CONTINUE
C      ENDIF
C      ENDIF
C      RETURN
C      END
```

DITTY

```
C-----
C
C      SUBROUTINE PMSET (NTA, POPT, PMI)
C
C      This module establishes interpolation values for population
C      dispersion factor options two and five
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Aug-87  MDT
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      NTA      - TIME PERIOD USED FOR INTERPOLATION
C      POPT( )  - POPULATION AT EACH TIME PERIOD
C      PM1( )   - POPULATION DISPERSION FACTOR FOR EACH
C                TIME PERIOD
C-----
C
C      DIMENSION POPT(20), PM1(20)
C
C      IF (POPT(1) .EQ. 0) THEN
C        P1 = 0.
C      ELSE
C        P1 = PM1(1) / POPT(1)
C      ENDIF
C
C      DO 100 IT = 1, NTA
C        PM1(IT) = P1 * POPT(IT)
C
C 100 CONTINUE
C
C      RETURN
C      END
```

DITTY

```
C-----
C
C      SUBROUTINE QAPAGE
C
C      QAPAGE PRINTS A REPORT OF INPUT PARAMETERS
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 15-Jul-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      INCLUDE 'BIODAT.CMN'
C      INCLUDE 'DAYPC.CMN'
C      INCLUDE 'DAY.CMN'
C      INCLUDE 'DISPSN.CMN'
C      INCLUDE 'NAMLST.CMN'
C      INCLUDE 'NUCNAM.CMN'
C      INCLUDE 'OPTION.CMN'
C      INCLUDE 'ORGID.CMN'
C      INCLUDE 'PATHIN.CMN'
C      INCLUDE 'POPU.CMN'
C      INCLUDE 'VARYBL.CMN'
C      INCLUDE 'TITL.CMN'
C      INCLUDE 'FLAGS.CMN'
C
C      CHARACTER CHISAL*5, CHTPA(7)*16, CHAPA(7)*18, CHMET(9)*20,
C      .          CHDIR(16)*6
C      LOGICAL WATPOP
C
C      DIMENSION FOFX(144,8), PRACT(144), IPRIT(144)
C
C      DATA CHTPA /'LEAFY VEGATABLES', 'OTHER VEGATABLES', 'EGGS',
C      .          'MILK', 'BEEF', 'PORK', 'POULTRY'/
C
C      DATA CHAPA /'FISH', 'CRUSTACEA', 'MOLLUSES', 'PLANTS',
C      .          'DRINKING WATER', 'SEDIMENT EXPOSURE',
C      .          'SWIMMING TIME'/
C
C      DATA CHMET /
C      .          'PASQUILL A', 'PASQUILL B', 'PASQUILL C', 'PASQUILL D',
C      .          'PASQUILL E', 'PASQUILL F', 'PASQUILL G', ' ', ' '/
C
C      DATA CHDIR /'NNE', 'NE', 'ENE', 'E', 'ESE', 'SE', 'SSE', 'S',
C      .          'SSW', 'SW', 'WSW', 'W', 'WNW', 'NW', 'NNW', 'N'/
C
```


DITTY

```
C   SET FLAG FOR HEADING SUBROUTINE--  
DATA IFROM /0/  
  
C   Output file-  
LUN = 17  
  
C   IF (IAC .EQ. 0) THEN  
      CHIAC = 'chronic'  
ELSE  
      CHIAC = 'acute'  
ENDIF  
  
C   IF (IPATH .EQ. 0) THEN  
      CHIPAT = 'atmospheric and liquid release'  
ELSE  
      IF (IPATH .EQ. 1) THEN  
         CHIPAT = 'atmospheric release'  
      ELSE  
         CHIPAT = 'liquid release'  
      ENDIF  
ENDIF  
  
C   IF (ISALT .EQ. 0) THEN  
      CHISAL = 'Fresh'  
ELSE  
      CHISAL = 'Salt'  
ENDIF  
  
C   IF (LUA .EQ. 1) TITLS(32) = 'DITTY.IN'  
C   IF (LUW .EQ. 1) TITLS(31) = 'DITTY.IN'  
  
C   CALL HEADIT (IFROM)  
C   TO PRINT DITTY1 HEADING LINES.  
C  
C  
C   PRINT LIBRARY INFORMATION--  
C  
C   WRITE (LUN, 2000)  
C   WRITE (LUN, 2001) TITLS(2)  
C   WRITE (LUN, 2002) TITLS(8)  
C   WRITE (LUN, 2003) CHISAL, TITLS(9)  
C   WRITE (LUN, 2004) TITLS(10)  
C   WRITE (LUN, 2005) TITLS(30)  
C   IF (IPOP .EQ. 3) WRITE (LUN, 2006) TITLS(27)  
C   IF (IWAT .GT. 0) WRITE (LUN, 2007) TITLS(31)  
C   IF (IAIR .GT. 0) WRITE (LUN, 2008) TITLS(32)  
  
C   PRINT MASTER RADIONUCLIDE CONTROL LIST--  
C   WRITE (LUN, 8000)
```

DITTY

```
      WRITE (LUN, 8001) (ELT(I), AW(I), I = 1, NUCTOT)
C
C
C      PRINT TERRESTRIAL AND AQUATIC PATHWAYS DATA--
C
      WRITE (LUN, 3000)
      WRITE (LUN, 3001)
      DO 100 I = 1, 7
        WRITE (LUN, 3002) CHTPA(I), GRWP(I), YELD(I), CONSUM(I),
          CHAPA(I), USAGE(I)
100  CONTINUE
      WRITE (LUN, 3003) EXTIM
C
C
C      PRINT WATERBORNE PARAMETERS--
C
      IF (IPATH .NE. 1) THEN
        WRITE (LUN, 4000)
        WRITE (LUN, 4001) CFLO, MOPYR, RECON, RM, RIRR
      ENDIF
C
C
C      PRINT SIGNATURE LINES--
      WRITE (LUN, 7000)
C
C      PRINT SITE GRID INFORMATION--
C
      IF (IEOQ .GT. 1) THEN
C
        CALL HEADIT (IFROM)
        WRITE (LUN, 6000)
        WRITE (LUN, 6001) NSECT
        WRITE (LUN, 6002) NDIST, (DIST(I), I = 1, NDIST)
C
        IF (IPATH .LE. 1 .AND. IEOQ .EQ. 2) THEN
          NSPRT = NSECT / 2
C
          Write first half--
          WRITE (LUN, 6100)
          WRITE (LUN, 6101) (CHDIR(I), I = 1, NSPRT)
          DO 200 IU = 1, NUBAR
            WRITE (LUN, 6103)
            DO 300 IM = 1, NMET
              WRITE (LUN, 6102) UBAR(IU), CHMET(MET(IM)),
                (F(IU,IM,I), I= 1, NSPRT)
300      CONTINUE
200      CONTINUE

          CALL HEADIT (IFROM)
```

DITTY

```

WRITE (LUN, 6100)
WRITE (LUN, 6101) (CHDIR(I), I = NSPRT+1, NSECT)
DO 201 IU = 1, NUBAR
  WRITE (LUN, 6103)
  DO 301 IM = 1, NMET
    WRITE (LUN, 6102) UBAR(IU), CHMET(MET(IM)),
      (F(IU,IM,I), I= NSPRT+1, NSECT)
301    CONTINUE
201    CONTINUE
  ENDIF

  WRITE (LUN, 6200) HS
ENDIF

PRINT RELEASE DATA IF GRPAH OPTION NOT SELECTED--
IF (IGRNUC .EQ. 0) THEN

  IF AIR RELEASE--
  IF (IPATH .LT. 2) THEN

    CALL HEADIT (IFROM)
    WRITE (LUN,9010)
    WRITE (LUN,9011)
    DO 770 IN = 1, NUCTOT
      NPR = 0
      DO 771 IT = 1, 144
        IF (ACTA(IT,IN) .GT. 0 ) THEN
          NPR = NPR + 1
          IPRIT(NPR) = IT-1
          PRACT(NPR) = ACTA(IT,IN)
        ENDIF
771      CONTINUE
      IF (NPR .GT. 0) WRITE (LUN,9012)
        ELT(IN),AW(IN), (IPRIT(I),PRACT(I),I=1,NPR)
770    CONTINUE

  ENDIF

  IF WATER RELEASE--
  IF (IPATH .NE. 1) THEN

    CALL HEADIT (IFROM)
    WRITE (LUN,9020)
    WRITE (LUN,9011)
    DO 780 IN = 1, NUCTOT
      NPR = 0
      DO 781 IT = 1, 144

```

DITTY

```

      IF (ACTW(IT,IN) .GT. 0) THEN
        NPR = NPR + 1
        IPRIT(NPR) = IT-1
        PRACT(NPR) = ACTW(IT,IN)
      ENDIF
781      CONTINUE
      IF (NPR .GT. 0) THEN
        WRITE (LUN,9012) ELT(IN),AW(IN),(IPRIT(I),
          PRACT(I),I=1,NPR)
      ENDIF
780      CONTINUE
      ENDIF
C      ENDIF
C
C      CALL HEADIT (IFROM)
C      PRINT NAMES OF RADIONUCLIDES WITH NO INTERNAL DF's--
      DO 420 I = 1, NUCTOT
        IF (INFLG(I) .EQ. 0) WRITE (LUN, 8011) ELT(I), AW(I)
420      CONTINUE
C
C      PRINT INPUT POPULATION DATA--
      WRITE (LUN,9100)
C
      IF (IPATH .LT. 2 .AND. IAC .GT. 0) THEN
        IF (IPA .LE. 0) THEN
          WRITE (LUN,9110)
        ELSEIF (IPA .EQ. 1) THEN
          WRITE (LUN,9112) PMA
        ELSEIF (IPA .GT. 1) THEN
          WRITE (LUN,9112) PM(1)
        ENDIF
C
      ELSEIF (IPATH .LT. 2) THEN
C
        IF (IPOP .EQ. 0) THEN
          WRITE (LUN,9120)
        ELSEIF (IPOP .EQ. 1) THEN
          WRITE (LUN,9122)
        ELSEIF (IPOP .EQ. 2) THEN
          WRITE (LUN,9127)
          WATPOP = .FALSE.
          DO 734 I = 1, NTA
            IF (POPT(I) .GT. 1.0) WATPOP = .TRUE.
734          CONTINUE
          WRITE (LUN,9128) (T(I), POPT(I), I=1,NTA)

```

DITTY

```
ELSEIF (IPOP .EQ. 3) THEN
  WRITE (LUN,9130)
ELSEIF (IPOP .EQ. 5) THEN
  WRITE (LUN,9134)
ELSEIF (IPOP .EQ. 6) THEN
  WRITE (LUN,9136)
ENDIF
C
  IF (IPOP .EQ. 4 .OR. (IPOP .EQ. 3 .AND. NTA .GT. 0)) THEN
    WRITE (LUN,9132)
    WRITE (LUN,9128) (T(I), PM1(I), I=1,NTA)
  ENDIF
C
ENDIF
C
C
  IF (IPATH .NE. 1 .AND. IAC .GT. 0) THEN
    IF (IPL .LE. 0) WRITE (LUN,9140)
    IF (IPL .EQ. 1) WRITE (LUN,9142) PPL
    IF (IPL .GT. 1) WRITE (LUN,9142) PL(1)
  ELSEIF (IPATH .NE. 1) THEN
    IF (IPOPL .LE. 0) WRITE (LUN,9150)
    IF (IPOPL .EQ. 1) WRITE (LUN,9152)
    IF (IPOPL .EQ. 2) THEN
      WRITE (LUN,9153)
      WRITE (LUN,9128) (TL(I), PL1(I), I=1,NTL)
    ENDIF
  ENDIF
ENDIF
C
  IF (IPATH .LT. 2 .AND. IPOP .EQ. 2) THEN
    CALL HEADIT (IFROM)
    Print first half--
    NDPR1 = (NDIST+1) / 2
    WRITE (LUN,9124) T(1), (DIST(I), I=1,NDPR1)
    WRITE (LUN,9125)
    DO 222 IS = 1, 16
      WRITE (LUN,9126) CHDIR(IS), (POP(I,IS), I=1,NDPR1)
222  CONTINUE
    Print second half--
    WRITE (LUN,9124) T(1), (DIST(I), I=NDPR1+1,NDIST)
    WRITE (LUN,9125)
    DO 223 IS = 1, 16
      WRITE (LUN,9126) CHDIR(IS), (POP(I,IS), I=NDPR1+1,NDIST)
223  CONTINUE
  ENDIF
C
  PRINT GRAPH OF POPULATION DISPERSION VALUES--
C
  IF (IGRPM .GT. 0) THEN
```

DITTY

```
C      IF (IPATH .LT. 2) THEN
        IF (IAC .GT. 0 .AND. IPOP .EQ. 6) GOTO 410
        DO 400 I = 1, 144
          FOFX(I,1) = PM(I)
400      CONTINUE
        CALL GRAPH (2, FOFX, 1, 0, 0, 0, 0)
410      CONTINUE
      ENDIF
C
      IF (IPATH .NE. 1) THEN
        DO 401 I = 1, 144
          FOFX(I,1) = PL(I)
401      CONTINUE
        CALL GRAPH (3, FOFX, 1, 0, 0, 0, 0)
      ENDIF
C
      ELSE
C      PRINT NUMERIC REPORT OF PM--
C
C      IF (IPATH .LT. 2) THEN
        IF (IAC .GT. 0 .AND. IPOP .EQ. 6) GOTO 411
        IF (IPOP .EQ. 0 .OR. IPOP .EQ. 5) GOTO 411
        CALL HEADIT (IFROM)
        WRITE (LUN,9030)
        WRITE (LUN,9031)
        WRITE (LUN,9032) (I-1, PM(I), I=1,144)
411      CONTINUE
      ENDIF
C
      IF (IPATH .NE. 1 .AND. IPOPL .GT. 0 .AND. WATPOP) THEN
        CALL HEADIT (IFROM)
        WRITE (LUN,9033)
        WRITE (LUN,9034)
        WRITE (LUN,9032) (I-1, PL(I), I=1,144)
      ENDIF
C
      ENDIF
C
C      PRINT GRAPH OF POPULATION FOR WATERBORNE PATHWAYS--
C
C      IF (IGRPL .GT. 0) THEN
        IF (IWAT .GT. 0) THEN
C
          DO 500 I = 1, 144
            FOFX(I,1) = PL(I)
```

DITTY

```
500    CONTINUE
C
      CALL GRAPH (3, FOFX, 1, 0, 0, 0, 0)
C
      ENDIF
      ENDIF
C
C
C    PRINT GRAPH OF TOTAL ACTIVITY OF ALL SELECTED RADIONUCLIDES--
C
      IF (IGRTNU .GT. 0)    THEN
C
        IF AIR RELEASE--
        IF (IPATH .LT. 2)    THEN
C
          CALL ZEROR (144, FOFX)
C
          DO 600 I = 1, 144
            DO 601 J = 1, NUCTOT
              FOFX(I,1) = FOFX(I,1) + ACTA(I,J)
601      CONTINUE
600      CONTINUE
C
          CALL GRAPH (4, FOFX, 1, 0, 0, 0, 1)
C
        ENDIF
C
C
C      IF WATER RELEASE--
      IF (IPATH .NE. 1)    THEN
C
        CALL ZEROR (144, FOFX)
C
        DO 700 I = 1, 144
          DO 701 J = 1, NUCTOT
            FOFX(I,1) = FOFX(I,1) + ACTW(I,J)
701      CONTINUE
700      CONTINUE
C
          CALL GRAPH (4, FOFX, 1, 0, 0, 0, 2)
C
        ENDIF
C
      ENDIF
C
C
C    PRINT GRAPH OF ACTIVITY OF EACH RADIONUCLIDE--
C
      IF (IGRNUC .GT. 0)    THEN
```

DITTY

```
C
C      IF AIR RELEASE--
C      IF (IPATH .LT. 2)      THEN
C
C          DO 750 IN = 1, NUCTOT
C              DO 751 IT = 1, 144
C                  FOFX(IT,1) = ACTA(IT,IN)
751          CONTINUE
C
C              CALL GRAPH (5, FOFX, 1, IN, 0, 0, 1)
C
750          CONTINUE
C
C      ENDIF
C
C      IF WATER RELEASE--
C      IF (IPATH .NE. 1)      THEN
C
C          DO 760 IN = 1, NUCTOT
C
C              DO 761 IT = 1, 144
C                  FOFX(IT,1) = ACTW(IT,IN)
761          CONTINUE
C
C              CALL GRAPH (5, FOFX, 1, IN, 0, 0, 2)
C
760          CONTINUE
C
C      ENDIF
C
C      ENDIF
C
C      RETURN
C
C      FORMAT STATEMENTS--
C
2000 FORMAT (// ' ---- DATA LIBRARIES USED ',42(' '), '(File) ----' //)
2001 FORMAT (' Master Radionuclide Data:',T70,' (2)',/' ',A77)
2002 FORMAT (' Food Concentration Ratios:',T70,' (8)',/' ',A77)
2003 FORMAT (' ',A5,' Water Bioaccumulation Factors:',T70,' (9)',
           /' ',A77)
2004 FORMAT (' External Exposure D.F.'s:',T70,' (10)',/' ',A77)
2005 FORMAT (' Inhalation/Ingestion D.F.'s:',T70,' (30)',/' ',A77)
2006 FORMAT (' Population Distribution:',T70,' (27)',/' ',A77)
2007 FORMAT (' Waterborne Release Data:',T70,' (31)',/' ',A77)
2008 FORMAT (' Airborne Release Data:',T70,' (32)',/' ',A77)
C
3000 FORMAT (// ' ---- TERRESTRIAL/AQUATIC PATHWAY DATA FOR AN ',
```


DITTY

```

      'AVERAGE INDIVIDUAL ',13('-'))
3001 FORMAT (' Growing' /
      ' Pathway      Period      Yield ',
      ' Consumption Pathway      Usage' /
      ' 14X, ' (days)      (kg/m2)      (kg/yr)',
      ' 21X, '(kg or hr/yr)' /)
3002 FORMAT (' ', A9, 2X, 1P3E10.1, 6X, A15, 1PE10.1)
3003 FORMAT (' External Exposure Time: ', 1PE10.2, ' hr/yr')
C
4000 FORMAT (// ' ---- LIQUID RELEASE PARAMETERS ',45('-'))
4001 FORMAT (' River Flow Rate, (ft3/sec) : ', 1PE8.1,
      ' T45, Months/Year Irrigated : ', 1PE8.1 /
      ' Reconcentration Ratio      : ', 1PE8.1,
      ' T45, Irrigation Rate' /
      ' Mixing Ratio              : ', 1PE8.1,
      ' T45, (liters/m2/month)      : ', 1PE8.1)
C
6000 FORMAT (// ' ---- SITE GRID DEFINITION ',52('-'))
6001 FORMAT (' Number of Sectors: ', I5)
6002 FORMAT (' Number of Distances: ', I5 / 1X, 10(8F9.0))
C
6100 FORMAT (// ' ---- JOINT FREQUENCY DATA ',52('-'))
6101 FORMAT (' Wind      Wind from: ',
      ' Speed Stability ', 16A6)
6102 FORMAT (1X, F5.1, 2X, A10, 16F6.2)
6103 FORMAT (' ')
C
6200 FORMAT (' Stack Height: ', F6.2)
C
7000 FORMAT (//// ' Input Prepared By: _____',
      ' Date: _____', //
      ' Input Checked By: _____',
      ' Date: _____')
C
8000 FORMAT (' ---- MASTER RADIONUCLIDE CONTROL LIST ',39('-'))
8001 FORMAT ( 7(2X, A2, A6))
8011 FORMAT (' No internal dose factors for ',A2,A6)
C
9010 FORMAT (' ---- AIR RELEASE OF EACH RADIONUCLIDE PER 70-YR'
      ' PERIOD (Ci) -----' /)
9011 FORMAT (' Radio- ',5(' Period/ '), /
      ' nuclide ',5(' Activity '), /
      ' ----- ',5(' ----- '))
9012 FORMAT (' ',A2, A6, 5(1X,I3,1PE9.1) /
      ' 40( 9X, 5(1X,I3,1PE9.1)) /)
9020 FORMAT (' ---- WATER RELEASE OF EACH RADIONUCLIDE PER 70-YR'
      ' PERIOD (Ci) -----' /)

```

DITTY

```
9030 FORMAT (// ' Population Dispersion Factors for Airborne ',  
          .      'Release, (person-sec/m3)')/  
9031 FORMAT ( 6(' Period/PM ') / 6(' ----- '))  
9032 FORMAT ( 6(1X,I3, 1PE8.1,1X))  
9033 FORMAT (// ' Population for Waterborne Release:')/  
9034 FORMAT ( 6(' Period/PL ') / 6(' ----- '))  
C  
9100 FORMAT (// ' ---- POPULATION DATA ',50(' '))/  
C  
9110 FORMAT (' Previous input values used for acute airborne ',  
          .      'release.')/  
C  
9112 FORMAT (' Population dispersion factor for acute airborne ',  
          .      'release = ',1PE10.2/  
C  
9120 FORMAT (' Previous input values used for chronic airborne ',  
          .      'release.')/  
C  
9122 FORMAT (' Population-weighted E/Q values were input for each ',  
          .      '70-yr time period.')/  
C  
9124 FORMAT (' Population for Chronic Airborne Release at Time ',  
          .      F7.0,':')/  
          .      ' Sector ',10(1PE9.1))  
9125 FORMAT (' ----- ',5(' ----- '))  
9126 FORMAT (' ',A7,10(1PE9.1))  
C  
9127 FORMAT (' Population for Chronic Airborne Release at the ',  
          .      'following Times A.D.:') / (' Time   Population') /  
          .      (' ----- '))  
C  
9128 FORMAT (' ',0PF7.0,1PE10.1)  
C  
9130 FORMAT (' Population for chronic airborne release read from ',  
          .      'file.')/  
C  
9132 FORMAT (' Population Dispersion Factors for Chronic Airborne',  
          .      'Release at the Following Times A.D.:') /  
          .      (' Time      PDF ') /  
          .      (' ----- '))  
C  
9134 FORMAT (' Previous population data used for chronic airborne ',  
          .      'release. Changes made to E/Q input.') /  
          .      ' Population-weighted E/Q values recalculated.')/  
C  
9136 FORMAT (' No chronic airborne release, constant population ',  
          .      'assumed.')/  
C  
9140 FORMAT (' Previous population values used for acute ',
```

DITTY

```
      .      'waterborne release.'//)
C
9142 FORMAT (' Population for acute waterborne ',
      .      'release = ',1PE9.2/)
C
9150 FORMAT (' Previous population values used for chronic ',
      .      'waterborne release.'//)
C
9152 FORMAT (' Population for chronic ',
      .      'waterborne release were input for each 70-yr time period.'//)
C
9153 FORMAT (' Population for Chronic Waterborne Release at the ',
      .      'following Times A.D.: '//(' Time   Population')/
      .      (' -----'))
C
9154 FORMAT ('      ',0PF7.0,1PE10.1)
C
      END
```

DITTY

```
C-----
C
C      SUBROUTINE REPORT
C
C      This module prints graphic reports of organ doses as a
C      function of time, numerical reports of organ doses, and maximum
C      dose period reports
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 22-Aug-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----

      INCLUDE 'DAYPC.CMN'
      INCLUDE 'FLAGS.CMN'
      INCLUDE 'NUCNAM.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'OPTION.CMN'
      INCLUDE 'ORGID.CMN'
      INCLUDE 'ORGMAS.CMN'
      INCLUDE 'VARYBL.CMN'
      INCLUDE 'RESULT.CMN'
      INCLUDE 'TIMES2.CMN'
      INCLUDE 'TITL.CMN'

      INTEGER IPAGE, NSET, ISET, ISTART, ISTOP, MAXLIN
      REAL FOFX(144,8), RADEDE(100), POPEDE(100)
      CHARACTER LINE*127, DUM*3, DASH1*50, DASH2*50, DASH3*50, DASH4*60,
      .      UNIT*1
      LOGICAL FIRST
      DATA DASH3 /'-----'/'
      DATA DASH4
      .      /'-----'/'
      DATA DASH1 /'-----'/'
      DATA DASH2 /'-----'/'
      DATA IFROM /1/

      NPATH = 4
      LINE = '-----'
      LUN = 17
      FIRST = .TRUE.
      MAXLIN = 41
      NSET = NUCTOT / MAXLIN
      IDD = MOD (NUCTOT, MAXLIN)
      IF (IDD .GT. 0) NSET = NSET + 1
```

DITTY

```
C      PRINT GRAPH OF DOSE TO EACH SELECTED ORGAN--
      IF (IGRDOS .GT. 0) THEN
        DO 200 I = 1, 144
          FOFX(I,1) = DTOTAL(I)
200    CONTINUE
C      CALL GRAPH (7, FOFX, 1, IO, IFROM, 0, 0)
C      TO PRINT GRAPH FOR THIS ORGAN.
C      WRITE (LUN,2004)
C
100    CONTINUE
      ENDIF
C
C
C      PRINT NUMERIC REPORT OF DOSE TO EACH ORGAN FOR EACH TIME PERIOD--
C
      TT = TZ
      IPAGE = 50
      INTL = 0
C
      DO 300 IT = 1, 144
C
      IF (IPAGE .GT. 43) THEN
        IF (IT .GT. 1) WRITE (LUN,2002) LINE
        CALL HEADIT (IFROM)
        WRITE (LUN,2000)
        WRITE (LUN,2002) LINE
        WRITE (LUN,2001)
        WRITE (LUN,2002) LINE
        IPAGE = 1
      ENDIF
C
      IF (IT .EQ. 1 .AND. IAC .GT. 0) THEN
C
        WRITE (LUN,1001) DTOTAL(1)
        IPAGE = IPAGE + 1
        FIRST = .FALSE.
C
      ELSEIF (IT .GT. 1) THEN
C
        ISAME = 1
        IF (IT .EQ. 1 .AND. FIRST) THEN
          ISAME = 0
        ELSEIF (IT .EQ. 144) THEN
          ISAME = 0
        ELSEIF (DTOTAL(IT) .NE. DTOTAL(IT-1)) THEN
          ISAME = 0
```

DITTY

```

      ENDIF
C
      IF (ISAME .EQ. 1 .AND. INTL .EQ. 0) THEN
        WRITE (LUN, 2010)
        INTL = 1
        IPAGE = IPAGE + 1
      ELSEIF (ISAME .EQ. 0) THEN
        WRITE (LUN, 1000) IT, TT, DTOTAL(IT)
        INTL = 0
        IPAGE = IPAGE + 1
      ENDIF
C
      ENDIF
C
      IF (IT .EQ. 144) THEN
        WRITE (LUN, 2002) LINE
        WRITE (LUN, 2004)
      ENDIF
C
      TT = TT + 70.
C
300 CONTINUE
C
C      Prepare EDE by radionuclide for population--
      BIGPOP = 0.0
      IBIGP = 0
      IBIGPN = 0
C
      Calculate EDE by radionuclide--
      DO 308 IN = 1, NUCTOT
        CALL WBEDE4 (POPINT(1, IN), POPEDE(IN))
308 CONTINUE
C
      Break radionuclides into pages--
      DO 309 ISET = 1, NSET

        ISTART = (ISET - 1) * MAXLIN + 1
        ISTOP = ISET * MAXLIN
        IF (ISTOP .GT. NUCTOT) ISTOP = NUCTOT

        CALL HEADIT (LUN)
        WRITE (LUN, 5115)
        WRITE (LUN, 5110) DASH4

        DO 310 IN = ISTART, ISTOP
          POPTOT = POPEDE(IN) + POPSUB(IN) + POPEXT(IN)
          IPR = POPTOT / DTOTAL(144) * 100.0
          IF (POPTOT .GT. BIGPOP) THEN

```

DITTY

```
        BIGPOP = POPTOT
        IBIGP = IPR
        IBIGPN = IN
    ENDIF
    WRITE (LUN,5114) ELT(IN), AW(IN), POPEDE(IN),
    .      POPSUB(IN)+POPEXT(IN), POPTOT, IPR

310    CONTINUE
    WRITE (LUN,5111) DASH4
    WRITE (LUN,4115)

309    CONTINUE

C      Set organ column indices and number of organs to print--

    NORGS = 0
C      Set organ print index--
    DO 306 IO = 1, 22
        DO 305 IN = 1, NUCTOT
            IF (IOFLG(IO)) THEN
                NORGS = NORGS + 1
                ICLN(NORGS) = IO
C                WRITE (*,*) NORGS, ICLN(NORGS), MASORG(ICLN(NORGS))
                GOTO 303
            ENDIF
        305    CONTINUE
    303    CONTINUE
    306    CONTINUE

C      Error return--
    IF (NORGS .EQ. 0) RETURN

C      Write whole body EDE report for maximum time period--

    CALL HEADIT (LUN)
    WRITE (LUN,1111) MAXTIM*70 + TZ, MAXTIM
    WRITE (LUN,1110) DASH1
    DO 304 IO = 1, NORGW
        IF (IO .EQ. 1) THEN
            WRITE (LUN,1114) 'Gonads ', HICDE(IO), WT(IO), HIWBE(IO)
        ELSEIF (IO .EQ. 2) THEN
            WRITE (LUN,1114) 'Breast ', HICDE(IO), WT(IO), HIWBE(IO)
        ELSE
            WRITE (LUN,1114) MASORG(ICDEH(IO)), HICDE(IO), WT(IO),
            .      HIWBE(IO)
        ENDIF
    304    CONTINUE
    WRITE (LUN,1112) DASH2, HIEDE, HIEXT+HISUB, DASH2, HIAEDE
```

DITTY

```
WRITE (LUN,4115)

C   Prepare EDE by radionuclide in maximum dose period if IREDE > 0--
   IF (IREDE .GT. 0) THEN

       BIGMAX = 0.0
       IBIGM = 0
       IBIGMN = 0

C   Calculate EDE by radionuclide--
   DO 307 IN = 1, NUCTOT
       CALL WBEDE4 (HIDOSR(1,IN), RADEDE(IN))
307  CONTINUE

C   If air case then print population report--
   IF (IPATH .EQ. 1) THEN

       UNIT = 'P'
       HIMI = HIAEDE

C   Break radionuclides into pages--
   DO 400 ISET = 1, NSET

       ISTART = (ISET - 1) * MAXLIN + 1
       ISTOP = ISET * MAXLIN
       IF (ISTOP .GT. NUCTOT) ISTOP = NUCTOT

       CALL HEADIT (LUN)
       WRITE (LUN,1111) MAXTIM*70 + TZ, MAXTIM
       WRITE (LUN,4110) DASH4

       DO 402 IN = ISTART, ISTOP
           DEXT = HISUBR(IN) + HIEXTR(IN)
           AIRTOT = RADEDE(IN) + DEXT
           IPR = AIRTOT / HIMI * 100.0
           IF (AIRTOT .GT. BIGMAX) THEN
               BIGMAX = AIRTOT
               IBIGM = IPR
               IBIGMN = IN
           ENDIF
           WRITE (LUN,4114) ELT(IN), AW(IN), RADEDE(IN), DEXT,
               AIRTOT, IPR
402  CONTINUE

       WRITE (LUN,4111) DASH4
       WRITE (LUN,4115)

400  CONTINUE
```


DITTY

```
ELSE
C   This is a water case, print average individual report--

    UNIT = ' '
    HIMI = HIAEDE / PL(MAXTIM)

C   Break radionuclides into pages--
    DO 420 ISET = 1, NSET

        ISTART = (ISET - 1) * MAXLIN + 1
        ISTOP = ISET * MAXLIN
        IF (ISTOP .GT. NUCTOT) ISTOP = NUCTOT

        CALL HEADIT (LUN)
        WRITE (LUN,1113) MAXTIM*70 + TZ, MAXTIM
        WRITE (LUN,4110) DASH4

        DO 422 IN = ISTART, ISTOP
            DEXT = (HISUBR(IN) + HIEXTR(IN)) / PL(MAXTIM)
            WATTOT = RADEDE(IN) / PL(MAXTIM) + DEXT
            IPR = WATTOT / HIMI * 100.0
            IF (WATTOT .GT. BIGMAX) THEN
                BIGMAX = WATTOT
                IBIGM = IPR
                IBIGMN = IN
            ENDIF
            WRITE (LUN,4114) ELT(IN), AW(IN), RADEDE(IN)/PL(MAXTIM),
                                DEXT, WATTOT, IPR
422      CONTINUE

        WRITE (LUN,4111) DASH4

420    CONTINUE

    ENDIF
ENDIF

C   Write detail reports for maximum time period--
    IF (NORGS .GT. 0) CALL DITBYR
    IF (NORGS .GT. 0) CALL DITBYP

C   Write one line QA report--

    LUN = 19
    CALL OPNFIL (5, 0, LUN)
    WRITE (LUN, 6000) TITLS(33) (1:18), DTOTAL(144), ELT(IBIGPN),
        .           AW(IBIGPN), IBIGP, HIMI, UNIT, ELT(IBIGMN),
        .           AW(IBIGMN), IBIGM, MAXTIM*70 + TZ,
        .           TODAY(1:8), CLOCK(1:5)
```

DITTY

RETURN

C---- Format Statements -----

```
1 FORMAT (1PE7.1)

1004 FORMAT (' ',A1,I3,1P, 15E8.1E2)
1110 FORMAT (//
.      T10,'
.      T10,'          Cumulative      Weighted'/
.      T10,'          Dose      Weighting      Cumulative'/
.      T10,'          Organ      Equivalent      Factors      Dose'/
.      ' ',T10,A50)      Equivalent'/'

1111 FORMAT (//, T13,'Maximum Dose Increment Received By Population'/
.      T13,'In Year ',I5,
.      ' (70-yr Time Period Number No:',I4,')'//)

1113 FORMAT (//, T13,'Maximum Dose Increment Received By ',
.      'Individual (rem)'/
.      T13,'In Year ',I5,
.      ' (70-yr Time Period Number No:',I4,')'//)

1114 FORMAT (' ',T10,A12,4X,1P,3(E9.1,2X), I11)

1112 FORMAT (' ',T10,A50/
.      T10,'Cumulative Effective Dose Equivalent',T48,1P,E9.1/
.      T10,'External Dose',T48,E9.1/' ',T10,A50,/
.      T10,'Lifetime Effective Cumulative '/
.      T12,'Dose Equivalent',T48,E9.1)

1000 FORMAT (11X, I10, 8X,  F10.0, 5( 8X, 1PE10.2))
1001 FORMAT (16X, 'Acute      ', 13X, 5( 8X, 1PE10.2) /)

2000 FORMAT (/5X, ' Lifetime Effective Cumulative Dose Equivalent ',
.      'as a Function of Time' / )
2001 FORMAT (13X, 'Period', 13X, 'Year', 14X, 'Dose')
2002 FORMAT (' ', A127)
2004 FORMAT (//,' Dose in units of person-rem;'/
.      ' that is the cumulative population dose received by ',
.      'the local population '/
.      ' over 10,000 years with an '
.      'assumed 70-yr individual lifetime.')
```

```
2005 FORMAT (//,10X,
.      ' Dose in units of rem.')
```

```
2010 FORMAT (10X,' until      until ')
```

DITTY

```
3005 FORMAT (21X, 127A1)
3006 FORMAT (30X, 'Total' , 5(8X, 1PG10.2))

4110 FORMAT (/ ,
      .T15, '
      .T15, '
      .T15, 'Radio-      Effective      Annual' /
      .T15, 'nuclide    Dose      External    Effective    Percent' /
      .T15, '            Equivalent    Dose      Equivalent    Of Total' /
      .T15, '            Dose      Dose      Dose' /
      .T15, A60)
4111 FORMAT (T15, A60)
4114 FORMAT (' ', T15, A2, 1X, A6, 1X, 1P, 3(E9.1, 2X), I11)
4115 FORMAT (//, ' Dose in units of person-rem;' /
      .      ' that is the cumulative population dose received by ',
      .      ' the local population ' /
      .      ' with an assumed 70-yr individual lifetime.')
```

```
5110 FORMAT (/ ,
      .T15, '
      .T15, '
      .T15, 'Radio-      Effective      Annual' /
      .T15, 'nuclide    Dose      External    Effective    Percent' /
      .T15, '            Equivalent    Dose      Equivalent    Of Total' /
      .T15, '            Dose      Dose      Dose' /
      .T15, A60)
5111 FORMAT (T15, A60)
5114 FORMAT (' ', T15, A2, 1X, A6, 1X, 1P, 3(E9.1, 2X), I11)
5115 FORMAT (/13X, ' Cumulative Population Dose Equivalent ',
      .      ' by Radionuclide' / )

6000 FORMAT (A18, ':', 1PE8.1, 0P, ' Prem ', A2, A6, I3, 1X,
      .      1PE8.1, 0P, 1X, A1, 'rem ', A2, A6, I3, 1X, I5,
      .      A8, 1X, A5)
```

C-----
END

DITTY

```
C-----
C
C      SUBROUTINE SETNUC
C
C      This module establishes the master list of radionuclides to be
C      included in this run
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Aug-87  MDT
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      INCLUDE 'RMD.CMN'
C      INCLUDE 'DKAY.CMN'
C      INCLUDE 'NUCNAM.CMN'
C      INCLUDE 'SOURCE.CMN'
C      INCLUOE 'FLAGS.CMN'
C
C
C      AL2 = ALOG (2.0)
C
C      INITIALIZE PARAMETERS--
1      CALL ZEROI (100, INFLG)
C      ICHN = 0
C      INUC = 0
C
C      FOR EACH DECAY CHAIN IN THE MASTER RADIONUCLIDE LIBRARY--
C      DO 100 IC = 1, NCH
C
C          NCN = NOFNUC(IC)
C          N1 = NCHST(IC)
C          N2 = N1 + NCN - 1
C          IONE = 0
C          I = 0
C
C          DO 200 IL = N1, N2
C
C              HAS A MEMBER OF THIS CHAIN BEEN FOUND BEFORE?--
C              IF (IONE .EQ. 1) THEN
C
C                  INUC = INUC + 1
C
C                  IFR2(1,INUC) = MAX (0, IFR(1,IL)-I )
C                  IFR2(2,INUC) = MAX (0, IFR(2,IL)-I )
C
C                  DK2(1,INUC) = DKF(1,IL)
```

DITTY

```
C      DK2(2,INUC) = DKF(2,IL)
C
C      AW(INUC) = AWM(IL)
C      ELT(INUC) = ELTM(IL)
C      AR(INUC) = AL2 * 365.25 / TR(IL)
C
C      ENDIF
C
C      IN = 1
C      IEND = 0
C
C      LOOP UNTIL MASTER RADIONUCLIDE LIST EXHAUSTED OR A MEMBER IS FOUND--
300  CONTINUE
C
C      DO ATOMIC WEIGHT SYMBOLS MATCH?--
C      IF (AWM(IL) .EQ. A(IN) ) THEN
C
C      DO THE ELEMENT NAMES MATCH?--
C      IF (ELTM(IL) .EQ. E(IN) ) THEN
C
C      SET FLAG FOR THIS NUCLIDE FOUND--
C      INFLG(IN) = 1
C
C      IF THIS IS FIRST MEMBER OF CHAIN TO BE FOUND--
C      IF (IONE .LE. 0) THEN
C
C      IONE = 1
C      I = IL - N1
C
C      INUC = INUC + 1
C      ICHN = ICHN + 1
C      IF (ICHN .GT. 0) NOFN(ICHN) = NCN - I
C
C      IFR2(1,INUC) = MAX (0, IFR(1,IL) - I )
C      IFR2(2,INUC) = MAX (0, IFR(2,IL) - I )
C
C      DK2(1,INUC) = DKF(1,IL)
C      DK2(2,INUC) = DKF(2,IL)
C
C      AW(INUC) = AWM(IL)
C      ELT(INUC) = ELTM(IL)
C      AR(INUC) = AL2 * 365.25 / TR(IL)
C
C      ENDIF
C
C      STOP SEARCHING--
C      IEND = 1
```

DITTY

```
C
      ELSE
C      MATCH NOT FOUND, COMPARE WITH NEXT MASTER LIST RECORD--
      IN = IN + 1
      ENDIF
C
      ELSE
C      MATCH NOT FOUND; COMPARE WITH NEXT MASTER LIST RECORD--
      IN = IN + 1
      ENDIF
C
      IF (IEND .LT. 1 .AND. IN .LE. NIN) GO TO 300
C
200  CONTINUE
100  CONTINUE
C
C      NUCTOT = INUC
      CALL NUCTST
C      TO DETERMINE IF ALL MASTER LIST RADIONUCLIDES WERE FOUND IN DATA
LIBRARY
C
      RETURN
      END
```

DITTY

```
C-----
C
C   SUBROUTINE SETUP ( YL1, NL )
C
C   This module fills the y-axis label array, y-axis tick marks, and
C   blanks out the graph storage array
C
C   Module of DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 9-Feb-88 RAP
C   Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C   YL - SELECTED Y-AXIS LABEL
C   NL - NUMBER OF CHARACTERS IN SELECTED Y-AXIS
C         LABEL
C-----
C
C   INCLUDE 'PLOT.CMN'
C
C   CHARACTER YL1*1(40), BLANK*1, AST*1, BLANK2*12
C
C   BLANK2 = ' '
C   AST = '.'
C   BLANK = ' '
C   IY = 40
C   IX = 73
C
C   CENTER Y-AXIS LABEL--
C
C   IS = (IY - NL) / 2
C
C   IF (IS .GT. 0) THEN
C     DO 100 I = 1, IS
C       LABELY(I) = BLANK
C 100 CONTINUE
C   ENDIF
C
C   TRANSFER SELECTED LABEL TO LABEL-Y ARRAY--
C
C   DO 200 I = 1, NL
C     IJ = IS + I
C     LABELY(IJ) = YL1(I)
C 200 CONTINUE
C
```

DITTY

```
C      BLANK OUT REMAINDER OF LABELY ARRAY--
      IT = NL + IS + 1
      IF (IT .LT. IY) THEN
        DO 700 I = IT, IY
          LABELY(I) = BLANK
700    CONTINUE
      ENDIF

C
C
C
C
C      BLANK-OUT ARRAY--
      DO 500 I = 2, IX-1
        DO 400 J = 1, IY
          ARRAY(J,I) = BLANK
400    CONTINUE
500  CONTINUE

C
C
C
C      SET VERTICAL BORDER INTO ARRAY--
      DO 600 J = 1, IY
        ARRAY(J,1) = AST
        ARRAY(J,73) = AST
600  CONTINUE

C
C
C
C      BLANK OUT LEGEND ARRAY
      DO 800 I = 1,40
        LEGEND(I) = BLANK2
800  CONTINUE

C
C
      RETURN
      END
```


DITTY

```
C-----
C
C      SUBROUTINE TRITUM (IST, IAW, WATCH, AIRCN, ANCONS, ANDRNK, CSOIL,
C      .                  EDIBL, AQUA, RIRR, MOPYR)
C
C      This module calculates environmental concentrations of Tritium
C      using a specific-activity model
C
C      Module of DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 13-Jul-88 RAP
C      Reviewed and Approved: 13-Sept-88 8A Napier
C-----
C
C      IST
C      IAW
C      WATCH
C      AIRCN
C      ANCONS(7)
C      ANDRNK(7)
C      CSOIL
C      EDIBL(7)
C      AQUA(5)
C-----
C
C      INCLUDE 'BIODAT.CMN'
C
C      DIMENSION ANCONS(7), ANDRNK(7), EDIBL(7), AQUA(5)
C      REAL RIRR, MOPYR
C
C      DATA H1 /9.0/
C      DATA H2 /0.008/
C      DATA H3 /0.0625/
C      DATA H4 /0.083/
C      DATA H5 /0.094/
C      DATA H6 /0.10/
C      DATA H7 /0.087/
C      DATA H8 /0.092/
C
C      DATA W1 /0.80/
C      DATA W2 /0.12/
C      DATA W3 /0.80/
C      DATA W4 /0.88/
C      DATA W5 /0.60/
```

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```
C DATA W6 /0.50/
DATA W7 /0.70/
DATA W8 /0.75/

C DATA Z1 /0.1/
DATA Z2 /0.03/

C TAIR = AIRCN * H1 / H2
  TWAT = WATCHN * H1
  CLEAF = TAIR + TWAT

  IF (RIRR .EQ. 0.0 .OR. MOPYR .EQ. 0.0) THEN
    CSOIL = 0.0
  ELSE
    CSOIL = AIRCN * Z1 / H2 + WATCHN * Z1
  ENDIF

C W1M = W1 / H1 + (1.0 - W1) * H3
W2M = W2 / H1 + (1.0 - W2) * H3
W3M = W3 / H1 + (1.0 - W3) * H3

C EDIBL(1) = CLEAF * W1M

C EDIBL(2) = EDIBL(1)

C EDIBL(3) = (ANCONS(3) * CLEAF * W2M + ANDRNK(3) * WATCHN) /
. (ANCONS(3) * W2M + ANDRNK(3) / H1) *
. (W8 / H1 + (1. - W8) * H8)

C EDIBL(4) = (ANCONS(4) * CLEAF * W3M + ANDRNK(4) * WATCHN) /
. (ANCONS(4) * W3M + ANDRNK(4) / H1) *
. (W4 / H1 + (1. - W4) * H4)

C EDIBL(5) = (ANCONS(5) * CLEAF * W2M + ANDRNK(5) * WATCHN) /
. (ANCONS(5) * W2M + ANDRNK(5) / H1) *
. (W5 / H1 + (1. - W5) * H5)

C EDIBL(6) = (ANCONS(6) * CLEAF * W2M + ANDRNK(6) * WATCHN) /
. (ANCONS(6) * W2M + ANDRNK(6) / H1) *
. (W6 / H1 + (1. - W6) * H6)

C EDIBL(7) = (ANCONS(7) * CLEAF * W2M + ANDRNK(7) * WATCHN) /
. (ANCONS(7) * W2M + ANDRNK(7) / H1) *
. (W7 / H1 + (1. - W7) * H7)

C
C IF (IAW .EQ. 2) THEN
C DO 100 I = 1, 4
```

DITTY

```
      AQUA(I) = BIOACF(I,IST) * WATCHN
100    CONTINUE
C
      AQUA(5) = WATCHN * DWCF(IST)
C
    ENDIF
C
    RETURN
  END
```

DITTY

```
C-----
C
C      SUBROUTINE WBEDE2 (ITT)
C
C      Subroutine WBEDE calculates the wholly body effective dose
C      equivalent (EDE) from the current time period
C
C      Module of Program DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      DOSEMO   - Dose to each organ in the master list
C      FLAG     - Flag set in bubble sort to indicate that a switch was
C                made this pass
C      IREMAN() - Index in organ list corresponding to the organ dose
C                in array REMAN
C      ITEMP    - Workspace for sort
C      NCDE     - Index of the current position in the CDE and ICDE
C                arrays
C      NREM     - Index of the current position in the REMAN and IREMAN
C                arrays
C      REMAN()  - Work array for ordering remaining organ doses by
C                highest dose
C      RTEMP    - Workspace for sort
C-----
C
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'RESULT.CMN'
C      INCLUDE 'ORGID.CMN'
C      INCLUDE 'OPT.CMN'
C
C      REAL RTEMP, REMAN(25), DOSMO(25), WDE(11), CDE(11)
C      INTEGER ITEMP, IREMAN(25), NREM, NCDE, FLAG, ICDE(11)
C
C      Order doses by master organ list--
C      DO 401 IO = 1, MORG
C          DOSMO(IO) = DOSINT(IO,ITT)
C 401 CONTINUE
C
C      Initialize arrays--
C      DO 402 IO = 1, 11
C          CDE(IO) = 0.0
C          WDE(IO) = 0.0
C          ICDE(IO) = 0
```

DITTY

402 CONTINUE

```
C      Move whole body organs to CDE array--

C      Gonads--
      IF (DOSMO(12) .GT. DOSMO(11)) THEN
        CDE(1) = DOSMO(12)
        ICDE(1) = 12
      ELSE
        CDE(1) = DOSMO(11)
        ICDE(1) = 11
      ENDIF

C      Breast (muscle)--
      CDE(2) = DOSMO(13)
      ICDE(2) = 13

C      Red blood marrow--
      CDE(3) = DOSMO(8)
      ICDE(3) = 8

C      Lung (and lymph) --
      CDE(4) = DOSMO(1)
      ICDE(4) = 1

C      Thyroid--
      CDE(5) = DOSMO(14)
      ICDE(5) = 14

C      Bone surface--
      COE(6) = DOSMO(7)
      ICDE(6) = 7

C      Move remaining organs into REMAN array for sorting--
      NREM = 0

C      Gastro-intestinal tract--
      DO 100 IO = 3, 6
        NREM = NREM + 1
        REMAN(NREM) = DOSMO(IO)
        IREMAN(NREM) = IO
100 CONTINUE

C      Specified organs--
      DO 110 IO = 15, MORG
        IF (IO .EQ. 22) THEN
C      Add stomach wall to gut--
          REMAN(3) = REMAN(3) + DOSMO(IO)
```

DITTY

```
      ELSEIF (DOSMO(IO) .GT. 0.0) THEN
        NREM = NREM + 1
        REMAN(NREM) = DOSMO(IO)
        IREMAN(NREM) = IO
      ENDIF
110 CONTINUE

C    Order remaining organs by highest dose--

      N = NREM - 1
200 CONTINUE
      FLAG = 0
      J = 1
201 CONTINUE
      IF (REMAN(J) .LT. REMAN(J+1)) THEN
        RTEMP = REMAN(J)
        ITEMP = IREMAN(J)
        REMAN(J) = REMAN(J+1)
        IREMAN(J) = IREMAN(J+1)
        REMAN(J+1) = RTEMP
        IREMAN(J+1) = ITEMP
        FLAG = 1
      ENDIF
      J = J + 1
      IF (J .LE. N) GOTO 201
      IF (FLAG .GT. 0) THEN
        N = N - 1
        IF (N .GT. 0) GOTO 200
      ENDIF

C    Move top 5 remaining organs into CDE array--

      NCDE = 6
      N2 = MIN (NREM, 5)

      DO 300 I = 1, N2
        NCDE = NCDE + 1
        CDE(NCDE) = REMAN(I)
        ICDE(NCDE) = IREMAN(I)
        IF (ICDE(NCDE) .LT. 1 .OR. ICDE(NCDE) .GT. MORG) GOTO 91
300 CONTINUE

C    Calculate WDE, EDE, and AEDE--

      EDE = 0.0

      DO 302 ID = 1, NCDE
        WDE(ID) = CDE(ID) * WT(ID)
```

DITTY

```
      EDE = EDE + WDE(IO)
302 CONTINUE

      AEDE2(ITT) = EDE + DOSSUB(ITT) + DOSEXT(ITT)

C      Check if maximum dose so far--
      IF (AEDE2(ITT) .GT. HIAEDE) THEN
        DO 304 IO = 1, 11
          HICDE(IO) = CDE(IO)
          HIWBE(IO) = WDE(IO)
          ICDEH(IO) = ICDE(IO)
304    CONTINUE
        HIEDE = EDE
        NORGW = N2 + 6
      ENDIF

      RETURN

C----- Error Conditions -----
      91 CONTINUE
      WRITE (*,*) 'Invalid master organ index in WBEDE',
        .      NCDE, ICDE(NCDE)
      CALL EXIT (1)

C-----
      END
```

DITTY

```
C-----
C
C      SUBROUTINE WBEDE4 (DOSIN, EDE)
C
C      Subroutine WBEDE calculates the whole body effective dose
C      equivalent (EDE) from the current time period
C
C      Module of Program DITTY of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 6-Nov-87 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      DOSEMO   - Dose to each organ in the master list
C      FLAG     - Flag set in bubble sort to indicate that a switch was
C                made this pass
C      IREMAN() - Index in organ list corresponding to the organ dose
C                in array REMAN
C      ITEMP    - Workspace for sort
C      NCDE     - Index of the current position in the CDE and ICDE
C                arrays
C      NREM     - Index of the current position in the REMAN and IREMAN
C                arrays
C      REMAN()  - Work array for ordering remaining organ doses by
C                highest dose
C      RTEMP    - Workspace for sort
C-----
C
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'RESULT.CMN'
C      INCLUDE 'ORGID.CMN'
C      INCLUDE 'OPT.CMN'
C
C      REAL RTEMP, REMAN(25), DOSMO(25), WDE(11), CDE(11), DOSIN(25)
C      INTEGER ITEMP, IREMAN(25), NREM, NCDE, FLAG, ICDE(11)
C
C      Order doses by master organ list--
C      DO 401 IO = 1, MORG
C          DOSMO(IO) = DOSIN(IO)
C401 CONTINUE
C
C      Initialize arrays--
C      DO 402 IO = 1, 11
C          CDE(IO) = 0.0
C          WDE(IO) = 0.0
C          ICDE(IO) = 0
```


DITTY

402 CONTINUE

```
C      Move whole body organs to CDE array--

C      Gonads--
      IF (DOSMO(12) .GT. DOSMO(11)) THEN
        CDE(1) = DOSMO(12)
        ICDE(1) = 12
      ELSE
        CDE(1) = DOSMO(11)
        ICDE(1) = 11
      ENDIF

C      Breast (muscle)--
      CDE(2) = DOSMO(13)
      ICDE(2) = 13

C      Red blood marrow--
      CDE(3) = DOSMO(8)
      ICDE(3) = 8

C      Lung (and lymph) --
      CDE(4) = DOSMO(1)
      ICDE(4) = 1

C      Thyroid--
      CDE(5) = DOSMO(14)
      ICDE(5) = 14

C      Bone surface--
      CDE(6) = DOSMO(7)
      ICDE(6) = 7

C      Move remaining organs into REMAN array for sorting--
      NREM = 0

C      Gastro-intestinal tract--
      DO 100 IO = 3, 6
        NREM = NREM + 1
        REMAN(NREM) = DOSMO(IO)
        IREMAN(NREM) = IO
100 CONTINUE

C      Specified organs--
      DO 110 IO = 15, MORG
        IF (IO .EQ. 22) THEN
C      Add stomach wall to gut--
          REMAN(3) = REMAN(3) + DOSMO(IO)
```

DITTY

```
      ELSEIF (DOSMO(IO) .GT. 0.0) THEN
        NREM = NREM + 1
        REMAN(NREM) = DOSMO(IO)
        IREMAN(NREM) = IO
      ENDIF
110 CONTINUE

C    Order remaining organs by highest dose--

      N = NREM - 1
200 CONTINUE
      FLAG = 0
      J = 1
201 CONTINUE
      IF (REMAN(J) .LT. REMAN(J+1)) THEN
        RTEMP = REMAN(J)
        ITEMP = IREMAN(J)
        REMAN(J) = REMAN(J+1)
        IREMAN(J) = IREMAN(J+1)
        REMAN(J+1) = RTEMP
        IREMAN(J+1) = ITEMP
        FLAG = 1
      ENDIF
      J = J + 1
      IF (J .LE. N) GOTO 201
      IF (FLAG .GT. 0) THEN
        N = N - 1
        IF (N .GT. 0) GOTO 200
      ENDIF

C    Move top 5 remaining organs into CDE array--

      NCDE = 6
      N2 = MIN (NREM, 5)

      DO 300 I = 1, N2
        NCDE = NCDE + 1
        CDE(NCDE) = REMAN(I)
        ICDE(NCDE) = IREMAN(I)
        IF (ICDE(NCDE) .LT. 1 .OR. ICDE(NCDE) .GT. MORG) THEN
          WRITE (*,*) 'Invalid master organ index in WBEDE',
            NCDE, ICDE(NCDE)
          .
          STOP
        ENDIF
      300 CONTINUE
```

DITTY

C Calculate WDE, EDE, and AEDE--

 EDE = 0.0

 DO 302 IO = 1, NCDE

 WDE(IO) = CDE(IO) * WT(IO)

 EDE = EDE + WDE(IO)

302 CONTINUE

 RETURN

C-----
 END

DITTY

```
C-----
C
C   SUBROUTINE WPATHS (ITIM, ITWX)
C
C   This module calculates environmental concentrations of
C   radionuclides from aquatic pathways
C
C   Module of DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 13-Jul-88 RAP
C   Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C   ITIM
C   ITWX
C-----
C
C   INCLUDE 'BIODAT.CMN'
C   INCLUDE 'DKAY.CMN'
C   INCLUDE 'EDCN.CMN'
C   INCLUDE 'FODATA.CMN'
C   INCLUDE 'PATHIN.CMN'
C   INCLUDE 'NUCNAM.CMN'
C   INCLUDE 'VARYBL.CMN'
C
C
C   CHARACTER*2 CONSTH, CONSTC
C   DIMENSION RATIRR(100), RATSED(100)
C
C   DIMENSION TRNL(7), ANCONS(7), ANDRNK(7), DUMMY(100)
C   DATA TRNL / 1.0, 0.1, 0.1, 1.0, 0.1, 0.1, 0.1/
C   DATA ANCONS /0., 0., 0.12, 55., 68., 4.2, 0.12/
C   DATA ANDRNK /0., 0., 0.3, 60., 50., 10., 0.3/
C
C   DATA CONST1 /1.119E-9/
C   DATA CONST2 /224./
C   DATA CONST3 /25300./
C   DATA CONST5 /0.25/
C   DATA CONST6 /365.25/
C
C   CONST4 = 0.69315 / 14. * 365.25
C   DATA CONST4 /18.0838/
C
C   DATA ONE /1./
C   DATA CONSTC /'C '/
C   DATA CONSTH /'H '/
```

DITTY

```
C      IF (RM .EQ. 0.0)      RM = 1.0
C      IF (RECON .EQ. 0.0)    RECON = 1.0
C
C      DO 101 I = 1, NUCTOT
C          DUMMY(I) = AR(I)
101  CONTINUE
C
C      JNUC = 0
C
C      FOR EACH DECAY CHAIN--
C      DO 100 ICH = 1, ICHN
C
C          J = NOFN(ICH)
C          IST = JNUC + 1
C          JNUC = JNUC + J
C          K = IST + J - 1
C
C      FOR EACH NUCLIDE IN THE CHAIN--
C      DO 200 I = IST, K
C          IF (CFLO .GT. 0.0 .AND. AR(I) .GT. 0.0) THEN
C              WATCON(I) = PL(ITIM) * RECON * RM * ACTW(ITIM,I) * CONST1 /
C                  CFLO / AR(I)
C          ELSE
C              WATCON(I) = 0.0
C          ENDIF
200  CONTINUE
C
C      IF THIS ELEMENT IS 'H '--
C      IF (ELT(IST) .EQ. CONSTH) THEN
C
C          CALL TRITUM (IST, 2, WATCON(IST), DUMMY1, ANCONS, ANDRNK,
C              SCONW(IST), EDBCNW(1,IST), AQUATC(1,IST),
C              RIRR, MOPYR)
C
C      ELSE
C      IF THIS ELEMENT IS 'C '--
C      IF (ELT(IST) .EQ. CONSTC) THEN
C
C          CALL CARBON (IST, 2, WATCON(IST), DUMMY1, ANCONS, ANDRNK,
C              SCONW(IST), EDBCNW(1,IST), AQUATC(1,IST),
C              RIRR, MOPYR )
C
C      ELSE
C
C      SKIP OVER IF ACUTE RELEASE, FIRST YEAR--
C      IF (ITIM .NE. 1) THEN
```

DITTY

```
C
C      SKIP OVER IF FIRST TIME CHRONIC RELEASE--
C      IF (ITIM .NE. 2) THEN
C
C          DECAY PREVIOUS SOIL CONCENTRATIONS--
C          CALL BCHAIN (J, 70., DK2(1,IST), IFR2(1,IST), AR(IST),
C                      AB(IST), SCONW(IST), SCONW(IST), 0)
C
C          WASH OUT PREVIOUS SEDIMENT CONCENTRATIONS (AND RE-
C          ESTABLISH EQUILIBRIUM WITH THIS PERIOD'S WATER
C          CONCENTRATION, IN FOLLOWING DO LOOP)
C          CALL ZEROR ( 100, SEDCON )
C
C      ENDIF
C  ENDIF
C
C      IF THERE IS A RELEASE--
C      IF (ITIM .LE. ITWX) THEN
C
C          TIME = 70.
C          IOONE = 1
C
C          IF (ITIM .EQ. 1) THEN
C              TIME = 1.0
C              IOONE = 0
C          ENDIF
C
C          DO 300 I = IST, K
C
C              IRRIGATION DEPOSITION RATE, WEIGHTED BY POPULATION
C              AND DECAY CONSTANT, PERSON-CI-YR/KG-YR
C              RATIRR(I) = WATCON(I) * RIRR / CONST2 * MOPYR
C
C              SEDIMENT DEPOSITION RATE IN PERSON-CI-YR/M**2-YR
C              RATSED(I) = WATCON(I) * CONST3
C
C          300 CONTINUE
C
C          CALL BCHAIN (J, TIME, DK2(1,IST), IFR2(1,IST), AR(IST),
C                      AB(IST), RATIRR(IST), RATIRR(IST), IOONE)
C
C          CALL BCHAIN (J, TIME, DK2(1,IST), IFR2(1,IST), AR(IST),
C                      DUMMY(IST), RATSED(IST), RATSED(IST), 1)
C
C      The following code was added to correct population included
C      in soil concentration--
C      PLC = 1.0
C      IF (ITIM .GT. 1) THEN
```

DITTY

```

      IF (PL(ITIM) .GT. 0.0 .AND. PL(ITIM-1) .GT. 0.0) THEN
        PLC = PL(ITIM) / PL(ITIM-1)
      ENDIF
    ENDIF

    SUM PREVIOUS AND CURRENT DEPOSITIONS--
    DO 400 I = IST, K

      SCONW(I) = SCONW(I) * PLC + RATIRR(I)
      SEDCON(I) = SEDCON(I) + RATSSED(I)

    400 CONTINUE

  ENDIF

  CALCULATE PATHWAY CONCENTRATIONS--
  DO 500 I = IST, K

    FIND ENVIRONMENTAL REMOVAL CONSTANT--
    ENVLAM = AR(I) + CONST4

    LOOP ON TERRESTRIAL PATHWAYS--
    DO 600 IP = 1, 7

      IF (YELD(IP) .GT. 0.0) THEN
        IF (ITIM .EQ. 1) THEN
          ACUTE LEAF CONCENTRATION--
          RLFCN = CONST5 * WATCON(I) * RIRR * 12. /
            YELD(IP)
        ELSE
          CHRONIC LEAF CONCENTRATION--
          RLFCN = CONST5 * (WATCON(I) * RIRR * 12.
            + SCONW(I) * DVEL(I) * .47)
            * (ONE - EXP (-ENVLAM * GRWP(IP)/CONST6))
            / YELD(IP) / ENVLAM
        ENDIF
      ELSE
        RLFCN = 0.0
      ENDIF

      PLTCON = RLFCN * TRNL(IP) + SCONW(I) * CRATIO(1,I)

      IF VEGATABLE PATHWAY--
        IF (IP .LE. 2) THEN

          EDBCNW(IP,I) = PLTCON
        
```

DITTY

```

C          ELSE
C          EDBCNW(IP,I) = (PLTCON * ANCONS(IP) + WATCON(I)
C          * ANDRNK(IP)) * CRATIO(IP-1,I)
C          ENDIF
C          600    CONTINUE
C          LOOP ON AQUATIC PATHWAYS--
C          DO 700 IWP = 1, 4
C          AQUATC(IWP,I) = WATCON(I) * BIOACF(IWP,I)
C          700    CONTINUE
C          DRINKING WATER--
C          AQUATC(5,I) = WATCON(I) * DWCF(I)
C          500    CONTINUE
C          ENDIF
C          100    CONTINUE
C          RETURN
C-----
C          END
```


DITTY

```
C-----
C
C   SUBROUTINE ZEROI(N,K)
C
C   THIS MODULE SETS N VALUES OF ARRAY K TO INTEGER ZERO.
C
C   Module of DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 27-Apr-87  RAP
C   Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C   DIMENSION K(1)
C
C   DO 1 J=1,N
C       K(J)=0
C   1 CONTINUE
C
C   RETURN
C-----
C
C   END
```

DITTY

```
C-----
C
C   SUBROUTINE ZEROR(N,A)
C
C   THIS MODULE SETS N VALUES OF ARRAY A TO REAL ZERO.
C
C   Module of DITTY of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last Modification: 27-Apr-87  RAP
C   Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C   DIMENSION A(1)
C
C   DO 1 J=1,N
C     A(J)=0.
C 1 CONTINUE
C
C   RETURN
C-----
C
C   END
```

INTDF

C-----
C
C Program title: INTDF - A module of the GENII
C environmental dosimetry software
C package.
C
C Prepared for: U. S. Department of Energy under
C Contract DE-AC06-76RLO 1830
C
C Contact: Bruce Napier
C Pacific Northwest Laboratory
C Richland WA 99352
C (509) 375-3916
C
C Code developers: B. A. Napier, R. A. Peloquin,
C and D. L. Strenge.
C Pacific Northwest Laboratory
C Richland WA 99352
C
C This code was prepared for an agency of the United States
C Government. Neither the United States Government or any agency
C thereof, or any of their employees, make any warranty, expressed
C or implied, or assumes any legal liability or responsibility for
C any third party's use, or the results of such use, of any portion
C of this program or represents that its use by such third party
C would not infringe privately owned rights.
C
C
C--- Program Information -----
C
C Problem description: To perform internal radiation dosimetry
C calculations for individuals for
C acute or chronic inhalation or ingestion
C of radionuclides.
C
C Results format: The output of INTDF is an output file
C called INTDF.OUT. A separate data
C transfer file is prepared containing
C either dose increment factors or lifetime
C doses for chronic exposure.
C
C Computer: This version is for the IBM PC/AT.
C
C Programming language: FORTRAN compiled using Lahey(tm)
C FORTRAN Compiler.
C
C Machine requirements: IBM PC/AT with a minimum of 640 Kbytes

INTDF

C random access memory and 1 20-Mbyte fixed
C disk drive.
C
C
C
C Reference: B. A. Napier, R. A. Peloquin, D. L. Streng,
C and J. V. Ramsdell. 1988. "GENII - The
C Hanford Environmental Radiation Dosimetry
C Software System." PNL-6584, Volumes 1, 2,
C and 3. Pacific Northwest Laboratory,
C Richland, WA 99352
C
C
C
C-----

C
C PROGRAM INTDF
C
C This module controls reading of the input file and data libraries,
C calculation of ingestion and inhalation dose rate factors, and
C writes library files for program DOSE
C
C Module of Program INTDF of the GENII Software Package
C Pacific Northwest Laboratory Environmental Dosimetry System
C
C Last Modification: 15-Apr-88 RAP
C Reviewed and Approved: 13-Sept-88 BA Napier
C
C-----
C
C NOTDUM - Dummy logical to ensure dummy calls are not made
C IEND - Final year of dose calculations - 1, integer
C INRAD - Index of the current radionuclide chain in the input
C list
C ISTOP - Flag set if no information for the current radionuclide
C was found in the metabolic data library
C TIMEND - End time of simulation in REAL days
C TIMCUR - Start time of current time loop in REAL days
C-----
C

INCLUDE 'FILES.CMN'
INCLUDE 'TITL.CMN'
INCLUDE 'TIMES.CMN'
INCLUDE 'OPT.CMN'
INCLUDE 'INVIN.CMN'
INCLUDE 'DAYPC.CMN'
INCLUDE 'INTDFS.CMN'
INCLUDE 'MTBPAR.CMN'
INCLUDE 'RAD.CMN'

INTDF

```
EXTERNAL DIFEQ2
INTEGER IEND, INRAD
LOGICAL ISTOP, NOTDUM

C   Dummy call for compilation--
DATA NOTDUM /.FALSE./
IF (NOTDUM) THEN
C   CALL DIFEQU (0.0, YT)
  CALL DIFEQ2 (0, 0.0D0, YWORK, YT)
ENDIF

C   Get system time and date--
CALL MAKDA2

C   Read file names--
LUN = 1
CALL OPNFIL ((3),(0),LUN)

C   Set integration method to LSODES2--
METHOD = 3

C---- Read input file and check inventory -----

LUN = 18
CALL OPNFIL ((4),(4),LUN)
READ (LUN,*) DCEND
READ (LUN,*) ACUTE
READ (LUN,*) DIAM
IF (DIAM .EQ. 0.0) DIAM = 1.0
READ (LUN,*) DEBUG
READ (LUN,*) RTOL
READ (LUN,*) ATOL
READ (LUN,*) ASSA
READ (LUN,*) HSTART
READ (LUN,*) NSC
READ (LUN,*) FETDOS
IF (FETDOS) THEN
  BACKSPACE (LUN)
  READ (LUN,*) FETDOS, FETAGE
ENDIF
IF (DEBUG) WRITE (*,*) DCEND, HSTART, ACUTE, METHOD, DEBUG

I = 0
1 CONTINUE
  READ (LUN, '(A2,A6)', END=2, ERR=98) ELTI(I+1), AWI(I+1)
  IF (DEBUG) WRITE (*, '(3A)')
  . ' Radionuclide: ', ELTI(I+1), AWI(I+1)
  IF (ELTI(I+1) .NE. ' ') I = I + 1
  IF (I .LT. 100) GOTO 1
```

INTDF

```
2 CONTINUE
  CLOSE (LUN)
  NIN = I
C   Set time indices--
  NTIME = INT(DCEND)
  IEND = NTIME - 1
C   Read master radionuclide library--
  CALL RLIBIN
C   Check input radionuclide list for validity--
  CALL IDNUC
C   Calculate lung deposition fraction--
  CALL DEP
C---- Open output files and print headings -----
  LUN = 15
  CALL OPNFIL ((2), (0), LUN)
  LUN = 20
  CALL OPNFIL ((2), (0), LUN)
C   WRITE (LUN, 'A') 'Committed Dose Equivalents (Sv/Bq)'
  LUN = 16
  CALL OPNFIL ((2), (0), LUN)
C==== Process each radionuclide in input list =====
  DO 200 INRAD = 1, NIN
C   Identify radionuclide and find daughters--
  CALL ORDIN (INRAD)
C   Read metabolic data for this radionuclide chain--
  ISTOP = .FALSE.
  CALL METLIB (ISTOP)
  IF (ISTOP) THEN
    LUN = 15
    CALL HEADNG (LUN)
    WRITE (LUN, 1001) ELTI(INRAD), AWI(INRAD)
    GOTO 200
  ENDIF
C   Read SIJ library--
```

INTDF

```
CALL SIJLIB (ISTOP)
IF (ISTOP) THEN
  LUN = 15
  CALL HEADNG (LUN)
  WRITE (LUN,1002) ELTI(INRAD), AWI(INRAD)
  GOTO 200
ENDIF

C      Set organ parameters--
      CALL SETORG

C      Get system time and date--
      CALL MAKDA2

C      Write input parameter report--
      CALL RITINT

C----- Calculate ingestion dose factors -----

      INHDF = .FALSE.
      ISTOP = .FALSE.

      IF (DEBUG) WRITE (*,*) 'Beginning ingestion calculations'

C      Initialize organ compartments for this radionuclide--
      CALL SETPAR

C      For each year of dose commitment period--
      DO 110 ITIME = 0, IEND

C          Set time in days--
          TIMEND = FLOAT ((ITIME+1)*365)
          TIMCUR = TIMEND - INT(AYEAR)

          IF (DEBUG) WRITE (*,*)
            'ITIME,TIMCUR,AYEAR: ',ITIME,TIMCUR,AYEAR

C          Perform integration of contamination remaining in each
C          organ model compartment--

          IF (METHOD .EQ. 1) THEN
C              CALL EULER (DIFEQU, TIMCUR, AYEAR)
          ELSEIF (METHOD .EQ. 2) THEN
C              CALL RUNGE (DIFEQU, TIMCUR, AYEAR)
          ELSE
C              CALL LS2 (DIFEQ2, TIMCUR, TIMEND, HSTART, DCEND)
          ENDIF
```

INTDF

```
C      Transfer to standard organs, multiply by Sij factors,
C      sum over daughters, calculate yearly dose increment, and
C      write line to output line--
      CALL CDECAL (ITIME+1)

110  CONTINUE

C      Write integrated retention report--
      CALL RITEND

C----- Calculate inhalation dose factors -----
      INHDF = .TRUE.
      ISTOP = .FALSE.

C      Initialize organ compartments for this radionuclide--
      CALL SETPAR

C      For each year of dose commitment period--
      DO 120 ITIME = 0, IEND

C          Set time indices--
          TIMEND = FLOAT ((ITIME+1)*365)
          TIMCUR = TIMEND - INT(AYEAR)

C          Perform integration of contamination remaining in each
C          organ model compartment--
          IF (METHOD .EQ. 1) THEN
C              CALL EULER (DIFEQU, TIMCUR, AYEAR)
          ELSEIF (METHOD .EQ. 2) THEN
C              CALL RUNGE (DIFEQU, TIMCUR, AYEAR)
          ELSE
C              CALL LS2 (DIFEQ2, TIMCUR, TIMENO, HSTART, DCEND)
          ENDIF

C          Transfer to standard organs, multiply by Sij factors,
C          sum over daughters, calculate yearly dose increment, and
C          write line to output line--
          CALL CDECAL (ITIME+1)

120  CONTINUE

C      Write integrated retention report--
      CALL RITEND

C      Write CDE increment data set--
      CALL RITINC (NTIME)
```


INTDF

```
C==== End of Radionuclide loop =====
200 CONTINUE
STOP

C---- Error Messages -----

91 CALL FILERR (1, LUN, 'In INTDF')
98 CALL FILERR (2, LUN, 'In INTDF')
99 CALL FILERR (3, LUN, 'In INTDF')

C---- Format Statements -----

1000 FORMAT (10X,A30)
1001 FORMAT (///' Data not found for ',A2,A6,' in metabolic data ',
.          'library.')
```

```
1002 FORMAT (///' Data not found for ',A2,A6,' in specific effective ',
.          'energy library.')
```

```
C-----
END
```

INTDF

```
C-----
C
C      SUBROUTINE ALK (YWORK2, YT2, NETDK, GUT2TC, LG2TC)
C
C      This module defines the ordinary differential equations for
C      the ALKALINE EARTH models formatted for LS2.
C
C      Module of INTDF
C      Last modification: 24-Nov-87 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      GUT2TC() - Transfer rate from gut to transfer compartment
C                (blood and body fluids)
C      LG2TC() - Transfer rate from lung to transfer compartment
C      YT2()    - Array of results for each equation passed to
C                calling subroutine
C      YWORK2() - YWORK ordered by j,i where j=equation index, i=
C                radionuclide position in chain as a single-
C                dimensioned array
C      NETDK()  - Decay for each radionuclide in each compartment
C
C      In YWORK2 and YT2 for each radionuclide i:
C      (17,i)   Transfer compartment (blood & fluids)
C      (24,i)   Retention in cancellous bone
C      (25,i)   Retention in OTHER organs
C      (26,i)   Retention in cortical bone
C      (27,i)   Retention in bone surface
C      (29,i)   Cancellous a bone compartment
C      (30,i)   Cancellous b bone compartment
C      (31,i)   Cortical a bone compartment
C      (32,i)   Cortical b bone compartment
C      (33,i)   OTHER organs compartments (33, 34, & 35)
C      (36,i)   Bone surface compartment
C-----
C
C      INCLUDE 'MTBPAR.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'ORGPARG.CMN'
C      INCLUDE 'OPT.CMN'
C
C      REAL*8 NETDK(9,45), LG2TC(9), GUT2TC(9), YWORK2(45,9), YT2(45,9)
C
C----- Transfer compartment (blood and body fluids) -----
C
C      DO 50 I = 1, NONUC
C        YT2(17,I) = LG2TC(I) + GUT2TC(I) + RTORG(1) * YWORK2(36,I)
```

INTDF

```
.      + RTOTHR(1) * YWORK2(33,I) + RTBONE(1)
.      * YWORK2(29,I) + RTBONE(3) * YWORK2(31,I)
.      - (RTBLOOD + TCBONE(1) + TCBONE(3) + TCORG(1)
.      + TCOTHR(1)) * YWORK2(17,I)
.      - NETDK(I,17)
```

53 CONTINUE

50 CONTINUE

C---- Cancellous and cortical bone compartments -----

```
DO 52 I = 1, NONUC
  YT2(29,I) = TCBONE(1) * YWORK2(17,I)
.           + RTBONE(2) * YWORK2(30,I)
.           - (RTBONE(1) + TCBONE(2)) * YWORK2(29,I)
.           - NETDK(1,29)

  YT2(30,I) = TCBONE(2) * YWORK2(29,I)
.           - RTBONE(2) * YWORK2(30,I) - NETDK(I,30)

  YT2(31,I) = TCBONE(3) * YWORK2(17,I)
.           + RTBONE(4) * YWORK2(32,I)
.           - (RTBONE(3) + TCBONE(4)) * YWORK2(31,I)
.           - NETDK(I,31)
  YT2(32,I) = TCBONE(4) * YWORK2(31,I)
.           - RTBONE(4) * YWORK2(32,I) - NETDK(I,32)
```

52 CONTINUE

C---- Bone Surface compartment -----

```
DO 62 I = 1, NONUC
  YT2(36,I) = TCORG(1) * YWORK2(17,I) -
.           RTORG(1) * YWORK2(36,I) - NETDK(I,36)
```

62 CONTINUE

C---- OTHER organ/tissues compartments -----

```
DO 58 I = 1, NONUC
  YT2(33,I) = TCOTHR(1) * YWORK2(17,I) -
.           RTOTHR(1) * YWORK2(33,I) - NETDK(I,33)
```

58 CONTINUE

C---- Integrated retentions -----

```
DO 59 I = 1, NONUC
  YT2(24,I) = YWORK2(29,I) + YWORK2(30,I) +
.           (YWORK2(17,I) * TCMULT(24))
  YT2(25,I) = YWORK2(33,I) + (YWORK2(17,I) * TCMULT(25))
```

INTDF

```
      YT2(26,I) = YWORK2(31,I) + YWORK2(32,I) +  
                  (YWORK2(17,I) * TCMULT(26))  
      YT2(27,I) = YWORK2(36,I)  
59  CONTINUE
```

```
      RETURN
```

```
C-----  
      END
```

INTDF

```
C-----
C
C      SUBROUTINE CDECAL (ITIM)
C
C      Subroutine CDECAL calculates the committed dose equivalent for
C      each organ for the current radionuclide chain, for a yearly
C      increment
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 3-DEC-87 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      ITIM      - ITIME+1, the current year passed from the calling
C                  program
C      CDE()     - Work array for committed dose equivalent, either
C                  inhalation or ingestion
C      DTYPE     - Character flag to indicate dose type; 'G'-ingestion,
C                  'H'-inhalation
C      OTHR()    - 'Other' contribution to specified organs
C      RA226M    - Bone compartment multiplier for RA daughters
C
C      Assumption: NORGL is the index of "other"
C-----
C
C      INCLUDE 'ORGPARG.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'INTDFS.CMN'
C      INCLUDE 'DOSES.CMN'
C      INCLUDE 'DAYPC.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'SIJS.CMN'
C      INCLUDE 'TITL.CMN'
C      INCLUDE 'MTBPAR.CMN'
C
C      CHARACTER DTYPE*1
C      INTEGER ITIM
C      REAL CDE(25), OTHR(9), RA226M
C
C      IF (TEI) THEN
C        N = NONUC - 1
C      ELSE
C        N = NONUC
C      ENDIF
```

INTDF

```
C      Add lymph to lung; calculate other contrib. to specified organs--
      DO 101 IN = 1, N
        YWORK(IN,18) = YWORK(IN,18) + YWORK(IN,19)
        YWORK(IN,19) = 0.0D0
101    CONTINUE

C      For each target organ, total over sources and chain members--
      DO 100 IT = 1, NORGL - 1

        CDE(IT) = 0.0
        IF (TARGET(IT)) THEN
          DO 110 IS = 1, NORGL
            DO 120 IN = 1, N

              IF (RA226 .AND. IN .GT. 1) THEN
                IF (IS .EQ. 9 .OR. IS .EQ. 10) THEN
                  RA226M = 0.3
                ELSE
                  RA226M = 0.0
                ENDIF
              ELSE
                RA226M = 1.0
              ENDIF

              IF (INHDF) THEN
C          Source organ contribution from each organ--
                CDE(IT) = CDE(IT) +
                  .      (YWORK(IN,IYX(IS)) * ORGMLT(IS) +
                  .      YWORK(IN,25) * ORGINH(IS))
                  .      * RA226M * SIJ(IT,IS,IN)
              ELSE
                CDE(IT) = CDE(IT) +
                  .      (YWORK(IN,IYX(IS)) * ORGMLT(IS) +
                  .      YWORK(IN,25) * ORGING(IS))
                  .      * RA226M * SIJ(IT,IS,IN)
              ENDIF
            120      CONTINUE
          110      CONTINUE
        ENDIF
      100    CONTINUE

C      Special handling for tellerium-iodine--
      IF (TEI) THEN

        IN = NONUC
        YWORK(IN,18) = YWORK(IN,18) + YWORK(IN,19)
        YWORK(IN,19) = 0.0D0
```

INTDF

```
      DO 102 IT = NORGL-2, NORGL
        DO 111 IS = NORGL-2, NORGL
          CDE(IT) = CDE(IT) + YWORK(IN,IYX(IS)) * ORGMLT(IS) *
            SIJ(IT,IS,IN)
111      CONTINUE
102    CONTINUE

      ENDIF

      IF (INHDF) THEN

C        Store inhalation dose factors--
        DO 200 IT = 1, NORGL - 1
          CDEINH(IT,ITIM) = CDE(IT)
200      CONTINUE
          DTYPE = 'H'
        ELSE

C        Store ingestion dose factors--
        DO 210 IT = 1, NORGL - 1
          CDEING(IT,ITIM) = CDE(IT)
210      CONTINUE
          DTYPE = 'G'
        ENDIF

C-----
      END
```

INTDF

```
C-----
C
C      SUBROUTINE DEP
C
C      This module calculates the respiratory tract deposition factors
C      from the activity median atmospheric diameter of an aerosol
C      distribution.
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 25-Feb-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      INCLUDE 'MTBPAR.CMN'
C
C      EXTERNAL ERFXP
C      REAL DELTA, DP, SP, DPL, SPL, XL, XP, FP, FAC, ZP
C      DATA DELTA /1.0E-06/
C
C      DP = 0.19
C      SP = 10.0
C      DPL = ALOG10 (DP)
C      SPL = ALOG10 (SP)
C
C      XL = ALOG10 (DIAM)
C      XP = ( XL - DPL ) / SPL
C
C      FP = SIMPS (DBLE(-5.0), DBLE(XP), DELTA, ERFXP)
C      FAC = SQRT (2.0 * 3.1415927)
C
C      ZP = 1.0 - FP / FAC
C
C      DP = 2.0
C      SP = 3.45
C      DPL = ALOG10 (DP)
C      SPL = ALOG10 (SP)
C
C      XP = (XL - DPL) / SPL
C      FP = SIMPS (DBLE(-5.0), DBLE(XP), DELTA, ERFXP)
C      ZNP = FP / FAC
C
C      ZT8 = 0.08
C
C      RETURN
C-----
C      END
```


INTDF

```
C-----
C
C      FUNCTION SIMPS (A, B, DELTA, ERFXP)
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 16-Feb-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      A      - Minimum of the definite integral
C      B      - Maximum of the definite integral
C      DELTA   - Permissible difference between two successive sums
C-----
C
C      EXTERNAL ERFXP
C      DOUBLE PRECISION A, B
C
C      N = 1
C      H = (B - A) / 2.0
C      FJAY = H * (ERFXP(A) + ERFXP(B))
C
C      A maximum of 2049 points will be used when L=11
C      DO 35 L = 1, 11
C          S = 0.0
C          DO 20 K = 1, N
C              S = S + ERFXP(A + DBLE((2.0 * FLOAT(K) - 1.0) * H))
C      20  CONTINUE
C
C          FI = FJAY + 4.0 * H * S
C          IF (L - 3) 26, 26, 23
C
C      23  CONTINUE
C          IF (DELTA - ABS((FI-BAR)/FI)) 30, 40, 40
C      26  CDNTINUE
C      30  BAR = FI
C          FJAY = (FI + FJAY) / 4.0
C          N = 2 * N
C          H = H / 2.0
C      35  CONTINUE
C
C      40  SIMPS = FI / 3.0
C
C      RETURN
C-----
C      END
```

INTDF

```
C-----  
C  
C    FUNCTION ERFXP (ARG)  
C  
C    Error function.  
C  
C    Module of Program INTDF of the GENII Software Package  
C    Pacific Northwest Laboratory Environmental Dosimetry System  
C  
C    Last modification: 16-Feb-88  RAP  
C    Reviewed and Approved: 13-Sept-88  BA Napier  
C-----
```

DOUBLE PRECISION ARG, EX

EX = -0.5D0 * ARG ** 2.0
ERFXP = DEXP (EX)

RETURN

```
C-----  
END
```

INTDF

```
C-----
C
C      SUBROUTINE DGCHAIN (T, AM, AO)
C
C      Th's subroutine calculates dQ/dt for a decay chain
C      containing up to nine members. DGCHAIN is a double precision
C      version of ACHAIN inputting the quantity of Q at t sub 0 and the
C      desired timestep and returning dQ/dt as opposed to the total amount
C      as returned in ACHAIN.
C
C      Module of INTDF
C      Last modification: 9-Jun-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      T      - Timestep to be used in calculation in units of
C              time corresponding to units of ALDAY, da
C      AM()    - Initial mass of each chain member
C      AMD()   - Internal array of AM / ALDAY
C      AO()    - The net change of mass per unit time of each chain member
C                to radiological decay and the corresponding ingrowth of
C                daughters.
C-----
C
C      INCLUDE 'DECAY.CMN'
C
C      REAL*8 A(45), SUMPR, ASUM, EXPO(9), ARG, AMD(9)
C      REAL*8 T, AM(9), AO(9), AO2(9)
C
C      DO 101 IJK = 1, NUC
C          AMD(IJK) = AM(IJK) / ALDAY(IJK)
C          AO(IJK) = 0.0D0
C          AO2(IJK) = 0.0D0
C 101 CONTINUE
C
C      If this is an initialization call (time=zero), then skip--
C      IF (T .EQ. 0.0D0) RETURN
C
C      Initialize coefficient array to zero--
C      DO 100 IJK = 1, 45
C          A(IJK) = 0.0D0
C 100 CONTINUE
C
C      Loop on each chain member--
C      DO 5 J=1,NUC
C
C          Calculate exponential for current radionuclide--
```

INTDF

```
ARG = -ALDAY(J) * T
IF (-ARG .GT. 50.000) THEN
  EXPO(J) = 0.000
ELSE
  EXPO(J)=DEXP(ARG)
ENDIF

C   Index of offset of Nn in A array--
JJ=J*(J-1)/2
JJJ = J + JJ

C   Upper limit of possible parent range--
J1=J-1

C   If this radionuclide is not the first member in the chain--
IF (J1 .GT. 0) THEN

C     Establish if 1 or 2 parents are possible--
IMAX=MIN0(J1,2)

C
C   Loop through all possible parents--
DO 3 M=1,J1

    MJJ = M + JJ

C     Loop through all possible grandparents, both decay fractions--
DO 2 L=M,J1
  DO 1 I=1,IMAX
    C   If IFRM index matches the current parent/grandparent--
    IF(IFRM(I,J).EQ.L) THEN
      M2 = M + L*(L-1)/2
      A(MJJ)=A(MJJ)+DBLE(DK(I,J))*ALDAY(L)*A(M2)
    ENDIF
1    CONTINUE
2    CONTINUE
    IF (ALDAY(J) .EQ. ALDAY(M)) THEN
      A(MJJ) = 0.000
    ELSE
      A(MJJ)=A(MJJ)/(ALDAY(J)-ALDAY(M))
    ENDIF
3    CONTINUE

  ENDIF

ASUM = 0.000
IF (J1 .GT. 0) THEN
  DO 12 IM = 1, J1
    JK = JJ + IM
```

INTDF

```
      ASUM = ASUM + A(JK)
12    CONTINUE
      ENDIF
      A(JJJ) = AMD(J) - ASUM

      SUMPR = 0.000
      J2 = J
      DO 110 IN = 1,J2
        JJIN = JJ + IN
        SUMPR = SUMPR + EXPO(IN) * A(JJIN)
110    CONTINUE
      AO2(J) = SUMPR

      5 CONTINUE

C    Calculate net change of mass per unit time--
      IF (T .GT. 1.0D-50) THEN
        DO 114 IJK = 1, NUC
          AO(IJK) = (AMD(IJK) - AO2(IJK)) * ALDAY(IJK) / T
114    CONTINUE
        ENDIF

      RETURN
C-----
      END
```

INTDF

```
C-----
C
C      SUBROUTINE DIFEQ2 (NEQ, H1, YWORK2, YT2)
C
C      This module defines the ordinary differential equations for
C      the GENERAL, ALKALINE EARTH, IODINE, and TELLURIUM/IODINE
C      models formatted for LS2.
C
C      Module of INTDF of the GENII Software System
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-Aug-88 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      ALZERO   - Flag set if all zeros
C      GUT2TC   - Transfer rate from gut to blood
C      H1       - Timestep, da
C      YWORK2() - YWORK ordered by j,i where j=equation index, i=
C                radionuclide position in chain
C      YT2()    - YT ordered by j,i where j=equation index,, i=
C                radionuclide position in chain
C
C      In YWORK2 and YT2 for each radionuclide i:
C      (1,i)    Lung compartments
C      (13,i)   Gut compartments
C      (18,i)   Retention in the lung
C      (19,i)   Retention in the lymph
C      (20,i)   Retention in the gut (stomach)
C      (21,i)   Retention in the small intestine
C      (22,i)   Retention in the upper large intestine
C      (23,i)   Retention in the lower large intestine
C
C      TE2I     - Sum of decay rates from all telluriums to iodine;
C                only used for tellurium/iodine model
C      N        - Number of radionuclide chain members to process;
C                normally NONUC, but excludes iodines in tellurium/
C                iodine chains
C      SAVIOD   - Iodine compartments to be saved and decayed separately,
C                NETDK iodine compartments will be used to accumulate
C                tellurium decay contributions
C-----
C
C      INCLUDE 'MTBPAR.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'ORGPARG.CMN'
C      INCLUDE 'OPT.CMN'
```

INTDF

```
INCLUDE 'DECAY.CMN'

REAL*8 YWORK2(45,9), YT2(45,9)
REAL*8 H1, NETDK(9,45), DKIN(9,45), TE2I
REAL*8 LG2TC(9), LG2GUT(9), GUT2TC(9), SAVIOD(45)
INTEGER NEQ, NEQ2, N

C---- Set indices, initialize parameters if tellurium/iodine -----
      IF (TEI) THEN
        N = NONUC-1
      ELSE
        N = NONUC
      ENDIF

C      Clean out accumulators-
      DO 60 I = 1, N
        LG2TC(I) = ZERO
        LG2GUT(I) = ZERO
        GUT2TC(I) = ZERO
      60 CONTINUE

      TE2I = 0.0D0

C---- Calculate radionuclide decay -----
      NEQ2 = NEQ / NONUC

      DO 12 J = 1, NEQ2

        DO 13 I = 1, NONUC
          DKIN(I,J) = YWORK2(J,I)
        13 CONTINUE

C      Save iodine for later decay; clear compartment to allow
C      accumulation of tellurium decay to pass to inorganic
C      compartment--
        IF (TEI) THEN
          SAVIOD(J) = YWORK2(J,NONUC)
          DKIN(J,NONUC) = 0.0
        ELSE
          SAVIOD(J) = ZERO
        ENDIF

        CALL DGCHAIN (H2, DKIN(1,J), NETDK(1,J))

      12 CONTINUE
```

INTDF

C----- Lung model -----

```
IF (INHDF) THEN
  IF (.NOT. CARBON .AND. .NOT. TRITUM) THEN

    DO 10 J = 1,9
      YT2(J,1) = DBLE(DEPOSIT(J)) - RTLUNG(J) * YWORK2(J,1)
      - NETDK(1,J)
      IF (TEI .AND. N .EQ. 1) TE2I = TE2I + NETDK(N+1,J)
      DO 11 I = 2, N
        YT2(J,I) = -RTLUNG(J) * YWORK2(J,I) - NETDK(I,J)
        IF (TEI .AND. I .EQ. N) TE2I = TE2I + NETDK(N+1,J)
11      CONTINUE
10    CONTINUE

    DO 14 I = 1, N

      YT2(10,I) = RTLUNG(8) * YWORK2(8,I) -
      RTLUNG(10) * YWORK2(10,I) - NETDK(I,10)
      YT2(11,I) = RTLUNG(9) * YWORK2(9,I) - NETDK(I,11)
      YT2(12,I) = RTLUNG(6) * YWORK2(6,I) +
      RTLUNG(7) * YWORK2(7,I) -
      RTLUNG(12) * YWORK2(12,I) - NETDK(I,12)

      LG2TC(I) = RTLUNG(1) * YWORK2(1,I) +
      RTLUNG(3) * YWORK2(3,I) +
      RTLUNG(5) * YWORK2(5,I) +
      RTLUNG(10) * YWORK2(10,I)

      LG2GUT(I) = RTLUNG(2) * YWORK2(2,I) +
      RTLUNG(4) * YWORK2(4,I)
      + RTLUNG(12) * YWORK2(12,I)

      IF (TEI .AND. I .EQ. N)
        TE2I = TE2I + NETDK(N+1,10) + NETDK(N+1,11) +
        NETDK(N+1,12)

14    CONTINUE
      ENDIF
    ENDIF
```

C----- Gut model -----

```
IF (CARBON .OR. TRITUM) THEN

  IF (.NOT. ACUTE) THEN
    DO 19 I = 1, N
```


INTDF

```

      GUT2TC(I) = 1.0 / 365.0
19    CONTINUE
      ENDIF

      ELSE
        DO 18 I = 1, N

          YT2(13,I) = LG2GUT(I) - RTGUT(1) * YWORK2(13,I) - NETDK(I,13)
          IF (I .EQ. 1) YT2(13,I) = YT2(13,I) + DBLE (UPTGUT)

          YT2(14,I) = FG2SI * RTGUT(1) * YWORK2(13,I) -
            (RTSIBL + RTGUT(2)) * YWORK2(14,I) - NETDK(I,14)
          YT2(15,I) = RTGUT(2) * YWORK2(14,I) -
            RTGUT(3) * YWORK2(15,I) - NETDK(I,15)
          YT2(16,I) = RTGUT(3) * YWORK2(15,I) -
            RTGUT(4) * YWORK2(16,I) - NETDK(I,16)

          GUT2TC(I) = RTSIBL * YWORK2(14,I) + FG2TC * RTGUT(1) *
            YWORK2(13,I)
          IF (TEI .AND. I .EQ. N) TE2I = TE2I + NETDK(N+1,13)
            + NETDK(N+1,14)
            + NETDK(N+1,15)
            + NETDK(N+1,16)

18    CONTINUE
      ENDIF

C---- Call specific models -----
      IF (IMOD(1) .EQ. 0) THEN
C      General model--
        CALL GEN (H1, YWORK2, YT2, NETDK, GUT2TC, LG2TC, TE2I, N,
          SAVIOD)

      ELSEIF (IMOD(1) .EQ. 1) THEN
C      Alkaline earth model--
        CALL ALK (YWORK2, YT2, NETDK, GUT2TC, LG2TC)

      ELSEIF (IMOD(1) .EQ. 2) THEN
C      Iodine model--
        CALL IOD (H1, YWORK2, YT2, NETDK, GUT2TC, LG2TC, TE2I)
      ENDIF

C---- Integrated retentions -----
      DO 40 I = 1, N
C      Lung and lymph--
        YT2(18,I) = YWORK2(3,I) + YWORK2(4,I) + YWORK2(5,I)
          + YWORK2(6,I) + YWORK2(7,I) + YWORK2(8,I)
      .

```

INTDF

```
.          + YWORK2(9,I) + YWORK2(12,I)
          YT2(19,I) = YWORK2(10,I) + YWORK2(11,I)

C          Gut--
          DO 41 J = 1, 4
            YT2(19+J,I) = YWORK2(J+12,I) + YWORK2(17,I) * TCMULT(19+J)
41      CONTINUE
40      CONTINUE

          RETURN
C-----
          END
```

INTDF

```
C-----
C
C   SUBROUTINE GEN (H1, YWORK2, YT2, NETDK, GUT2TC, LG2TC, TE2I,
C     N, SAVIOD)
C
C   This module defines the ordinary differential equations for
C   the GENERAL model.
C
C   Module of Program INTDF of the GENII Software Package
C   PACific Northwest Laboratory Environmental Dosimetry System
C
C   Last modification: 17-Mar-88 RAP
C   Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C   GUT2TC()    - Transfer rate from gut to transfer compartment,
C                (blood and body fluids)
C   LG2TC()    - Transfer rate from lung to transfer compartment
C   YT2()      - Array of results for each equation passed to
C                calling program
C   YWORK2()   - YWORK ordered by j,i where j=equation index, i=
C                radionuclide position in chain, as a single dimen-
C                sioned array
C   NETDK()    - Decay for each radionuclide in each compartment
C
C   YWORK2(17,i) - Quantity in the transfer compartment
C   YWORK2(24,i) - Integrated retention in bone
C   YWORK2(25,i) - Integrated retention in OTHER tissues/organs
C   YWORK2(26,i) - Integrated retention specified organ no. 1
C   YWORK2(27,i) - Integrated retention specified organ no. 2
C   YWORK2(28,i) - Integrated retention specified organ no. 3
C   YWORK2(29,i) - Quantity in each of 4 bone compartments
C   YWORK2(33,i) - Quantity in each of 3 OTHER compartments
C   YWORK2(36,i) - Quantity in each of 9 specified organ
C                compartments
C
C   YT2(17,i)   - Transfer compartment (blood & fluids)
C   YT2(24,i)   - Retention in the bone,
C   YT2(25,i)   - Retention in OTHER organs
C   YT2(26,i)   - Retention in specified organs
C   YT2(29,i)   - Bone compartments
C   YT2(33,i)   - OTHER organs compartment
C   YT2(36,i)   - Specified organ compartments
C
C   TE2I       - Sum of decay rates from all telleriums to iodine;
C                only used for tellerium/iodine model
C   N          - Number of radionuclide chain members to process;
C                normally NONUC, but excludes iodines in tellerium/
```

INTDF

```
C      iodine chains
C      SAVIOD      - Iodine compartments to be saved and decayed separately,
C                  NETDK iodine compartments will be used to accumulate
C                  tellerium decay contributions
C
C-----

      INCLUDE 'DECAY.CMN'
      INCLUDE 'MTBPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'ORGPARG.CMN'
      INCLUDE 'RAD.CMN'

      INTEGER N
      REAL*8 YWORK2(45,9), YT2(45,9), NETDK(9,45), LG2TC(9), GUT2TC(9),
      .      TE2I, SAVIOD(45)

C---- Transfer compartment (blood and body fluids) -----
      DO 20 I = 1, N
        YT2(17,I) = LG2TC(I) + GUT2TC(I) - RTBLOO0 * YWORK2(17,I)
        .      - NETDK(I,17)
        IF (TEI .AND. I .EQ. N) TE2I = TE2I + NETDK(N+1,17)
      20 CONTINUE

C---- Bone compartments -----
      DO 24 J = 1, NBONE
        DO 26 I = 1, N
          YT2(J+28,I) = RTBLOOD * TCBONE(J) * YWORK2(17,I) -
          .      RTBONE(J) * YWORK2(J+28,I) - NETDK(I,J+28)
          IF (TEI .AND. I .EQ. N) TE2I = TE2I + NETDK(N+1,J+28)
        26 CONTINUE
      24 CONTINUE

C---- OTHER organ/tissues compartments -----
      DO 27 J = 1, NOTHER
        DO 28 I = 1, N
          YT2(J+32,I) = RTBLOOD * TCOTHR(J) * YWORK2(17,I) -
          .      RTOTHR(J) * YWORK2(J+32,I) - NETDK(I,J+32)
          IF (TEI .AND. I .EQ. N) TE2I = TE2I + NETDK(N+1,J+32)
        28 CONTINUE
      27 CONTINUE

C---- Specified organ compartments -----
      DO 30 J = 1, NOCOMP
        DO 32 I = 1, N
```

INTDF

```
      YT2(J+35,I) = RTBLOOD * TCORG(J) * YWORK2(17,I) -
      .             RTORG(J) * YWORK2(J+35,I) - NETDK(I,J+35)
      IF (TEI .AND. I.EQ.N) TE2I = TE2I + NETDK(N+1,J+35)
32  CONTINUE
30  CONTINUE

C---- Tellerium/iodine special handling -----
      IF (TEI) THEN

C      Replace decayed iodine in compartments now that tellerium
C      contributions have been accumulated--
      DO 35 J = 1, 45
        NETDK(N+1,J) = SAVIOD(J) * (1.000 - EXP(-ALDAY(N+1) * H2))/H2
35  CONTINUE

      CALL IOD (H1, YWORK2, YT2, NETDK, GUT2TC, LG2TC, TE2I)
      ENDIF

C---- Integrated retention -----

      DO 33 I = 1, N

        YT2(25,I) = YWORK2(33,I) + YWORK2(34,I) + YWORK2(35,I) +
        .             YWORK2(17,I) * TCMULT(25)
        YT2(24,I) = YWORK2(29,I) + YWORK2(30,I) + YWORK2(31,I) +
        .             YWORK2(32,I) + YWORK2(17,I) * TCMULT(24)

        K = 35
        DO 42 J1 = 1, NORG
          YT2(J1+25,I) = 0.000
          DO 43 J2 = 1, NORGCM(J1)
            K = K + 1
            YT2(J1+25,I) = YT2(J1+25,I) + YWORK2(K,I) +
            .             YWORK2(17,I) * TCMULT(J1+25)
          43  CONTINUE
        42  CONTINUE
      33  CONTINUE

C      If tritium inhalation increase by 50% to account for transpiration--
      IF (TRITUM .AND. INHDF) THEN

        DO 53 I = 1, N
          YT2(25,I) = YT2(25,I) * 1.5
          YT2(24,I) = YT2(24,I) * 1.5
          DO 52 J1 = 1, NORG
            YT2(J1+25,I) = YT2(J1+25,I) * 1.5
          52  CONTINUE
        53  CONTINUE
```

INTDF

ENDIF

RETURN

C-----

END

INTDF

SUBROUTINE IOD (H1, YWORK2, YT2, NETDK, GUT2TC, LG2TC, TE2I)

This module defines the ordinary differential equations for the IODINE and TELLURIUM/IODINE models formatted for LS2.

Module of INTDF

Last modification: 24-Sep-87 RAP

Reviewed and Approved: 13-Sept-88 BA Napier

GUT2TC() - Transfer rate from gut to transfer compartment (blood and body fluids)
LG2TC() - Transfer rate from lung to transfer compartment
YT2() - Array of results for each equation passed to calling subroutine
YWORK2() - YWORK ordered by j,i where j=equation index, i= radionuclide position in chain as a single-dimensioned array
NETDK() - Decay for each radionuclide in each compartment
FF - Fraction to fetal thyroid; 0.0 if off or if age <=90days, 0.03*(Age/90 -1.0) if on and age > 90 da.
FM - Fraction to thyroid
FB - Fraction to bladder; 0.7-FF
RTI - Loss from inorganic (da-1), lambda 17
RTFO - Loss from fetal organic (da-1), lambda 39
RTMO - Loss from maternal organic (da-1), lambda 33
RTFT - Loss from fetal thyroid (da-1), lambda 38
RTMT - Loss from maternal thyroid (da-1), lambda 36
RTBLAD - Loss from bladder (da-1), lambda 37
H1 - Current time of integration (da)
DAYS - Same as H1 in single precision (da)
AGESTP() - Age steps for s-factors in SIJI array
SIJI() - S-factors for days as specified in AGESTP, for each iodine isotope
INDX - Proper age index of fetus in AGESTP array, used to select s-factor from SIJI array
AGE - Current age of the fetus
TE2I - Sum of decay rates from all telluriums to iodine; only used for tellurium/iodine model

In YWORK2 and YT2 for each radionuclide i:

(25,i) Retention in inorganic/transfer, maternal organic = other
(26,i) Retention in maternal thyroid
(27,i) Retention in bladder
(28,i) Retention in fetal thyroid
(33,i) OTHER, = organic/transfer (maternal)

INTDF

C (36,i) Thyroid compartment (maternal)
C (37,i) Bladder compartment (maternal)
C (38,i) Fetal thyroid compartment
C (39,i) Fetal organic transfer
C (40,i) S-factor multiplication
C (41,i) Inorganic/transfer compartment
C (45,i) Integrated S-factor multiplication

C-----

INCLUDE 'MTBPAR.CMN'
INCLUDE 'RAD.CMN'
INCLUDE 'ORGPARG.CMN'
INCLUDE 'OPT.CMN'

REAL*8 NETDK(9,45), LG2TC(9), GUT2TC(9), YWORK2(45,9), YT2(45,9),
. H1, TE2I
REAL RTI, RTFO, RTMO, RTFT, RTMT, RTBLAD, AGESTP(11), SIJI(11,7),
. DAYS, AGE

DATA AGESTP /90.0, 91.0, 92.0, 95.0, 100.0, 110.0, 130.0,
. 150.0, 170.0, 200.0, 250.0/

DATA SIJI /43.0, 41.0, 39.0, 35.0, 28.0, 20.0, 10.0, 5.9,
. 3.7, 2.0, 8.8,
. 140.0, 130.0, 120.0, 110.0, 87.0, 62.0, 33.0,
. 19.0, 11.0, 6.1, 2.6,
. 330.0, 320.0, 300.0, 270.0, 210.0, 160.0, 83.0,
. 49.0, 30.0, 17.0, 7.2,
. 530.0, 520.0, 500.0, 440.0, 390.0, 290.0, 170.0,
. 100.0, 67.0, 38.0, 17.0,
. 680.0, 650.0, 630.0, 550.0, 450.0, 310.0, 170.0,
. 98.0, 61.0, 37.0, 15.0,
. 820.0, 790.0, 760.0, 710.0, 580.0, 420.0, 240.0,
. 140.0, 93.0, 54.0, 24.0,
. 630.0, 610.0, 590.0, 530.0, 440.0, 310.0, 170.0,
. 97.0, 62.0, 34.0, 15.0/

C---- Initialize transfer rates -----

DATA RTI /1.92/
. RTFO /5.8E-2/
. RTMO /5.8E-2/
. RTFT /5.3E-5/
. RTMT /8.7E-3/
. RTBLAD /9.1/

C---- Determine iodine position in chain -----

INTDF

```
IF (TEI) THEN
  I = NONUC
ELSE
  I = 1
ENDIF
```

C---- Calculate current age of fetus and fractions -----

```
DAYS = REAL(H1)
AGE = FETAGE + DAYS
FM = 0.3

IF (.NOT. FETDOS) THEN
  FF = 0.0
ELSEIF (AGE .LT. 90.0) THEN
  FF = 0.0
ELSEIF (AGE .GT. 270.0) THEN
  FF = 0.0
ELSE
  FF = 0.03 * (AGE / 90.0 - 1.0)
ENDIF

FB = 0.7 - FF
```

C---- Inorganic/transfer compartment -----

```
C  WRITE (*,*), NETDK(I,41), TE2I
  YT2(41,I) = LG2TC(I) + GUT2TC(I) - RTI * YWORK2(41,I)
  .          - NETDK(I,41) + RTFO * YWORK2(39,I)
  .          + RTMO * YWORK2(33,I) * 0.9 - TE2I
```

C---- Fetal compartments -----

```
IF (FETDOS) THEN
  YT2(38,I) = FF * RTI * YWORK2(41,I)
  .          - RTFT * YWORK2(38,I) - NETDK(I,38)
  .
  YT2(39,I) = RTFT * YWORK2(38,I)
  .          - RTFO * YWORK2(39,I) - NETDK(I,39)
  .
ENDIF
```

C---- Maternal compartments -----

```
YT2(36,I) = FM * RTI * YWORK2(41,I) -
  .          RTMT * YWORK2(36,I) - NETDK(I,36)
  .
YT2(33,I) = RTMT * YWORK2(36,I) -
```

INTDF

```
.          RTMO * YWORK2(33,I) - NETDK(I,33)
YT2(37,I) = FB * RTI * YWORK2(41,I) -
.          0.9 * 0.1 * RTMO * YWORK2(33,I)
.          - RTBLAD * YWORK2(37,I) - NETDK(I,37)

C----- S-factor multiplication -----
      IF (FETDOS .AND. AGE .LT. 270.0) THEN
C      Find s-factor based on time--
      DO 70 IG = 1, 11
        IF (DAYS .GE. AGESTP(IG)) INDX = IG
70    CONTINUE

      YT2(40,I) = YWORK2(40,I) * SIJI(INDX,IODI)

      ENDIF

C----- Integrated retentions -----
      YT2(25,I) = (YWORK2(41,I) + YWORK2(33,I)) * TCMULT(25)
      YT2(26,I) = YWORK2(36,I) + (YWORK2(41,I) + YWORK2(33,I))
        * TCMULT(26)
      YT2(27,I) = YWORK2(37,I) + (YWORK2(41,I) + YWORK2(33,I))
        * TCMULT(27)
      YT2(28,I) = YWORK2(38,I)
      YT2(45,I) = YWORK2(40,I)

      RETURN
C-----
      END
```

INTDF

```
C-----
C
C      SUBROUTINE LS2 (F, TI, HI, HSTART, DCEND)
C
C      Subroutine LS2 implements the LSODES stiff differential
C      equation solver.
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 3-Dec-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      F      - Subroutine defining the differential equations. F
C              must have the form:  F( H1, YT)
C      T      - Value of independent variable - time, da
C      TI     - Initial value of time this execution of LS2
C      TE     - Final value of time this execution of LS2
C      HI     - Absolute time when evaluation should be stopped (Passed
C      in)
C      H      - Absolute time when evaluation should be stopped (Double)
C      F      - Name of subroutine for right-hand side vector F
C      T      - The initial value of the independent variable
C      TOUT   - First point where output is desired
C      ITOL   - Control integer for error tolerance calculation
C      RTOL   - Relative tolerance parameter
C      ATOL   - Absolute tolerance parameter (scalar or array)
C      HSTART - Initial step size
C      ITASK  - Set to 1 for normal computation of output values of
C              YWORK at T=TOUT
C      ISTATE - Control integer, used for both input and output
C      IOPT   - 0 to indicate no optional inputs used
C      RWORK() - Real work array
C      LRW    - Declared length of RWORK
C      IWORK() - Integer work array
C      LIW    - Declared length of IWORK
C      JAC    - Dummy name for Jacobian matrix subroutine
C      MF     - Method flag: 222 for stiff method, internally-generated
C              sparse Jacobian.
C      NEQALL - Total number of equations processed by LSODES2
C      DCEND  - Time of the dose commitment period, yrs
C-----
C
C      INCLUDE 'INTDFS.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'OPT.CMN'
```

INTDF

```
INCLUDE 'MTBPAR.CMN'

EXTERNAL F
INTEGER LAST, IWORK(1500), ITOL, ITASK, ISTATE, IOPT, LRW, LIW,
      NEQALL
REAL TI, HI, DCEND
REAL*8 T, RWORK(22000)
REAL*8 H, HSTART, YWORK2(405), YT2(405)
CHARACTER JAC*6

T = DBLE(TI)
H = DBLE(HI)

IF (TI .EQ. 0.0) THEN
C      Initialize parameters--

      ISTATE = 1
      ITOL = 1
      LIW = 1500
      LRW = 22000
      MF = 222
      ITASK = 1
      IOPT = 1

      DO 10 I = 1, LIW
        IWORK(I) = 0
10     CONTINUE
      DO 11 I = 1, LRW
        RWORK(I) = 0.0
11     CONTINUE

      DO 16 I = 1, 405
        YWORK2(I) = ZERO
        YT2(I) = ZERO
16     CONTINUE

C      Maximum absolute step size allowed--
      RWORK(6) = ASSA

C      Initial step size--
      RWORK(5) = REAL(HSTART)

C      Maximum number of steps allowed during one call to the solver--
      IWORK(6) = NSC

C      Maximum number of messages printed per problem--
      IWORK(7) = 3
```

INTDF

```
      NEQALL = 45 * NONUC
C      Transfer into YWORK2 array--
      I1 = 1
      DO 12 I = 1, NONUC
        DO 14 J = 1, 45
          YWORK2(I1) = YWORK(I,J)
          I1 = I1 + 1
14      CONTINUE
12      CONTINUE

      ELSE

C      This is a continuation call--
      ISTATE = 2

      ENDIF

      CALL LSODES2(F, NEQALL, YWORK2, T, H, ITOL, RTOL, ATOL,
        .          ITASK, ISTATE, IOPT, RWORK, LRW, IWORK, LIW,
        .          JAC, MF)

      IF (ISTATE .EQ. -1) THEN
        ISTATE = 1
        IWORK(6) = NSC*2
        CALL LSODES2(F, NEQALL, YWORK2, T, H, ITOL, RTOL, ATOL,
          .          ITASK, ISTATE, IOPT, RWORK, LRW, IWORK, LIW,
          .          JAC, MF)
      ENDIF

C      Check if successful step--
      IF (ISTATE .LT. 0) GOTO 91

      CALL DIFEQ2 (NEQALL, ZERO, YWORK2, YT2)

C      Transfer results into YWORK array--

      I1 = 1
      DO 20 I = 1, NONUC
        DO 22 J = 1, 45

          YWORK(I,J) = YWORK2(I1)
          I1 = I1 + 1

22      CONTINUE
20      CONTINUE
```

INTDF

```
C      Save LSODES information report--
      IF (HI .EQ. DCEND*365.0) THEN
        IF (INHDF) THEN
          I = 2
        ELSE
          I = 1
        ENDIF
        ISTAT(1,I) = IWORK(11)
        ISTAT(2,I) = IWORK(12)
        ISTAT(3,I) = IWORK(13)
        ISTAT(4,I) = IWORK(17)
        ISTAT(5,I) = IWORK(18)
        ISTAT(6,I) = IWORK(19)
      ENDIF

      RETURN
```

```
C----- Error Conditions -----
91 WRITE (*,*) ' Error return for LSODES2, ISTATE = ', ISTATE
   WRITE (*,*) ' RWORK(11 to 14) ', (RWORK(I), I=11,14)
   WRITE (*,*) ' IWORK(11 to 26) ', (IWORK(I), I=11,26)
   STOP
```

```
C-----
      END
```

INTDF

```
C-----
C
C      SUBROUTINE METLIB (ISTOP)
C
C      Subroutine METLIB reads the metabolic parameters for the organs
C      specified in this run and constructs the organ list for this
C      radionuclide chain.
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      ELMNT      - Element name read from metabolic data library
C      AGEM       - Age flag read from metabolic data library; A-Adult,
C                  I-Infant
C      ORG        - Organ name read from metabolic data library
C      F1IN()     - Input array of F1 input values
C      ISTOP      - Flag returned to calling program if no data is found
C                  for the current radionuclide in the metabolic data
C                  library
C      ATNOIN     - Input atomic number
C      FOUND      - Logical flag set when element is found
C-----
C
C      INCLUDE 'INTDFS.CMN'
C      INCLUDE 'ORGPARG.CMN'
C      INCLUDE 'MTBPAR.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'ORGMAS.CMN'
C
C      REAL F1IN(5)
C      INTEGER ATNOIN
C      LOGICAL FOUND, ISTOP
C      CHARACTER ELMNT*14, AGEM*1, AGE*1, ORG*8, OTHERI*8, BONEIN*8,
C      .          ENDIN*8, MARROW*8, CAN*8, DUM*8
C
C      DATA AGE /'A'/, OTHERI /'Other  '/, BONEIN /'Bone  '/,
C      .      ENDIN /'End    '/, MARROW /'R Marrow'/,
C      .      CAN /'Bone Can'/
C
C      Initialize organ index parameters to base list--
C      NORGL = 14
C      DO 164 I = 15, 25
```

INTDF

```
      IORG(I) = 0
164  CONTINUE

      NORG = 0
      NOCOMP = 0
      NBONE = 0
      NOTHER = 0

C      Initialize all specified organ flags--
      DO 12 I = 1, 25
        SPECOR(I) = .FALSE.
      12  CONTINUE

C----- Open file and read title -----

      LUN = 3
      CALL OPNFIL ((4),(0),LUN)

C----- Read file until element is found -----

      FOUND = .FALSE.
10      CONTINUE

      READ (LUN,*,END=91,ERR=98) ATNOIN

      IF (ATNOIN .EQ. ATNUM(1)) THEN
        READ (LUN,20) ELMNT, AGEM, RTBLOOD, UEXTC, FEXTC
        READ (LUN,*) (F1IN(I),I=1,3)
        IF (AGE .EQ. AGEM) FOUND = .TRUE.
      ENDIF

      IF (.NOT. FOUND) THEN
        DO 14 I=1,19
          READ(LUN,21,END=99,ERR=98) ORG
          IF(ORG .EQ. ENDIN) GOTO 10
        14  CONTINUE
      ELSE

C----- Element found, read data set -----

        IF (CLASS(1) .EQ. 'D') THEN
          F1 = F1IN(1)
        ELSEIF (CLASS(1) .EQ. 'W') THEN
          F1 = F1IN(2)
        ELSE
          F1 = F1IN(3)
        ENDIF

C      No other information needed for iodine--
```


INTDF

```
IF (IMOD(1) .EQ. 2) GO TO 40

C      ---- Organ data loop -----

41  CONTINUE
    READ (LUN,21,END=99,ERR=98) ORG,TCIN, RTIN, UIN, FIN
    IF (ORG .EQ. ENDIN) GOTO 40
    IF (IMOD(1) .EQ. 0) THEN

C      ---- General Model Input -----

        IF (ORG .EQ. OTHERI) THEN

C          "Other" organ data--
            NOTHER = 1
            TCOTHR(1) = TCIN
            RTOTHR(1) = ALOG2 / RTIN
            DO 33 I = 2, 4
                READ (LUN,21,END=99,ERR=98) ORG,TCIN, RTIN, UIN, FIN
                IF (ORG .EQ. ENDIN) GOTO 40
                IF (TCIN .GT. 0.0) THEN
                    NOTHER = I
                    TCOTHR(I) = TCIN
                    RTOTHR(I) = ALOG2 / RTIN
                ENDIF
            33  CONTINUE

            ELSEIF (ORG .EQ. BONEIN .OR. ORG .EQ. MARROW) THEN

C          Bone compartments data--
            NBONE = 1
            TCBONE(1) = TCIN
            RTBONE(1) = ALOG2 / RTIN

            IF (ORG .EQ. BONEIN) THEN
                SPECOR(9) = .TRUE.
                SPECOR(10) = .TRUE.
            ELSEIF (ORG .EQ. MARROW) THEN
                SPECOR(10) = .TRUE.
            ENDIF

            DO 34 I = 2, 4
                READ (LUN,21,END=99,ERR=98) ORG,TCIN, RTIN, UIN, FIN
                IF (ORG .EQ. ENDIN) GOTO 40
                IF (TCIN .GT. 0.0) THEN
                    NBONE = I
                    TCBONE(I) = TCIN
```

INTDF

```

      RTBONE(I) = ALOG2 / RTIN
      ENDIF
34      CONTINUE

      ELSE

C      Assume that this is a specified-organ--
      NORG = NORG + 1
      NOCOMP = NOCOMP + 1
      IF (NOCOMP .GT. 9) GOTO 93
      NORGCM(NORG) = 1

C      Check if this organ is in standard list--
      DO 135 IO = 11, 14
        IF (ORG .EQ. MASORG(IO)) THEN
          SPECOR(IO) = .TRUE.
          NORGCR(NORG) = IO
          GOTO 131
        ENOIF
135      CONTINUE

C      Add additional organs to organ list--
      DO 130 IO = 15, 22
        IF (ORG .EQ. MASORG(IO)) THEN
          NORGL = NORGL + 1
          IORG(NORGL) = IO
          SPECOR(NORGL) = .TRUE.
          NORGCR(NORG) = NORGL
          GOTO 131
        ENOIF
130      CONTINUE
      GOTO 92
131      CONTINUE

      TCORG(NOCOMP) = TCIN
      RTORG(NOCOMP) = ALOG2 / RTIN
      DO 35 I = 2, 4
        READ (LUN,21,END=99,ERR=98) ORG,TCIN, RTIN, UIN, FIN
        IF (ORG .EQ. ENDIN) GOTO 40
        IF (TCIN .GT. 0.0) THEN
          NOCOMP = NOCOMP + 1
          IF (NOCOMP .GT. 9) GOTO 93
          NORGCM(NORG) = NORGCM(NORG) + 1
          TCORG(NOCOMP) = TCIN
          RTORG(NOCOMP) = ALOG2 / RTIN
        ENOIF
35      CONTINUE
      ENDIF
```

INTDF

```
C      ---- Alkaline Earth Model Input -----
      ELSEIF (IMOD(1) .EQ. 1) THEN

          IF (DEBUG) WRITE (*,*) 'Alkaline earth model'
          IF (ORG .EQ. CAN) THEN

              NBONE = 4

C          Set specified organ flags--
              SPECOR(7) = .TRUE.
              SPECOR(9) = .TRUE.
              SPECOR(10) = .TRUE.

C          Read trabecular/cancellous bone data--
              TCBONE(1) = TCIN
              RTBONE(1) = RTIN
              READ (LUN,21) ORG,TCIN, RTIN, UIN, FIN
              TCBONE(2) = TCIN
              RTBONE(2) = RTIN
              READ (LUN,11) DUM, OUM

C          Read cortical bone data--
              READ (LUN,21) ORG,TCIN, RTIN, UIN, FIN
              TCBONE(3) = TCIN
              RTBONE(3) = RTIN
              READ (LUN,21) ORG,TCIN, RTIN, UIN, FIN
              TCBONE(4) = TCIN
              RTBONE(4) = RTIN
              READ (LUN,11) DUM, DUM

C          Read bone surface data, store as first specified organ--

              READ (LUN,21) ORG,TCIN, RTIN, UIN, FIN
              NORGCR(1) = 7
              NORG = 1
              NOCOMP = 1
              NORGCM(1) = 1
              TCORG(1) = TCIN
              RTORG(1) = RTIN
              READ (LUN,111) DUM, DUM, DUM

C          Read "Other" organ data--
              READ (LUN,21) ORG,TCIN, RTIN, UIN, FIN
              NOTHER = 1
              TCOTHR(1) = TCIN
              RTOTHR(1) = RTIN
              IF (DEBUG) WRITE (*,*) 'No. :';NBONE, NOTHER, NORG, NOCOMP
              GOTO 40
```

INTDF

```
        ELSE
          GOTO 94
        ENDIF
      ENDIF
    GOTO 41
  ENDIF

40 CONTINUE

C    Specify thyroid and bladder for tellurium/iodine and iodine organs--
    IF (IMOD(1) .EQ. 2 .OR. TEI) THEN
      NORGL = NORGL + 1
      IORG(NORGL) = 15
      SPECOR(14) = .TRUE.
      SPECOR(15) = .TRUE.
    ENDIF

C    Add "other" to organ list--
    NORGL = NORGL + 1
    IORG(NORGL) = 23

1000 CONTINUE

C    Need to check this for different models--
    NEQ = 35 + NOCOMP

    CLOSE (LUN)
    RETURN

C---- ERROR MESSAGES -----

91 WRITE (*,*) 'No data in METLIB for ',ATNUM(1),'; skipped'
    CLOSE (LUN)
    ISTOP = .TRUE.

    RETURN

92 WRITE (*, '(3A)') ' Organ ',ORG,
   .      ' in METLIB not in master organ list.'
    CALL EXIT (1)

93 WRITE (*,*) 'Error in METLIB: too many organs (NORG)'
    CALL EXIT (1)

94 WRITE (*,*) 'Error in METLIB: Alkaline Earth organs expected'
    CALL EXIT (1)

98 CALL FILERR (3, LUN, ELMNT)
99 CALL FILERR (2, LUN, 'In METLIB')
```

INTDF

C---- FORMATS -----

11 FORMAT (A8/A8)
111 FORMAT (A8/A8/A8)
20 FORMAT(A14, 1X, A1, 7X, 3F5.3)
21 FORMAT(1X, A8, 1X, 4E10.3)

C-----
END

INTDF

```
C-----
C
C      SUBROUTINE ORDIN (INRAD)
C
C      This module controls reading of the master radionuclide library and
C      identification of each radionuclide in the input list.
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      ELTEMP   - Temporary character parameter used to parse element
C                 name (ELNAME), out of full element name string (FULNAM)
C      INRAD    - Loop index of the radionuclide chain currently considered
C      IL       - Loop index of the master radionuclide library
C      IN       - Loop index of the list of radionuclides to be considered
C                 for this case
C      H4       - Halflife / 10.0 for current radionuclide, used to find
C                 shortest halflife in chain
C      NXENON   - Number of xenon daughters of the current iodine chain
C      TRCUR    - Halflife of each radionuclide in the current change,
C                 (da)
C-----
C
C      INCLUDE 'RMD.CMN'
C      INCLUDE 'RMD2.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'DECAY.CMN'
C      INCLUDE 'INVIN.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'MTBPAR.CMN'
C
C      INTEGER INRAD, IL, IN
C      REAL*8 H4
C      REAL TRCUR(9)
C
C      Initialize special flags--
C      CARBON = .FALSE.
C      TRITUM = .FALSE.
C      RA226 = .FALSE.
C      TEI = .FALSE.
C      IODI = 0
C      NXENON = 0
```

INTDF

```
N1 = NFLAG2(INRAD)
NCN = NOFNUC(NCHN(N1))
N3 = NCHST(NCHN(N1))
N2 = N3 + NCN -1
N4 = NCN - (N2 - N1 + 1)
IF (DEBUG) WRITE (*,*) 'N1, N3, NCN, N2, N4:'
IF (DEBUG) WRITE (*,*) N1, N3, NCN,N2,N4

IN = 0

C   Loop on all nuclides in active chain --
DO 15 IL=N1,N2

    IN = IN + 1

C   Include nuclide IL in array position IN--

    ELT(IN) = ELTM(IL)
    AW(IN) = AWM(IL)
    HL(IN) = TR(IL)
    TRCUR(IN) = TR(IL)
    ALDAY(IN) = DBLE (0.693 / TR(IL))
    AL(IN) = ALDAY(IN) / SECDA
    IRMD(IN) = IL

    IFRM(1,IN) = MAX (0,IFR(1,IL)-N4)
    IFRM(2,IN) = MAX (0,IFR(2,IL)-N4)
    IF (IFRM(1,IN) .GT. 0) DK(1,IN) = DKF(1,IL)
    IF (IFRM(2,IN) .GT. 0) THEN
        IF (IFRM(1,IN) .GT. 0) THEN
            DK(2,IN) = DKF(2,IL)
        ELSE
C           If first parent is not in input list, move to 1st branching
C           ratio column--
            IFRM(1,IN) = IFRM(2,IN)
            IFRM(2,IN) = 0
            DK(1,IN) = DKF(2,IL)
        ENDIF
    ENDIF

    IMOD(IN) = IMODM(IL)
    BONE(IN) = BONED(IL)
    CLASS(IN) = TCLASS(IL)
    ATNUM(IN) = ATNO(IL)

    IF (CLASS(IN) .EQ. 'D') THEN
        ICL(IN) = 1
    ELSEIF (CLASS(IN) .EQ. 'W') THEN
        ICL(IN) = 2
```

INTDF

```
ELSE
  ICL(IN) = 3
ENDIF

C    Set special flags--

IF (IN.EQ.1 .AND. ELT(IN).EQ.'RA' .AND. AW(IN).EQ.'226') THEN
  RA226 = .TRUE.
ELSEIF (ELT(IN) .EQ. 'I ') THEN
  IF (DEBUG) WRITE (*,*) 'Iodine found in chain'
  IF (AW(IN) .EQ. '125  ') THEN
    IODI = 1
  ELSEIF (AW(IN) .EQ. '129  ') THEN
    IODI = 2
  ELSEIF (AW(IN) .EQ. '131  ') THEN
    IODI = 3
    NXENON = 1
  ELSEIF (AW(IN) .EQ. '132  ') THEN
    IODI = 4
  ELSEIF (AW(IN) .EQ. '133  ') THEN
    IODI = 5
    NXENON = 2
  ELSEIF (AW(IN) .EQ. '134  ') THEN
    IODI = 6
  ELSEIF (AW(IN) .EQ. '135  ') THEN
    IODI = 7
    NXENON = 3
  C    Includes Cs135 under xenon exclusion
  ENDIF
ELSEIF (ELT(IN) .EQ. 'TE') THEN
  TEI = .TRUE.
ELSEIF (ELT(IN) .EQ. 'C ') THEN
  CARBON = .TRUE.
ELSEIF (ELT(IN) .EQ. 'H ') THEN
  TRITUM = .TRUE.
ENDIF

15 CONTINUE
NONUC = IN
NUC = NONUC

C    Check for TE/I and XE daughters--
IF (TEI .AND. IODI .EQ. 0) THEN
C    Reset tellurium/iodine flag--
  IF (DEBUG) WRITE (*,*) 'Tellurium flag set off:',TEI, IODI
  TEI = .FALSE.
ELSEIF (IODI .GT. 0) THEN
C    Remove any xenon daughters--
  NONUC = NONUC - NXENON
```


INTDF

ENDIF

IF (DEBUG) WRITE (*,*) 'TEI, IODI:',TEI, IODI

C Check for smallest halflife to establish timestep for DGCHAIN calls;
C but should not be greater than 1 day--

H2 = 1.0D20

DO 31 IN = 1, NONUC

H4 = DBLE (TRCUR(IN) / 10.0D0)

IF (H4 .LT. H2) H2 = H4

31 CONTINUE

IF (H2 .GT. 1.0D0) H2 = 1.0D0

C Check number of radionuclides in chain, INTDF at present dimensions
C is only guaranteed to handle 8-member chains--
IF (NONUC .GT. 8) GOTO 91

RETURN

C---- Error Handling -----

91 WRITE (*,*) 'INTDF can only handle 8-member chains.'
CALL EXIT (1)

C---- Format Statements -----

1000 FORMAT (' ',I3,2X,A2,A6,2X,A14,2A2,E9.2,2(I2,E9.2))

C-----
END

INTDF

```
C-----
C
C      SUBROUTINE RITEND
C
C      Subroutine RITINC writes total transformation report.
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 17-Mar-88 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      N      - No. of specified organ compartments to print
C      ORG()  - Organ titles for integrated retention reports
C-----

      INCLUDE 'DAYPC.CMN'
      INCLUDE 'DOSES.CMN'
      INCLUDE 'INTDFS.CMN'
      INCLUDE 'MTBPAR.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'ORGMAS.CMN'
      INCLUDE 'ORGPARG.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'TIMES.CMN'

      INTEGER N
      CHARACTER ORG*8(25), EXPTYP*7, AUNIT*30, CUNIT*30, UNIT*30, AST*1

      DATA AST /'*'/
      DATA CUNIT /'Sv per 70 yr/Bq/yr for 70 yr'/
      DATA AUNIT /'Sv/Bq'/'/

      LUN = 15

C      Fill organ name array--
      DO 101 I = 1, 6
         ORG(I) = MASORG(I)
101 CONTINUE

      IF (IMOD(1) .EQ. 0) THEN
C      General Model--

         ORG(7) = 'Bone'
         ORG(8) = 'Other'
         IF (TEI) THEN
```

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```

      ORG(9) = 'Thyroid'
      ORG(10) = 'Bladder'
      N = 2
    ELSE
      DO 102 I = 1, NORG
        ORG(I+8) = ORGANS(NORGCR(I))
102    CONTINUE
      N = NORG
    ENDIF

    ELSEIF (IMOD(1) .EQ. 1) THEN
C      Alkaline Earth--

      ORG(7) = 'Can Bone'
      ORG(8) = 'Other'
      ORG(9) = 'Cor Bone'
      ORG(10) = 'Bone Sur'
      N = 2

    ELSEIF (IMOD(1) .EQ. 2) THEN
C      Iodine--

      ORG(7) = ' '
      ORG(8) = 'Other'
      ORG(9) = 'Thyroid'
      ORG(10) = 'Bladder'
      N = 2
    ENDIF

C    Print headings--

    IF (INHDF) THEN
      WRITE (LUN, 14)
    ELSE
      CALL HEADNG (LUN)
      IF (RA226) THEN
        WRITE (LUN, 10) INT(DCEND), ELT(1), AW(1), AST
      ELSE
        WRITE (LUN, 10) INT(DCEND), ELT(1), AW(1)
      ENDIF
      WRITE (LUN, 15) CLASS(1), F1
      WRITE (LUN, 11)
    ENDIF
    WRITE (LUN,12) (ELT(I), AW(I), I=1, NONUC)

    WRITE (LUN,13) ORG(1), (YWORK(I,18) * SECDA,I=1,NONUC)
```

INTDF

```
IF (IMOD(1) .EQ. 2) THEN

    WRITE (LUN,13) ORG(3), (YWORK(I,3+17) * SECDA,I=1,NONUC)
    WRITE (LUN,13) ORG(4), (YWORK(I,4+17) * SECDA,I=1,NONUC)
    WRITE (LUN,13) ORG(5), (YWORK(I,5+17) * SECDA,I=1,NONUC)
    WRITE (LUN,13) ORG(6), (YWORK(I,6+17) * SECDA,I=1,NONUC)
    WRITE (LUN,13) ORG(9), (YWORK(I,9+17) * SECDA,I=1,NONUC)
    WRITE (LUN,13) ORG(10), (YWORK(I,10+17) * SECDA,I=1,NONUC)
    WRITE (LUN,13) ORG(8), (YWORK(I,8+17) * SECDA,I=1,NONUC)

ELSEIF (TEI) THEN

    DO 202 J = 3, 7
        WRITE (LUN,13) ORG(J), (YWORK(I,J+17) * SECDA,I=1,NONUC)
202    CONTINUE
    WRITE (LUN,13) ORG(9), (YWORK(I,9+17) * SECDA,I=1,NONUC)
    WRITE (LUN,13) ORG(10), (YWORK(I,10+17) * SECDA,I=1,NONUC)
    WRITE (LUN,13) ORG(8), (YWORK(I,8+17) * SECDA,I=1,NONUC)

ELSE

    DO 100 J = 3, 8 + N
        WRITE (LUN,13) ORG(J), (YWORK(I,J+17) * SECDA,I=1,NONUC)
100    CONTINUE
    ENDIF

IF (FETDOS) THEN
    WRITE (LUN,13) 'Fetal '
    WRITE (LUN,13) 'Thyroid ', (YWORK(I,28) * SECDA, I=1,NONUC)
    WRITE (LUN,20) (YWORK(I,45) * SECDA, I=1,NONUC)
ENDIF

IF (INHDF) THEN
C    Write CDE reports--

    WRITE (LUN,19) INT(DCEND), ELT(1), AW(1)
    WRITE (LUN,18) ORGANS(1), (ORGANS(I), I=3,8)
    WRITE (LUN,17) 'Oral ', CDEING(1,NTIME),
        . (CDEING(J,NTIME), J=3,8)
    WRITE (LUN,17) 'Inhalation', CDEINH(1,NTIME),
        . (CDEINH(J,NTIME), J=3,8)

    WRITE (LUN,18) (ORGANS(I), I=11, NORGL-1)
    WRITE (LUN,17) 'Oral ', (CDEING(J,NTIME), J=11, NORGL-1)
    WRITE (LUN,17) 'Inhalation', (CDEINH(J,NTIME), J=11, NORGL-1)

    IF (ACUTE) THEN
        EXPTYP = 'Acute '
        UNIT = AUNIT
    
```

INTDF

```
ELSE
  EXPTYP = 'Chronic'
  UNIT = CUNIT
ENDIF

LUN = 20
WRITE (LUN,2) ELT(1), AW(1), CLASS(1), F1, TODAY, CLOCK,
  EXPTYP, UNIT
  WRITE (LUN,3) NORGL-4, IORG(1), (IORG(J),J=3,8),
    (IORG(J),J=11, NORGL-1)
  WRITE (LUN,4) ORGANS(1), (ORGANS(I),I=3,8),
    (ORGANS(I),I=11,NORGL-1)
  WRITE (LUN,16) 'G', NTIME, CDEING(1,NTIME),
    (CDEING(J,NTIME),J=3,8), (CDEING(J,NTIME),J=11,NORGL-1)
  WRITE (LUN,16) 'H', NTIME, CDEINH(1,NTIME),
    (CDEINH(J,NTIME),J=3,8), (CDEINH(J,NTIME),J=11,NORGL-1)
  LUN = 15
ENDIF

IF (METHOD .EQ. 3 .AND. INHDF) THEN
C   Print LSODES status report--
  WRITE (LUN,1) ((ISTAT(J,I),I=1,2), J=1,6)
ENDIF

C   Write RA226 and H3 footnotes --
  IF (RA226 .AND. INHDF) WRITE (LUN,21)
  IF (TRITUM .AND. INHDF) WRITE (LUN,22)

RETURN

C---- Format Statements -----
1 FORMAT (//50X,'Oral Inhalation'/
  . ' Number of steps taken by the LSODES solver: ',2I7/
  . ' Number of F (DIFEQ2) evaluations: ',2I7/
  . ' Number of Jacobian evaluations: ',2I7/
  . ' Length of RWORK actually required: ',2I7/
  . ' Length of IWORK actually required: ',2I7/
  . ' Number of non-zero elements in Jacobian matrix: ',2I7)
2 FORMAT (A2,A6,'Class: ',A1,' F1: ',F9.5, 5X, 3A10, A30)
3 FORMAT (18(I3))
4 FORMAT (5X,20A8)
10 FORMAT (17X,'Number of Nuclear Transformation Over',I3,' Years'/
  .13X,'In Source Organs or Tissue per Unit Intake of Activity'/
  .26X,'(Transformations/Bq) of ',A2, A6, A1)
11 FORMAT (' Oral')
12 FORMAT (14X, 9(A2,A6,1X))
13 FORMAT (' ',A10, 1X, 1P, 9E9.1)
14 FORMAT (/' Inhalation')
```

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```
15 FORMAT (1X,T60,' Inhalation Class ',A1,/1X,T60,' F1: ',1PE8.1)
16 FORMAT (A1, I3, 1P, 15E8.1E2)
17 FORMAT (A10, 1P, 15E9.1E2)
18 FORMAT (/12X,20(A8,1X))
19 FORMAT (//17X,'Committed Dose Equivalent Over',I3,' Years'/
.10X, 'In Target Organs or Tissue per Unit Intake of Activity'/
.28X, '(Sv/Bq) of ',A2,A6)
20 FORMAT (/ ' Fetal Thyroid Dose: '/1P,10X,9E8.1E2)
21 FORMAT (/ ' *Note: RA226 daughters corrected for RN222 diffusion ',
. 'in dose calculation.')
22 FORMAT (/ ' *Note: Inhalation dose increased by 50% to account ',
. 'for transpiration.')
```

C-----
END

INTDF

```
C-----
C
C      SUBROUTINE RITINC (NTIM)
C
C      Subroutine RITINC writes ingestion and inhalation dose increment
C      data sets to be read by the DOSE program. RITINC also checks
C      for dose increment of zero or stable; if so, a flag is passed
C      back to stop calculations
C
C      Module of INTDF
C      Last Modification: 12-Nov-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      DTYPE      - Character flag to indicate dose type; 'G'-ingestion,
C                  'H'-inhalation
C      HINC()      - Inhalation CDE increment for each organ
C      GINC()      - Ingestion CDE increment for each organ
C      LARGEH      - Largest inhalation increment
C      LARGEH      - Largest ingestion increment
C      CUTOFH      - Cutoff value for writing inhalation CDE increments to
C                  file for each organ. Value is equal to 1/1000 of starting
C                  value.
C      CUTOFG      - Cutoff value for writing ingestion CDE increments to
C                  file for each organ. Value is equal to 1/1000 of starting
C                  value.
C      NTIM        - Final year of simulation
C-----
C
C      INCLUDE 'ORGPARG.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'DOSES.CMN'
C      INCLUDE 'DPT.CMN'
C
C      REAL HINC(25,70), GINC(25,70), LARGEH, LARGEH, CUTOFH, CUTOFG
C      INTEGER NTIM, NGORG(30), NHORG(30)
C      CHARACTER DTYPE
C
C      LUN = 16
C
C      LARGEH = 0.0
C      LARGEH = 0.0
C      CUTOFH = 0.0
C      CUTOFG = 0.0
C
C      Calculate cutoff--
```

INTDF

```
DO 200 IT = 1, NORGL-1
  NGORG(IT) = 0
  NHORG(IT) = 0
  GINC(IT,1) = CDEING(IT,1)
  HINC(IT,1) = CDEINH(IT,1)
  IF (GINC(IT,1) .GT. 0) NGORG(IT) = 1
  IF (HINC(IT,1) .GT. 0) NHORG(IT) = 1
  IF (CDEING(IT,1) .GT. LARGE) LARGE = CDEING(IT,1)
  IF (CDEINH(IT,1) .GT. LARGE) LARGE = CDEINH(IT,1)
200 CONTINUE

  CUTOFG = LARGE / 1000.0
  CUTOFH = LARGE / 1000.0

C   Calculate increments and check cutoff--
DO 202 IY = 2, NTIM

C     Ingestion increments--
DO 214 IT = 1, NORGL-1
  GINC(IT,IY) = CDEING(IT,IY) - CDEING(IT,IY-1)
  IF (GINC(IT,IY) .GT. CUTOFG) THEN
    NGORG(IT) = IY
  ELSE
    GINC(IT,IY) = 0.0
  ENDIF
214 CONTINUE

C     Inhalation increments--
DO 204 IT = 1, NORGL-1
  HINC(IT,IY) = CDEINH(IT,IY) - CDEINH(IT,IY-1)
  IF (HINC(IT,IY) .GT. CUTOFH) THEN
    NHORG(IT) = IY
  ELSE
    HINC(IT,IY) = 0.0
  ENDIF
204 CONTINUE

202 CONTINUE

C   Write increments to file--

  DTYPE = 'G'
  WRITE (LUN,1003) NGORG(1), (NGORG(IT),IT=3,8),
    (NGORG(IT), IT=11,NORGL-1)
DO 304 IT = 1, NORGL-1
  IF (NGORG(IT) .GT. 0) THEN
    WRITE (LUN,1004) DTYPE, (GINC(IT,IY), IY=1, NGORG(IT))
  ENDIF
304 CONTINUE
```


INTDF

```
DTYPE = 'H'
WRITE (LUN,1003) NHORG(1), (NHORG(IT), IT=3,8),
      (NHORG(IT), IT=11,NORGL-1)
DO 302 IT = 1, NORGL-1
  IF (NHORG(IT) .GT. 0) THEN
    WRITE (LUN,1004) DTYPE, (HINC(IT,IY), IY=1, NHORG(IT))
  ENDIF
302 CONTINUE

RETURN
```

C---- Format Statements -----

```
1003 FORMAT (30I3)
1004 FORMAT (A1,1P,15E8.1E2/,10(1X,15E8.1/))
```

C-----
END

INTDF

```
C-----
C
C      SUBROUTINE RITINT
C
C      This subroutine prints a report of input parameters for the INTDF
C      program to the standard output file (LUN=6) and file headings to
C      the integrated retention, CDE, and CDE increment data files.
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 6-Jun-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      EXPTYP   - Exposure type descriptive parameter, set to either acute
C                or chronic
C-----

      INCLUDE 'RAD.CMN'
      INCLUDE 'DECAY.CMN'
      INCLUDE 'INTDFS.CMN'
      INCLUDE 'MTBPAR.CMN'
      INCLUDE 'ORGPAR.CMN'
      INCLUDE 'ORGMAS.CMN'
      INCLUDE 'SIJS.CMN'
      INCLUDE 'OPT.CMN'
      INCLUDE 'TIMES.CMN'
      INCLUDE 'DAYPC.CMN'

      CHARACTER EXPTYP*7, CUNIT*30, AUNIT*30, UNIT*30
      CUNIT = 'Sv per 70 yr/Bq/yr for 70 yr'
      AUNIT = 'Sv/Bq'

      LUN = 15
      CALL HEADNG (LUN)
C      Write radionuclide report--

      WRITE (LUN,*) ' '
      DO 100 IN = 1, NONUC
        WRITE (LUN,1000) IN, ELT(IN), AW(IN), BONE(IN),
          .           CLASS(IN), HL(IN), ALDAY(IN),
          .           (IFRM(J,IN),DK(J,IN),J=1,2)
100 CONTINUE

C      Write model selection, input parameters--
```

INTDF

```
WRITE (LUN,*) ' '
IF (TEI) THEN
  WRITE (LUN,1022) 'Tellurium/Iodine Model'
ELSEIF (IMOD(1) .EQ. 0) THEN
  WRITE (LUN,1022) 'General Model'
ELSEIF (IMOD(1) .EQ. 1) THEN
  WRITE (LUN,1022) 'Alkaline Earth Model'
ELSEIF (IMOD(1) .EQ. 2) THEN
  WRITE (LUN,1022) 'Iodine Model'
ELSE
  WRITE (LUN,1022) 'Unspecified model'
ENDIF
IF (FETDOS) WRITE (LUN,1022) 'Fetal Thyroid Dose'

IF (ACUTE) THEN
  WRITE (LUN,1022) 'Acute exposure'
  EXPTYP = 'Acute '
  UNIT = AUNIT
ELSE
  WRITE (LUN,1022) 'Chronic exposure'
  EXPTYP = 'Chronic'
  UNIT = CUNIT
ENDIF

WRITE (LUN,*) ' '
WRITE (LUN,*) 'Dose commitment period:           ',DCEND
IF (FETDOS) WRITE (LUN,*)
.           'Fetal age (days):                     ',FETAGE

WRITE (LUN,*) ' '
WRITE (LUN,*) 'Particle size:                               ',DIAM
WRITE (LUN,*) 'Lung deposition fractions:'
WRITE (LUN,*) '  Nasal-pharynx region:           ',ZNP
WRITE (LUN,*) '  Pulmonary region:              ',ZP
WRITE (LUN,*) '  Tracheo-bronchial region:       ',ZTB

WRITE (LUN,*) ' '
IF (METHOD .EQ. 1) THEN
  WRITE (LUN,1021) 'Euler'
ELSEIF (METHOD .EQ. 2) THEN
  WRITE (LUN,1021) 'Runge-Kutta'
ELSEIF (METHOD .EQ. 3) THEN
  WRITE (LUN,1021) 'LSODES2 equation solver'
  WRITE (LUN,*) 'Relative error tolerance:           ',REAL(RTOL)
  WRITE (LUN,*) 'Absolute error tolerance:           ',REAL(ATOL)
  WRITE (LUN,*) 'Absolute step size allowed:         ',REAL(ASSA)
  WRITE (LUN,*) 'No. of steps to convergence allowed: ',NSC
ELSE
```

INTDF

```
      WRITE (LUN,*) 'Integration method:                unspecified'
ENDIF

      WRITE (LUN,*) 'Starting time step:                ',REAL(HSTART)

C      Write organ report--

      WRITE (LUN,1023)
      DO 150 IO = 1, NORGL
        WRITE (LUN,1020) ORGANS(IO), IORG(IO), TARGET(IO),
          .           IYX(IO), MASMAS(IORG(IO)), ORGMLT(IO),
          .           ORGING(IO), ORGINH(IO)
150 CONTINUE
      WRITE (LUN,*) ' '
      IF (IMOD(1) .NE. 2) WRITE (LUN,*)
      . 'Transfer compartment rate:', RTBLOOD

C      Write metabolic report--

      CALL HEADNG (LUN)
      WRITE (LUN,*) ' '
      WRITE (LUN,*) 'No. of OTHER compartments (TCMULT):',NOTHER,
      .           TCMULT(25)
      WRITE (LUN,*) ' '
      DO 110 I = 1, NOTHER
        WRITE (LUN,*) 'TC, RT: ',I, TCOTHR(I), RTOTHR(I)
110 CONTINUE

      WRITE (LUN,*) ' '
      WRITE (LUN,*) 'No. of bone compartments (TCMULT):',NBONE,
      .           TCMULT(24)
      WRITE (LUN,*) ' '
      DO 120 I = 1, NBONE
        WRITE (LUN,*) 'TC, RT: ',I, TCBONE(I), RTBONE(I)
120 CONTINUE

      I = 0
      WRITE (LUN,1011) NORGL, (TCMULT(25+IJ),IJ=1,NORGL)
      WRITE (LUN,*) ' '
      IF (NORGL .GT. 0) THEN
        WRITE (LUN,1013) NOCOMP
        DO 130 I1 = 1, NORGL
          DO 131 I2 = 1, NORGLCM(I1)
            I = I + 1
            WRITE (LUN,1010) ORGANS(NORGLCM(I1)),I, I1, I2,
            .           TCORG(I), RTORG(I)
131 CONTINUE
130 CONTINUE
      ENDIF
```

INTDF

C Signature lines--

```
      WRITE (LUN,85)
85  FORMAT (/79('='))
      WRITE(LUN,89)
89  FORMAT(///,'Input prepared by: _____',
           '      Date: _____',//
           'Input checked by: _____',
           '      Date: _____'//)
      WRITE (LUN,85)
```

C SIJ report skipped for production runs--

```
      IF (DEBUG) THEN
        DO 140 IN = 1, NONUC
          CALL HEADNG (LUN)
          WRITE (LUN,*) ' '
          WRITE (LUN,'(4A)') ' SEEs for ',ELT(IN),AW(IN),
            ' (MeV/g transformation)'

          WRITE (LUN,*) ' '
          WRITE (LUN,1003) (ORGANS(J),J=1,8)
          DO 141 IT = 1, NORGL
            WRITE (LUN,1006) ORGANS(IT), (SIJ(IT,IS,IN)/MEVSV,IS=1,8)
141      CONTINUE

          WRITE (LUN,*) ' '
          WRITE (LUN,1003) (ORGANS(J),J=9,NORGL)
          DO 142 IT = 1, NORGL
            WRITE (LUN,1006) ORGANS(IT),
              (SIJ(IT,IS,IN)/MEVSV,IS=9,NORGL)
142      CONTINUE

140    CONTINUE
      ENDIF
```

C---- Write file subheadings -----

```
      LUN = 16
      WRITE (LUN,1001) ELT(1), AW(1), CLASS(1), F1, TODAY, CLOCK,
        EXPTYP, UNIT
      WRITE (LUN,1005) NORGL-4, IORG(1),(IORG(J),J=3,8),
        (IORG(J),J=11, NORGL-1)

      RETURN
```

C---- Error Messages -----

```
98 CALL FILERR (3, LUN, 'In RITINT')
```

INTDF

99 CALL FILERR (2, LUN, 'In RITINT')

C---- Format Statements -----

```
1000 FORMAT (I1,1X,A2,A6,6X,2A2,1P,2E9.2,0P,2(I2,E9.2))
1001 FORMAT ('! ',A2,A6,'Class: ',A1,' F1: ',F9.5, 5X, 3A10, A3)
1002 FORMAT ('      Lung      Lymph      Gut      S Int      UL Int ',
.          'LL Int Bone      OTHERs      Organ 1 Organ 2')
1003 FORMAT (/ ' Target                               Source Organs' /
.          ' Organ                               ',15(A7,1X))
1004 FORMAT (' ',A1,I3,3X,1P, 15E8.1E2)
1005 FORMAT (18(I3))
1006 FORMAT (' ',A8,1P, 15E8.1E2)
1007 FORMAT (9(A2,A6,1X))
1010 FORMAT (' ',A8,3I7,2E9.2)
1011 FORMAT (/ 'No. of specified organs (TCMULT):',T41,I3,1P,5E9.2)
1013 FORMAT ( 'No. of specified organ compartments:',T41,I3//
.          'Organ          Comp.  Organ  Sub  TCORG  RTORG' /
.          'Name          Index  Index  Index (frac)  (rate)' /)
1020 FORMAT (A8,I5,L7,3X,I8,2X,1P,4E10.1)
1021 FORMAT ('Integration method:',T41,A)
1022 FORMAT (1X,T41,A)
1023 FORMAT (//
.          '      Organ          Compartment  Organ' /,
.          '      Organ  Index  Target?      Index      Mass      ORGMLT',
.          '      ORGING  ORGINH' /)
```

C-----

END

INTDF

```
C-----
C
C   SUBROUTINE SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
C
C   This subroutine reads a data set from SEE file.
C
C   Module of Program INTDF of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Version of 1-Dec-87  RAP
C   Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C   ITYP      - Integer flag indicating file format; 0-unformatted,
C               1-formatted sequential
C   IUNIT      - Logical unit number of the SEE file
C   IPASS      - Pass counter, increased for each time end of file is
C               encountered, incremented and tested in this subroutine
C   NPASS      - Maximum number of passes for this radionuclide chain
C-----
C
C   INCLUDE 'SEE.CMN'
C
C   CHARACTER EXCH1*I, EXCH2*1, DUM*I
C   INTEGER IUNIT, ITYP, IPASS, NPASS
C   LOGICAL ISTOP, IEOF
C
C   IEOF = .FALSE.
C
C   IF (ITYP .EQ. 1) THEN
C
C       Formatted file--
C       READ (IUNIT,70,END=100) AH01, EXCH1, LEME1, ZH01, HLIFE1, UNITS1
C
C       READ (IUNIT,71) AH0, EXCH, LEME, ZH0, HLIFE, UNITS, NPRS, NPRT,
C
C           IG, IGBAR, TODAY, BONES
C
C       READ (IUNIT,72) (IPRS(I),I=1,NPRS), (IPRT(I),I=1,NPRT)
C       READ (IUNIT,73) ((OBLIN(I,K),I=1,NPRS),K=1,NPRT)
C       READ(IUNIT,70,END=100) AH02,EXCH2,LEME2,ZH02,HLIFE2,UNITS2
C
C       IF (AH01 .NE. AH02) GO TO 92
C
C   ELSE
C
C       Unformatted file--
```

INTDF

```
      READ (IUNIT,END=100) AHO, EXCH, LEME, ZHO, HLIFE, UNITS,  
      .                      NPRS, NPRT, IG, IGBAR, TODAY, BONES  
  
      READ (IUNIT) (IPRS(I),I=1,NPRS), (IPRT(I),I=1,NPRT)  
      READ (IUNIT,END=100) ((DBLIN(I,K),I=1,NPRS),K=1,NPRT)  
  
      ENDIF  
      RETURN  
  
100 CONTINUE  
  
C      End of file encountered; increment counter and check limit--  
      IPASS = IPASS + 1  
      IF (IPASS .GT. NPASS) THEN  
        ISTOP = .TRUE.  
      ELSE  
        IEOF = .TRUE.  
        REWIND (IUNIT)  
        IF (ITYP .EQ. 1) THEN  
          READ (IUNIT,'(A)') DUM  
        ELSE  
          READ (IUNIT) DUM  
        ENDIF  
      ENDIF  
      RETURN  
  
C----- Error Conditions -----  
  
      91 CALL FILERR (2, IUNIT, LEME)  
  
      92 WRITE (*,1) AHO1,AHO2  
          CALL FILERR (3, IUNIT, LEME)  
  
C----- Format Statements -----  
  
      70 FORMAT (5X,F5.0,1X,A1,1X,3A4,F5.0,1PE11.4,1X,2A4)  
      71 FORMAT (1X,F5.0,1X,A1,3A4,F5.0,E11.4,1X,2A4,8I3,A3,1X,A1)  
      72 FORMAT (40I2)  
      73 FORMAT (8E10.2)  
      1  FORMAT (' UNEXPECTED ERROR:  HEADER=',F5.0,'TRAILER= ',F5.0)  
  
C-----  
      END
```


INTDF

```
C-----
C
C      SUBROUTINE SETORG
C
C      Subroutine SETORG sets organ flags, indices, and cross-indices
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 19-Feb-88 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      ACTMAS - Total mass of all active organs for this radionuclide
C      OTHMAS - Mass of OTHER compartment
C      OTHORG - Mass of remaining OTHER after non-specified organs
C              have been accounted for
C-----
C
C      INCLUDE 'ORGPARG.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'INTDFS.CMN'
C      INCLUDE 'MTBPAR.CMN'
C
C      LOGICAL FOUND
C      REAL ACTMAS, MASING, MASINH, OTHMAS
C
C      ACTMAS = 0.0
C      MASING = 0.0
C      MASINH = 0.0
C      OTHMAS = 0.0
C
C      Set transfer compartment fractions for gut--
C      TCMULT(20) = 0.0
C      TCMULT(21) = 0.0
C      TCMULT(22) = 0.0
C      TCMULT(23) = 0.0
C
C      DO 141 IO = 1, NORGL
C
C      Store organ names into array--
C      ORGANS(IO) = MASORG(IORG(IO))
C
C      Set target flags--
```

INTDF

```
IF (IORG(IO) .EQ. 2) THEN
  TARGET(IO) = .FALSE.
ELSEIF (IORG(IO) .EQ. 9) THEN
  TARGET(IO) = .FALSE.
ELSEIF (IORG(IO) .EQ. 10) THEN
  TARGET(IO) = .FALSE.
ELSE
  TARGET(IO) = .TRUE.
ENDIF

C      Set integrated retention compartment (YWORK) cross-index--

C      ---- Iodine Model -----
IF (IMOD(1) .EQ. 2 .OR. TEI) THEN

  IF (IORG(IO) .LT. 7) THEN
    IYX(IO) = IO + 17
  ELSEIF (IORG(IO) .EQ. 14) THEN
    IYX(IO) = 26
  ELSEIF (IORG(IO) .EQ. 15) THEN
    IYX(IO) = 27
  ELSE
    IYX(IO) = 25
  ENDIF

C      There is always a bone compartment for tellurium--
  IF (TEI .AND. (IO .GT. 6 .AND. IO .LT. 12)) IYX(IO) = 24

C      Set transfer compartment apportion fraction based on mass-
  TCMULT(26) = MASMAS(14) / (TOTMAS - MASMAS(1))
  TCMULT(27) = MASMAS(15) / (TOTMAS - MASMAS(1))

C      ---- General Model -----
ELSEIF (IMOD(1) .EQ. 0) THEN

  IF (IORG(IO) .LT. 7) THEN
    IYX(IO) = IO + 17
  ELSEIF (IORG(IO) .LT. 11) THEN
    IYX(IO) = 24
  ELSE
    FOUND = .FALSE.
    DO 142 J = 1, NORG
      IF (IO .EQ. NORGCR(J)) THEN
        IYX(IO) = 25 + J
        FOUND = .TRUE.
      ENDIF
    CONTINUE
    IF (.NOT. FOUND) IYX(IO) = 25
  ENDIF
142
```

INTDF

```
C      Set transfer compartment apportion fraction based on mass-
TCMULT(24) = (MASMAS(9) + MASMAS(10)) / (TOTMAS - MASMAS(1))

      DO 152 J = 1, NORG
        IOG = IORG(NORGCR(J))
        IF (DEBUG) WRITE (*,*) 'SETORG (J,norgcr,iog):',J,
          NORGCR(J),IOG
        TCMULT(25+J) = MASMAS(IOG) / (TOTMAS - MASMAS(1))
152    CONTINUE

C      ---- Alkaline Earth Model -----
      ELSEIF (IMOD(1) .EQ. 1) THEN

        IF (IORG(IO) .LT. 7) THEN
          IYX(IO) = IO + 17
        ELSEIF (IORG(IO) .EQ. 7) THEN
          IYX(IO) = 27
        ELSEIF (IORG(IO) .EQ. 9) THEN
          IYX(IO) = 26
        ELSEIF (IORG(IO) .EQ. 10) THEN
          IYX(IO) = 24
        ELSE
          IYX(IO) = 25
        ENDIF

C      Set transfer compartment apportion fraction based on mass-
TCMULT(24) = MASMAS(10) / (TOTMAS - MASMAS(1))
TCMULT(26) = MASMAS(9) / (TOTMAS - MASMAS(1))

      ENDIF

141 CONTINUE

C---- Set organ multipliers -----

C      First set to 1.0 or bone fraction if specified, 0.0 if not--
      DO 145 IO = 1, NORGL

        ORGMLT(IO) = 0.0

        IF (SPECOR(IO)) THEN
          ORGMLT(IO) = 1.0
          IF (IMOD(1) .EQ. 1) THEN
C      Alkaline earth model
            ORGMLT(9) = 1.0
            ORGMLT(10) = 1.0
          ELSEIF (BONE(1) .EQ. 'S') THEN
```

INTDF

```
C      Surface seeker: area of cort and cann is about equal.
      ORGMLT(9) = 0.5
      ORGMLT(10) = 0.5
      ELSEIF (BONE(1) .EQ. 'V') THEN
C      Volume seeker: ratios are about five to one
      ORGMLT(9) = 0.8
      ORGMLT(10) = 0.2
      ENDIF

C      Accumulate total mass of active organs--
      ACTMAS = ACTMAS + MASMAS(IORG(IO))

      ELSE
      IF (IO .GT. 6 .AND. IO .LT. 11) GO TO 146
      IF (IYX(IO) .EQ. 25) GO TO 146
      ORGMLT(IO) = 1.0
146    CONTINUE
      ENDIF

145 CONTINUE

C      Determine mass of active lung and gut
      TEMPH = 0.0
      TEMPG = 0.0
      OTHG = 0.0
      OTHH = 0.0

C      Ingestion--
      IF (F1 .EQ. 1.0) THEN
      TEMPG = MASMAS(3)
      SPECOR(3) = .TRUE.
      ELSE
      TEMPG = MASMAS(3) +
      .      MASMAS(4) + MASMAS(5) + MASMAS(6)
      SPECOR(3) = .TRUE.
      SPECOR(4) = .TRUE.
      SPECOR(5) = .TRUE.
      SPECOR(6) = .TRUE.
      ENDIF

C      Set mass of other--
      MASING = TOTMAS - ACTMAS - TEMPG

C      Apportion OTHER compartment by mass of organs--
      DO 151 IO = 1, NORGL-1
      IF (.NOT. SPECOR(IO)) THEN
```

INTDF

```
      IF (IO .EQ. 9 .OR. IO .EQ. 10) THEN
        ORGING(IO) = 0.0
      ELSE
        ORGING(IO) = MASMAS(IORG(IO)) / MASING
        OTHG = OTHG + MASMAS(IORG(IO))
      ENDIF
    ELSE
      ORGING(IO) = 0.0
    ENDIF
151 CONTINUE
    IF (DEBUG) WRITE (*,*) 'OTHG:', OTHG

C    Set fraction of remaining OTHER by mass--
    ORGING(NORGL) = (MASING - OTHG) / MASING

C    Inhalation--
    IF (F1 .EQ. 1.0) THEN
      TEMPH = MASMAS(1) + MASMAS(2) + MASMAS(3)
      SPECOR(1) = .TRUE.
      SPECOR(2) = .TRUE.
      SPECOR(3) = .TRUE.
    ELSE
      TEMPH = MASMAS(1) + MASMAS(2) + MASMAS(3) +
        MASMAS(4) + MASMAS(5) + MASMAS(6)
      SPECOR(1) = .TRUE.
      SPECOR(2) = .TRUE.
      SPECOR(3) = .TRUE.
      SPECOR(4) = .TRUE.
      SPECOR(5) = .TRUE.
      SPECOR(6) = .TRUE.
    ENDIF

C    Set mass of other--
    MASINH = TOTMAS - ACTMAS - TEMPH
    OTHMAS = TOTMAS - ACTMAS - MASMAS(1) - MASMAS(2) - MASMAS(3) -
      MASMAS(4) - MASMAS(5) - MASMAS(6)

C    Apportion OTHER compartment by mass of organs--
    DO 181 IO = 1, NORGL-1
      IF (.NOT. SPECOR(IO)) THEN
        IF (IO .EQ. 9 .OR. IO .EQ. 10) THEN
          ORGINH(IO) = 0.0
        ELSE
          ORGINH(IO) = MASMAS(IORG(IO)) / MASINH
          OTHH = OTHH + MASMAS(IORG(IO))
        ENDIF
      ELSEIF ((CARBON .OR. TRITUM) .AND. IO .EQ. 1) THEN
        ORGINH(IO) = MASMAS(IORG(IO)) / MASINH
      
```

INTDF

```
      OTHH = OTHH + MASMAS(IORG(IO))
    ELSE
      ORGINH(IO) = 0.0
    ENDIF
181 CONTINUE
    IF (DEBUG) WRITE (*,*) 'OTHH:',OTHH

C    Set fraction of remaining OTHER by mass--
    ORGINH(NORGL) = (MASINH - OTHH) / MASINH

C    Set transfer compartment apportion fraction for OTHER--
    TCMULT(25) = OTHMAS / (TOTMAS - MASMAS(1))

    RETURN

C-----
    END
```

INTDF

```
C-----
C
C      SUBROUTINE SETPAR
C
C      This modules initializes lung and gut model compartments for
C      either an ingestion run or an inhalation run. Rate units, da-1.
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 17-Aug-88  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----

      INCLUDE 'ORGPARG.CMN'
      INCLUDE 'MTBPAR.CMN'
      INCLUDE 'INTDFS.CMN'
      INCLUDE 'DECAY.CMN'
      INCLUDE 'RAD.CMN'
      INCLUDE 'OPT.CMN'

      DO 22 J = 1, 45
        DO 23 I = 1, 9
          YWORK(I,J) = 0.0
23    CONTINUE
22    CONTINUE

      UPTGUT = 0.0
      DO 24 I = 1, 9
        DEPOSIT(I) = 0.0
24    CONTINUE

C      Set gut model rates--

      RTGUT(1) = 24.0
      RTGUT(2) = 6.0
      RTGUT(3) = 24.0/13.0
      RTGUT(4) = 1.0

      IF(F1.EQ.1.0) THEN
        FG2SI = 0.0
        FG2TC = 1.0
        RTSIBL = 0.0
      ELSE
        FG2SI = 1.0
        FG2TC = 0.0
        RTSIBL = (F1 * RTGUT(2)) / (1.0 - F1)
        IF (DEBUG) WRITE (*,*) 'RTSIBL: ', RTSIBL
```

INTDF

ENDIF

C---- Set lung model rates -----

IF (INHDF) THEN

RTLUNG(1) = ALOG2 / 0.01

RTLUNG(2) = ALOG2 / 0.4

RTLUNG(3) = ALOG2 / 0.01

RTLUNG(4) = ALOG2 / 0.2

RTLUNG(12) = RTLUNG(4)

IF (CLASS(1) .EQ. 'D') THEN

RTLUNG(2) = RTLUNG(1)

RTLUNG(5) = ALOG2 / XDIV(1)

RTLUNG(6) = 0.0

RTLUNG(7) = 0.0

RTLUNG(8) = RTLUNG(5)

RTLUNG(9) = 0.0

RTLUNG(10) = RTLUNG(5)

ELSEIF (CLASS(1) .EQ. 'W') THEN

RTLUNG(5) = ALOG2 / XDIV(2)

RTLUNG(6) = ALOG2

RTLUNG(7) = RTLUNG(5)

RTLUNG(8) = RTLUNG(5)

RTLUNG(9) = 0.0

RTLUNG(10) = RTLUNG(5)

ELSE

RTLUNG(5) = ALOG2 / XDIV(3)

RTLUNG(6) = ALOG2

RTLUNG(7) = RTLUNG(5)

RTLUNG(8) = RTLUNG(5)

RTLUNG(9) = RTLUNG(5)

RTLUNG(10) = ALOG2 / 1000.0

ENDIF

IF (ACUTE) THEN

IF (CARBON .OR. TRITUM) THEN

YWORK(1,17) = 1.0

ELSE

DO 42 I = 1, 1

INTDF

```

      YLUNG(I,1) = DBLE( ZNP )
      YLUNG(I,2) = YLUNG(I,1)
      YLUNG(I,3) = DBLE( ZTB )
      YLUNG(I,4) = YLUNG(I,3)
      YLUNG(I,5) = DBLE( ZP )
      YLUNG(I,6) = YLUNG(I,5)
      YLUNG(I,7) = YLUNG(I,5)
      YLUNG(I,8) = YLUNG(I,5)
      YLUNG(I,9) = YLUNG(I,5)
42      CONTINUE

      DO 43 J = 1, 1
        DO 20 I=1,9

          YLUNG(J,I) = YLUNG(J,I) * ADJ(I,ICL(1))
20          CONTINUE

43      CONTINUE
      ENDIF

      ELSE
C      Chronic--

      DEPOSIT(1) = ZNP / 365.0
      DEPOSIT(2) = DEPOSIT(1)
      DEPOSIT(3) = ZTB / 365.0
      DEPOSIT(4) = DEPOSIT(3)
      DEPOSIT(5) = ZP / 365.0
      DEPOSIT(6) = DEPOSIT(5)
      DEPOSIT(7) = DEPOSIT(5)
      DEPOSIT(8) = DEPOSIT(5)
      DEPOSIT(9) = DEPOSIT(5)

      DO 21 I=1,9

        DEPOSIT(I) = DEPOSIT(I) * ADJ(I,ICL(1))
21      CONTINUE

      ENDIF

      ELSE
C      Set ingestion rates --

      IF (ACUTE) THEN

        IF (CARBON .OR. TRITUM) THEN
```

INTDF

```
        YWORK(1,17) = 1.0

        ELSE
            DO 44 I = 1, 1
                YGUT(I,1) = DBLE(1.0)
                IF (DEBUG) WRITE (*,1034) YGUT(I,1)
44         CONTINUE
            UPTGUT = 0.0
        ENDIF

        ELSE
C         Chronic--

            UPTGUT = 1.0 / 365.0
            IF (DEBUG) WRITE (*,1033) UPTGUT

        ENDIF

C         Clear lung rates--
        DO 30 I = 1, 9
            RTLUNG(I) = 0.0
            DEPOSIT(I) = 0.0
30     CONTINUE
        RTLUNG(10) = 0.0
        RTLUNG(12) = 0.0

        ENDIF
        RETURN

C----- Format Statements -----
1031 FORMAT (' Initial quantity in Y lung compartments: ',
.         9(10X, I4, 4X, E10.3/))
1032 FORMAT (' Initial quantity in DEPOSIT lung compartments: ',
.         9(10X, I4, 4X, E10.3/))
1033 FORMAT (' Initial quantity in UPTGUT for ingestion: ',E10.3)
1034 FORMAT (' Initial quantity in YGUT(1,1) for ingestion: ',E10.3)

C-----
        END
```

INTDF

```
C-----
C
C      SUBROUTINE SIJLIB (ISTOP)
C
C      This subroutine handles reading of the SEE data libraries and
C      storing of Sij (SEE) values for radionuclides considered in this
C      chain.
C
C      Module of Program INTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      DENOM      - Summation of mass of target organ; used for Sij of
C                   OTHER to target calculation
C      ITYP       - Integer flag indicating file format; 0-unformatted,
C                   1-formatted sequential
C      IUNIT      - Logical unit number of the SEE file
C      IPASS      - Pass counter, increased for each time end of file is
C                   encountered, incremented and tested in this subroutine
C      IWORK      - Logical unit number of workspace file
C      NPASS      - Maximum number of passes for this radionuclide chain
C      NUMER      - Summation of mass of target organ times SEE of target
C                   organ; used for Sij of OTHER to target calculation
C-----
C
C      INCLUDE 'RAD.CMN'
C      INCLUDE 'SIJS.CMN'
C      INCLUDE 'ORGPARG.CMN'
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'MTBPAR.CMN'
C      INCLUDE 'SEE.CMN'
C      INCLUDE 'RMD.CMN'
C      INCLUDE 'RMD2.CMN'
C
C      CHARACTER A*6, A1(6)*1, DUM*1
C      EQUIVALENCE (A, A1(1))
C      LOGICAL META(9), META2(30), FOUND, ISTOP, IEOF
C      REAL RMDAW(9), RMDAW2(30), TEFE2(30,40), NUMER, DENOM
C      INTEGER IWORK, ITYP
C
C      Unformatted file--
C      ITYP = 0
```

INTDF

```
C   Workspace file--
      IWORK = 7
      CALL OPNFIL (1, 0, IWORK)
      REWIND IWORK

C   Process radionuclide chain, determine if metastable and
C   convert atomic mass to real number--

      DO 203 IN = 1, NONUC
        META(IN) = .FALSE.
        A = AW(IN)
        DO 204 I = 3, 6
          IF (A1(I) .EQ. 'M') THEN
            META(IN) = .TRUE.
            A1(I) = '.'
          ENDIF
204    CONTINUE
        WRITE (7, '(A)') A
        BACKSPACE (7)
        READ (7, '(F6.0)') RMDAW(IN)
203    CONTINUE

      IF (DEBUG) WRITE (*,*) 'META:', META, 'RMDAW:', RMDAW

C   Also process implicit daughter array--

      DO 207 ID = 1, NIDRMD
        META2(ID) = .FALSE.
        A = AW2M(ID)
        DO 208 I = 3, 6
          IF (A1(I) .EQ. 'M') THEN
            META2(ID) = .TRUE.
            A1(I) = '.'
          ENDIF
208    CONTINUE
        WRITE (7, '(A)') A
        BACKSPACE (7)
        READ (7, *) RMDAW2(ID)
207    CONTINUE

      CLOSE (IWORK)

C   Determine if this chain is to be treated as surface or volume seeker--
      IF (BONE(1) .EQ. 'N') THEN
        IF (HL(1) .GT. 15.0) THEN
          BONE(1) = 'V'
        ELSE
          BONE(1) = 'S'
```

INTDF

```
      ENDIF
    ENDIF

C    Input file--
      IUN = 41
      CALL OPNFIL (1, 0, IUN)

      READ (IUN,10) SOPT,VOPT,LPAGE
      READ (IUN,30) NSORS,NTARG
      DO 50 I=1,NSORS
        READ (IUN,40) (SORG(I,J),J=1,8)

50    CONTINUE
      DO 60 I=1,NTARG
        READ (IUN,40) (TORG(I,J),J=1,12)

60    CONTINUE
      READ (IUN,65) (SYMBOL(I),I=1,103)
      CLOSE (IUN)

C    Select SEE file based on atomic number of parent--
      IF (ATNUM(1) .LT. 44) THEN
        IUNIT = 45
      ELSEIF (ATNUM(1) .LT. 81) THEN
        IUNIT = 46
      ELSE
        IUNIT = 47
      ENDIF
      CALL OPNFIL (7, 0, IUNIT)

C    Determine maximum number of passes through file to allow--
      NPASS = NONUC
      IPASS = 1
      DO 403 IN = 1, NONUC
        NPASS = NPASS + NDAU(IRMD(IN))
403    CONTINUE
      IF (DEBUG) WRITE (*,*) 'Maximum no. of passes of SEE file:',NPASS

C    Loop through all radionuclides in chain--
      DO 404 IN = 1, NONUC

        IF (IN .GT. 1) THEN
          IF (ATNO(IRMD(IN)) .LT. ATNO(IRMD(IN-1))) THEN
            REWIND (IUNIT)
            READ (IUNIT) DUM
          ENDIF
        ENDIF

        FOUND = .FALSE.
```

INTDF

```
C      Loop until radionuclide found in SEE library--
500    CONTINUE

C      Read a data set from SEE file--
      CALL SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
      IF (IEOF) GOTO 500
      IF (ISTOP) GOTO 600
      ISY = INT (ZHO)

C      Check if this data set matches radionuclide--
      IF (SYMBOL(ISY) .EQ. ELT(IN)) THEN
        IF (AHO .EQ. RMDAW(IN)) THEN
          IF (META(IN)) THEN
            IF (EXCH .EQ. 'M') FOUND = .TRUE.
          ELSE
            IF (EXCH .EQ. ' ') FOUND = .TRUE.
          ENDIF
        ENDIF
      ENDIF

      IF (.NOT. FOUND) THEN

C      Radionuclide was not found, skip volume data set,
C      go to next record--
      CALL SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
      IF (IEOF) GOTO 500
      IF (ISTOP) GOTO 600
      GOTO 500

      ELSE

C      Radionuclide was found, read data set into array--
      DO 111 K = 1, NPRT
        DO 112 I = 1, NPRS
          TEFE(IPRS(I), IPRT(K)) = REAL(DBLIN(I,K))
112      CONTINUE
111      CONTINUE

      IF (BONE(1) .EQ. 'S') THEN

C      Surface seeker, double check and skip over volume data set--
      CALL SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
      IF (IEOF) GOTO 500
      IF (ISTOP) GOTO 600

      ELSE

C      Volume seeker, read second data set and double check--
      CALL SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
```

INTDF

```
      IF (IEOF) GOTO 500
      IF (ISTOP) GOTO 600

C      Overlay volume data into array--
      DO 117 K = 1, NPRT
        DO 118 I = 1, NPRS
          TEFE(IPRS(I),IPRT(K)) = REAL(DBLIN(I,K))
118        CONTINUE
117      CONTINUE
      ENDIF

C      Check for implicit daughters--
      IF (NDAU(IRMD(IN)) .GT. 0) THEN

        DO 301 ID = 1, NIDRMD
          IF (IPNDX(ID) .EQ. IRMD(IN)) THEN
501          CONTINUE
          CALL SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
          IF (IEOF) GOTO 501
          IF (ISTOP) GOTO 600
          ISY = INT (ZHO)

C          Check if this radionuclide is an implicit daughter--
          IDD = 0
          IF (SYMBOL(ISY) .EQ. ELT2M(ID)) THEN
            IF (AHO .EQ. RMDAW2(ID)) THEN
              IF (META2(ID)) THEN
                IF (EXCH .EQ. 'M') IDD = ID
              ELSE
                IF (EXCH .EQ. ' ') IDD = ID
              ENDIF
            ENDIF
          ENDIF

          IF (IDD .EQ. 0) THEN

C            Daughter was not found, skip volume data set--
            CALL SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
            IF (IEOF) GOTO 501
            IF (ISTOP) GOTO 600
            GOTO 501
          ELSE

C            Daughter was found, read data set into holding array--
            DO 311 K = 1, NPRT
              DO 312 I = 1, NPRS
                TEFE2(IPRS(I),IPRT(K)) = REAL(DBLIN(I,K))
312              CONTINUE
311            CONTINUE
```

INTDF

```
IF (BONE(1) .EQ. 'S') THEN

C      Surface seeker, double check and skip over volume--
      CALL SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
      IF (IEOF) GOTO 501
      IF (ISTOP) GOTO 600

      ELSE
C      Volume seeker, read second data set and double check--
      CALL SEERED (ITYP, IUNIT, IPASS, NPASS, ISTOP, IEOF)
      IF (IEOF) GOTO 501
      IF (ISTOP) GOTO 600

C      Overlay volume data into array--
      DO 317 K = 1, NPRT
        DO 318 I = 1, NPRS
          TEFE2(IPRS(I),IPRT(K)) = REAL (DBLIN(I,K))
318      CONTINUE
317      CONTINUE
      ENDIF

C      Add daughter to parent--
      DO 417 K = 1, NTARG
        DO 418 I = 1, NSORS
          TEFE(I,K) = TEFE(I,K) + (TEFE2(I,K) * BRANCH(ID))
418      CONTINUE
417      CONTINUE

      ENDIF
      ENDIF
301    CONTINUE
    ENDIF

C      Transfer data for this radionuclide into Sij array, collect
C      summations, calculate OTHER to target organ--

C      For each target organ--
      DO 401 IT = 1, NORGL-1

        NUMER = 0.0
        DENOM = 0.0

        ITT = TINDX(IORG(IT))
        IF (ITT .LE. 0) GOTO 92

C      For each source organ--
      DO 402 IS = 1, NORGL
        ISS = SINDX(IORG(IS))
```


INTDF

```
      IF (ISS .GT. 0) THEN
        SIJ(IT,IS,IN) = TEFE(ISS,ITT) * MEVSV
        NUMER = NUMER + (MASMAS(IORG(IS)) * SIJ(IT,IS,IN))
        DENOM = DENOM + MASMAS(IORG(IS))
      ENDIF

402      CONTINUE

      SIJ(IT,NORGL,IN) = (TOTMAS * SIJ(IT,NORGL,IN) - NUMER) /
                        (TOTMAS - DENOM)
      IF (DEBUG) THEN
        WRITE (*,*) IN, IT, numer, denom, totmas*sj(it,norgl,in)
        WRITE (*,*) (SIJ(IT,IS,IN) / MEVSV ,IS=1,NORGL)
      ENDIF

C      There is a significance problem because we only read 2
C      significant figures on TEFE but values vary by up to
C      20 orders of magnitude.
      IF (SIJ(IT,NORGL,IN) .LT. 0.0) SIJ(IT,NORGL,IN) = 0.0

401      CONTINUE

      IF (META(IN)) THEN
        REWIND (IUNIT)
        READ (IUNIT) DUM
      ENDIF

      ENDIF
404 CONTINUE

600 CONTINUE
      CLOSE (IUNIT)
      RETURN

C---- Error Conditions -----
      92 WRITE (*,*) 'Target organ index is 0 (IT,IORG(it):',IT, IORG(IT)
        CALL EXIT (1)

C---- Format Statements -----
      10 FORMAT(I2,/,I2,/,I3)
      30 FORMAT(2I4)
      40 FORMAT(12A2)
      65 FORMAT(2X, A2)

C-----
      END
```

INTDF

EXTDF

C-----
C
C Program title: EXTDF - A module of the GENII
C environmental dosimetry software
C package.
C
C Prepared for: U. S. Department of Energy under
C Contract DE-AC06-76RLO 1830
C
C Contact: Bruce Napier
C Pacific Northwest Laboratory
C Richland WA 99352
C (509) 375-3916
C
C Code developers: B. A. Napier, R. A. Peloquin,
C and D. L. Streng.
C Pacific Northwest Laboratory
C Richland WA 99352
C
C This code was prepared for an agency of the United States
C Government. Neither the United States Government or any agency
C thereof, or any of their employees, make any warranty, expressed
C or implied, or assumes any legal liability or responsibility for
C any third party's use, or the results of such use, of any portion
C of this program or represents that its use by such third party
C would not infringe privately owned rights.
C
C
C--- Program Information -----
C
C Problem description: To perform external radiation dosimetry
C calculations for individuals for
C numerous potential geometries for the
C entire master list of radionuclides.
C
C Results format: The output of EXTDF is an output file
C called EXTDF.OUT. A separate data
C transfer file is prepared containing
C normalized external dose rate factors.
C
C Computer: This version is for the IBM PC/AT.
C
C Programming language: FORTRAN compiled using Lahey(tm)
C FORTRAN Compiler.
C
C Machine requirements: IBM PC/AT with a minimum of 640 Kbytes
C random access memory and 1 20-Mbyte fixed

EXTDF

disk drive.

Current Reference: B. A. Napier, R. A. Peloquin, D. L. Streng,
and J. V. Ramsdell. 1988. "GENII - The C
Hanford Environmental Radiation Dosimetry C
Software System." PNL-6584, Volumes 1, 2, C
and 3. Pacific Northwest Laboratory, C
Richland, WA 99352

Original Reference: R. L. Engel, J. Greenborg, and M. M.
Hendrickson. 1966. "ISOSHL - A Computer Code
for General Purpose Isotope Shielding C
Analysis" BNWL-236, Pacific Northwest C
Laboratory, Richland, WA

PROGRAM EXTDF

This module is the main program to calculate gamma attenuation
for various source and shield configurations. This module is
a modified version of the CONTRL subroutine of the ISOSHL
computer program, see references in the documentation. This
version of the program calculates dose rate factors for all
members of the radionuclide library. RIBD has been removed,
only single cases may be processed (NEXT has been eliminated),
and MODE has been removed from input with only MODE=2
operational.

Module of Program EXTDF of the GENII Software Package
Pacific Northwest Laboratory Environmental Dosimetry System

Last modification: 25-Jul-88 RAP
Reviewed and Approved: 13-Sept-88 BA Napier

Legend:

C	- Variable is calculated internally
I	- Variable is input is NAMELIST input
L	- Variable is input from libraries
O	- Other input
ANG1	- Cone angle for Tr. cone source, shield normal angle for line source (I)
ANG2	- Detector angle for line source (I)
BAN(8)	- Effective atomic number of build up LIBE (L)
BLIB()	- Buildup factor library (L):

EXTDF

```

C          i= Energy group,
C          j= 1 for A1, 2 for ALFA1, 3 for ALFA2
C          k= Material
C      COEF() - Energy dependent shield material coefficient (L):
C          i= Determines energy
C          j= 1=Mass absorption coef (MU), 2=Energy absorption coef C
C          (MUE)
C          k= determines material
C      DELR - Length of radial intervals for numerical integration (I)
C      DSRATE - Gamma dose rate due to energy flux rate of 1 Mev/scm/sec
C          at 16 energy levels (C)
C      EAN(20) - Effective atomic number for shield LIBE (L)
C      EAW(20) - Effective atomic weight for shield LIBE (L)
C      ENERGY() - Photon energy in MeV for 25 groups (C)
C      IEXTU - Index of selected input/output units:
C          0= rem/hr per Ci/cm3 (ISOSHL D default)
C          1= mrem/hr per Ci/m3 (MAXI1)
C          2= mrem/yr per uCi/cm3 (Kocher)
C          3= person Sv/yr per Bq/m3 (GENII air)
C          4= person Sv/yr per Bq/L (GENII on water surface)
C          5= mrem/yr per uCi/cm2 (Kocher)
C          6= person Sv/yr per Bq/m2 (GENII ground)
C          7= mrem/yr per pCi/m3 (IMPACTS-BRC ground)
C          8= mrem/hr per Ci/m2 (MAXI1)
C      IGEOM - Variable to specify source and shield geometries (I):
C          1= Point source, slab shields
C          2= Line source, slab shields
C          3= Spherical source and shields
C          4= Spherical source, slab shields
C          5= Truncated cone source and shields- detector at apex
C          6= Disc source, slab shields
C          7= Cylindrical source and shields
C          8= Cylindrical source, slab shields
C          9= Cylinder with detector at end
C          10= Rectangular solid
C          11= Cylindrical source, cyl and slab shields
C          12= Annular cylindrical source, cyl and slab shields
C      IPHSUB() - Startind subscript in photon array of each RMDLIB member (C)
C      JBUF - Shield region to be used for calculatind build up; will be
C          set to last shield if not specified (I)
C      LA() - Atomic number (L)
C      ML() - Mass number (L)
C      MODE - Type of source strength input (0). Only mode=2 is
C          allowed in this environmental version of ISOSHL D; Ci
C          of each isotope input in WEIGHT
C      MU() - Mass absorption coef for each shield no and energy group C
C      MULTI - Units correction aplied to result corresponding to option
C          parameter IEXTU
C      NPHEN - Number of photon energy groups (C)

```

EXTDF

C NPSI - No. of vertical intervals for numerical integration (I)
C NSHLD - Number of shield regions, maximum = 5, (I)
C NTHETA - No. of lateral intervals for numeric integration (I)
C PHOTON() - Photon probability library (L):
C PHOTON(1,) = Probability at
C PHOTON(2,) = MeV
C RANGE() - Range of photon energy in MeV for 16 energy groups (C)
C SLTH - Length of line or cyl source, radius of disc or end cyl
C source, length of rect source (I)
C SSV1 - Exponential SS dist SS=SSV2*XPN(SSV1*VARIABLE) (I)
C SURORG() - Organ dose to surface dose ratio for each energy range
C T - Thickness of shield regions, solid sources are considered
C as first shield region
C WIN - Scalar source inventory modification factor
C X - Dist. to detector from center of cyl and sph sources,
C through source of cone, endcyl and rect sources (I)
C Y - Offset of detector from shield normal to point source and
C and base of cyl, height of rect source (I)
C
C-----

INCLUDE 'ISO.CMN'
INCLUDE 'RMD.CMN'
INCLUDE 'DAYPC.CMN'
INCLUDE 'TITL.CMN'

DIMENSION WEIGHT(250), DUMMY(26), COEF(25,2,20),
. SHNAM(2,20), DSRATE(25), DOSE(25), EAN(20),
. EAW(20), BAN(8), DUM(25), MSHLD1(20),
. BREMS(25), ERANGE(25), TEMP(27), SURORG(25)

REAL MULTI

NAMELIST /INPUT/ T,WIN,NSHLD,SLTH,X,Y,ANG1,ANG2,ANG3,
. JBUF,IGEOM,SSV1,SSV2,NTHETA,NPSI,DELR,IEXTU

DATA WIN /1.0/, IEXTU /0/
DATA BLANK /4H /
DATA DSRATE/ 8.23E-5, 1.73E-5, .635E-5, .328E-5, .229E-5,
1 .1891E-5, .1714E-5, .1617E-5, .1603E-5, .1728E-5, .196E-5,
2 .206E-5, .204E-5, .208E-5, .200E-5, .193E-5, .184E-5, .176E-5,
3 .171E-5, .166E-5, .160E-5, .154E-5, .152E-5, .148E-5, .143E-5/

DATA (DUMMY(I),I=1,26)/.01,.02,.03,.04,.05,.06,.07,.08,.09,.1,.2,
1 .3,.4,.55,.75,.9,1.1,1.35,1.6,1.8,2.0,2.2,2.4,2.6,2.8,3.2/

DATA (DUM(I),I=1,25)/.015,.025,.035,.045,.055,.065,.075,.085,.095,
1 .15,.25,.35,.475,.65,.825,1.0,1.225,1.475,1.7,1.9,2.1,2.3,2.5,
2 2.7,3.0/

EXTDF

```
DATA ERANGE /9*.01,3*.1,.15,.2,.15,.2,2*.25,6*.2,.4/
DATA SURORG /0.0424, 0.131, 0.267, 0.410, 0.507,
.           0.550, 0.59, 0.62, 0.65, 0.67,
.           0.66, 0.65, 0.65, 0.66, 0.67,
.           0.68, 0.7, 0.72, 0.74, 0.76,
.           0.765, 0.77, 0.775, 0.777, 0.78/

C   Read file names, get system date and time, read master radionuclide
C   library, open library files--
CALL OPNFIL (3, 0, 1)
CALL MAKDA2
CALL RLIBIN
CALL OPNFIL (4, 0, 34)
CALL OPNFIL (4, 0, 26)

C   Default is to do both gamma and beta--
MODE = 2
ISPEC = 3

DO 1 I=1,26
1  RANGE(I) = DUMMY(I)

DO 2 I=1,25
2  ENERGY(I) = DUM(I)

PI = 3.1415927

C   Set number of isotopes equal to no. in RMDLIB
ISOS = NUCS

C   Read energies from library--
CALL NRGLIB

C   Read shield material library--

DO 205 IMU=1, 20
  READ (34,201) DUMMY(1),DUMMY(2),J1,K1,TEMP,ILL
  DO 701 I=1,9
    COEF(I,1,J1) = TEMP(I)
701  CONTINUE
    AN = TEMP(10)
    AW = TEMP(11)
    DO 702 I=10,25
      COEF(I,1,J1) = TEMP(I+2)
702  CONTINUE

  IF(3*IMU.NE.ILL.AND.K1.NE.1.AND.J1.LT.1.AND.J1.GT.20) THEN
    WRITE (*,202) J1
```

EXTDF

```
      ELSE
        SHNAM(1,J1)=DUMMY(1)
        SHNAM(2,J1)=DUMMY(2)
        EAN(J1)=AN
        EAW(J1)=AW
      ENDIF

205 CONTINUE

C    Read buildup coefficient library--

225 READ (34,226) J,K, (DUMMY(I),I=1,8), AN, KEY
      IF (J.GT.0 .AND. J.LE.8 .AND. K.GT.0.AND. K.LE.6) GO TO 230
C    WRITE (*,228) J,K,(DUMMY(I),I=1,8), AN,KEY

      GO TO 235
230 KS =(K+1)/ 2
      KM2= MOD(K+1,2)
      DO 232 L=1,8
        LS = L + KM2*8
232 BLIB(LS,KS ,J) = DUMMY(L)
      IF (K.EQ.1) BAN(J) = AN

235 IF (KEY.EQ.0) GO TO 225
      DO 238 I=1,8
        IF(BAN(I).GT.0.) GO TO 238

      NBUD = I-1

      GO TO 240
238 CONTINUE
      NBUD = 8
240 CONTINUE

C    Read in buildup factor for low energy groups--
C    BUPLWE(I,J,K) I= Z NUMBER, J = ENERGY, K = MEAN FREE PATH
      DO 745 I8=1,7
        READ (34,9240) ((BUPLWE(IB,JB,KB), JB=1,5), KB=1,7)
745 CONTINUE
      CLOSE (34)

C    Initialize--

      MODE = 2
      MODSAV = MODE
      NSHLD = 0
      SLTH = 0.
      X = 0.
```


EXTDF

```
Y = 0.
ANG1 = 0.
ANG2 = 0.
ANG3 = 0.
NPSI = 1
JBUF = 1
IGEOM = 0
SSV1 = 0.
SSV2 = 0.
SABAN = 0.
NPHEN=25

DO 501 I=1,25
  DO 501 J=1,6
501    MU(J,I) = 0.

DO 255 I=1,5
  T(I) = 0.
255 CONTINUE

C    Read input parameters and transfer title for printing--
      CALL OPNFIL (4, 0, 35)
      READ (35,INPUT)
      TITLS(5) = TITLS(35)

C    Convert deg to radians--
      ANG1 = ANG1 * PI / 180.
      ANG2 = ANG2 * PI / 180.
      ANG3 = ANG3 * PI / 180.

C    Open output file and print heading--
      CALL OPNFIL (2, 0, 36)
      CALL HEADNG (36)
      IF (WIN .NE. 1.0) WRITE (36,112) WIN
112  FORMAT (// 'All values have been adjusted by a factor of:',
.      T60,1PE9.1/
.      'Note: printed units are not correct.')

C    Read and process shield material specs--

      IF (J8UF.EQ.0) J8UF = NSHLD
      SUM1 = 0.
      SUM2 = 0.
      NMAXS1 = 0
      SUMSLD = 0

      WRITE (36,502) (I,I=1,5)
```

EXTDF

```
503 CONTINUE
    READ (35,*) KEY,MAT,(DUMMY(J),J=1,5)
    WRITE (36,523) (SHNAM(I,MAT),I=1,2),(DUMMY(J),J=1,5)

    IF (MAT .LT. 1 .OR. MAT .GT. 20) GOTO 91

509 IF(DUMMY(1) .GT. 0.0) THEN
    NMAXS1 = NMAXS1 + 1

    MSHLD1(NMAXS1) = MAT

    FRACT(NMAXS1)=DUMMY(1)

    IF (EAW(MAT).NE.0.) THEN
        SUMSLD = SUMSLD + EAN(MAT)*DUMMY(1)/EAW(MAT)

    ENDIF
ENDIF

C Calculate mass absorbtion coefficients--
C
DO 520 I=1,NPHEN
DO 521 J=1,NSHLD

    MU (J,I) = MU(J,I) + DUMMY(J) * COEF(I,1,MAT)

521 CONTINUE
520 CONTINUE

    IF (EAW(MAT).EQ.0.) GO TO 525
    SUM1 = DUMMY(JBUF)/ EAW(MAT) + SUM1

    SUM2 = DUMMY(JBUF) * EAN(MAT) / EAW(MAT) + SUM2

525 IF (KEY .EQ. 0) GO TO 503

DO 530 IK = 1,NMAXS1
    L = MSHLD1(IK)
    ZABS(IK)=EAN(L)
    IF (EAW(L)*SUMSLD.EQ.0.) GO TO 530
    FRACT(IK) = EAN(L)*FRACT(IK)/(EAW(L)*SUMSLD)
530 CONTINUE

    NZABS = NMAXS1
    IF (SUM1.NE.0.) ABAN = SUM2/SUM1

C Build MU for summy shield of air
DO 535 I=1,NPHEN
```

EXTDF

```
      MU(NSHLD+1,I) = COEF(I,1,3) * 1.2929E-3
535 CONTINUE

C      For environmental version always process entire RMDLIB--
      DO 620 IN=1,ISOS
C      DO 620 IN=25,25

      DO 270 I=1,3
      DO 270 J=1,25
270      SOURCE(I,J) = 0.

C      Build source strength table and calculate attenuation--
      DO 602 J=1,25
      BREMS(J) = 0.0
C      BREMS(J) is Bremsstrahlung yield in photons per MeV--
      SOURCE (1,J) = 0.
      SOURCE (2,J) = ENERGY(J)
      SOURCE (3,J) = 0.
602 CONTINUE

C      Set multiplier to activity per unit area or volume--
      IF (IGEOM .EQ. 6) THEN
      MULTI = PI * SLTH * SLTH
      ELSEIF (IGEOM .EQ. 9) THEN
      MULTI = PI * SLTH * SLTH * T(1)
      ELSEIF (IGEOM .EQ. 10) THEN
      MULTI = Y * SLTH * T(1)
      ELSE
      MULTI = 1.0
      ENDIF

      IF (IEXTU .EQ. 1) THEN
C      Units are mrem/hr per Ci/m3 (MAXII volume)
      MULTI = MULTI * 1.0E-03

      ELSEIF (IEXTU .EQ. 2) THEN
C      Units are mrem/yr per uCi/cm3 (Kocher)
      MULTI = MULTI * 8.766

      ELSEIF (IEXTU .EQ. 3) THEN
C      Units are person Sv/yr per Bq/m3 (GENII air)
      MULTI = MULTI * 2.37E-15

      ELSEIF (IEXTU .EQ. 4) THEN
C      Units are person Sv/yr per Bq/L (GENII on water surface)
      MULTI = MULTI * 2.37E-12

      ELSEIF (IEXTU .EQ. 5) THEN
```

EXTDF

```
C      Units are mrem/yr per uCi/cm2 (Kocher)
      MULTI = MULTI * 8.766

      ELSEIF (IEXTU .EQ. 6) THEN
C      Units are person Sv/yr per Bq/m2 (GENII ground)
      MULTI = MULTI * 2.37E-13

      ELSEIF (IEXTU .EQ. 7) THEN
C      Units are mrem/yr per pCi/m3 (Impacts-BRC)
      MULTI = MULTI * 8.766E-12

      ELSEIF (IEXTU .EQ. 8) THEN
C      Units are mrem/hr per Ci/m2 (MAXI1 ground)
      MULTI = MULTI * 0.1

      ELSE
C      Units are rem/hr per Ci/cm2 or cm3
      MULTI = MULTI * 1.0
      ENDIF

      IF (IN .GT. 1) WEIGHT(IN-1) = 0.0
      WEIGHT(IN) = WIN
      TERM = WEIGHT(IN)
      KBEG = IPHSUB(IN)
      KEND = KBEG + NP(IN) - 1

C      WRITE (*,*) ELTM(IN), AWM(IN), '(B/P)', NB(IN), NP(IN)
C      WRITE (*,*) '      Photons: ', KBEG, KEND
C      WRITE (*,*) '      Energy ', (PHOTON(2,I), I=KBEG, KEND)
C      WRITE (*,*) '      Inten. ', (PHOTON(1,I), I=KBEG, KEND)

      IF (NB(IN) .GT. 0) THEN

C      there are beta emitters--
      CALL BETA (IN, TERM)

      DO 9630 II=1,25

C      BRGAM(II) is the Bremsstrahlung yield in photons per MeV
C      ERANGE(II) is the group energy range in MeV
      BREMS(II) = BREMS(II) + BRGAM(II) * ERANGE(II)
      SOURCE(1,II) = SOURCE(1,II) + BRGAM(II) * ERANGE(II)

9630    CONTINUE
      ENDIF

C      WRITE (*,*) 'BRGAM:', BRGAM
```

EXTDF

```
C      IF (NP(IN) .GT. 0) THEN
        do gamma calculations--
          DO 610 K=KBEG,KEND
C      group photon energies--
          IF (PHOTON(2,K) .GT. 0.0) THEN
            DO 605 L=1,26
C      IF (PHOTON(2,K).LT. RANGE(L)) GOTO 607
605      CONTINUE
          L = 25
          GOTO 608
607      L = MAX0 (L-1, 1)
608      CONTINUE
          RAP = SOURCE(1,L)
          SOURCE(1,L) = TERM * PHOTON(1,K) * 3.7E+10 + SOURCE(1,L)
C      WRITE (*,*) 'Photon: ',L, TERM, PHOTON(1,K), RAP,
C      SOURCE(1,L)
          ENDIF
610      CONTINUE
        ENDIF
C      Build two sets of buildup coefficients for later interpolation
C      on effective atomic no.(ABAN)
C      BUF (1, ) = A1, BUF(2, )= A2 =1.-A1, BUF(3, )=ALPHA 1,
C      BUF (4, ) = ALPHA 2, BUIF = Buildup interpolation factor
C      The calculated buildup factor will be interpolated rather
C      than the coefficient
6302  IF(BAN(1).LT.ABAN) GO TO 631
      JBS1  = 1
      JBS2  = 2
      GO TO 635
631   DO 634 J=2,NBUD
      IF (ABAN - BAN(J)) 632,633,634
632   JBS1  = J-1
      JBS2  = J
      GO TO 635
633   JBS1  = J
      JBS2  = J+1
      GO TO 635
634   CONTINUE
```

EXTDF

```
JBS1  = NBUD
JBS2  = NBUD-1
635   FRED = BAN(JBS2)-BAN(JBS1)
      IF (FRED.NE.0.) BUIF = (ABAN-BAN(JBS1))/FRED

      DO 650 J=1,NPHEN
        JSAVE = J

636     IF(SOURCE(1,J)) 6636,650,6636
6636    IF(SOURCE(1,J)=-.1) 6637,6361,6361

6361    BUF (1,1)= TERP (ENERGY,BLIB(1,1,JBS1),SOURCE(2,J))
        BUF (1,2)= TERP (ENERGY,BLIB(1,1,JBS2),SOURCE(2,J))

        BUF (2,2)= 1. - BUF (1,2)

      DO 637 L=3,4

        BUF(L,1) = TERP (ENERGY,BLIB(1,L-1,JBS1), SOURCE(2,J))
        BUF(L,2) = TERP (ENERGY,BLIB(1,L-1,JBS2), SOURCE(2,J))

637    CONTINUE

C      Attenuation calculation--

6637   CONTINUE

      JPH = J

      IF (IGEOM .EQ. 1) THEN
        CALL POINT

      ELSEIF (IGEOM .EQ. 2) THEN
        CALL LINE

      ELSEIF (IGEOM .LT. 3) THEN
        CALL SPHERE

      ELSEIF (IGEOM .EQ. 5) THEN
        CALL TCONE

      ELSEIF (IGEOM .EQ. 6) THEN
        CALL DISC

      ELSEIF (IGEOM .LT. 9 .OR. IGEOM .EQ. 11) THEN
        CALL CYL

      ELSEIF (IGEOM .EQ. 9) THEN
```

EXTDF

```
      CALL ENDCYL
    ELSEIF (IGEOM .EQ. 10) THEN
      CALL RECT
    ELSEIF (IGEOM .EQ. 12) THEN
      CALL ANCYL
    ELSE
      GOTO 92
    ENDIF
C      Dose for each energy group--
      TERPB1 = TERPB(ENERGY,DSRATE,SOURCE(2,J))
      DOSE(J) = SOURCE(3,J) * TERPB1 * SURORG(J)
C      WRITE (*,*) 'SOURCE/TERPB1: ',J, SOURCE(3,J), TERPB1
C      Total dose for this radionuclide--
      TDOSE(IN) = TDOSE(IN) + DOSE(J) * MULTI
650  CONTINUE
      WRITE (*,*) 'DOSE from :', ELTM(IN), AWM(IN), TDOSE(IN)
620  CONTINUE
C      Write report--
      CALL SHORT (IEXTU)
      WRITE (*,*) 'No. of betas: ', IBESUB(NUCS)
      WRITE (*,*) 'No. of photons: ', IPHSUB(NUCS)
      STOP
C---- Error Conditions -----
91  WRITE (*,*) 'The following shield specs data rejected'
      WRITE (*,504) KEY,MAT,(DUMMY(I),I=1,5)
      STOP
92  WRITE (*,*) 'IGEOM', IGEOM, ' is out of range'
      STOP
C---- Format Statements -----
201  FORMAT(A4,A3,I2,I1,9F7.0,F2.0,F3.0/10X,9F7.0/10X,7F7.0,19X,I2)
```

EXTDF

```
202 FORMAT(' INVALID ATTENUATION COEFFICIENT SET FOR THE ',I2,  
  .16H SHIELD MATERIAL/1H ,32HCHECK YOUR RESULTS CAREFULLY....)  
226 FORMAT (8X, 2I1,8F7.0,F3.0,2X,I1)  
228 FORMAT ( 47HOFOLLOWING INVALID BUILDUP FACTOR DATA REJECTED /  
  1 1X, 2I1,8E10.3,-3PF6.3,I3)  
502 FORMAT(/,'Shield composition (gm/cc):',/9X, 5I8)  
504 FORMAT (I1,7X,I2,5E10.4)  
523 FORMAT (2A4,4X,1P,5E8.1)  
9240 FORMAT ( 6X, 10F6.3)
```

C-----
 END

EXTDF

```
C-----
C
C      SUBROUTINE BETA (J, TERM)
C
C      This module counts the number of beta end point energies or
C      probabilities. This module was taken from ISOSHL, see
C      references in documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 29-Jul-87  RAP
C-----
C
C      INCLUDE 'ISO.CMN'
C
C      ZSORCE = LA(J)
C      L = 1
C      LL = IBESUB(J)
C      LLEND = LL + NB(J) - 1
C      KOUNT = NB(J)
C
C      WRITE (*,*) '      Betas: ', LL, LLEND
C      WRITE (*,*) '      Energy ', (BETENS(2,I), I=LL, LLEND)
C      WRITE (*,*) '      Inten. ', (BETENS(1,I), I=LL, LLEND)
C
C      DO 50 I =LL, LLEND
C      BETAEP(L) = BETENS(2,I)
C      BETAPR(L) = BETENS(1,I)
50  L = L + 1
C
C      CALL BYIELD (ZSORCE)
C
C      DO 70 I = 1,25
70  BRGAM(I) = TERM * 3.7E10 * YIELD(I)
C
C      RETURN
C-----
C
C      END
```

EXTDF

```
C-----
C
C      BLOCK DATA BLOCK3
C
C      This block data routine contains the hremssstrahlung source
C      tables. This block data module was taken from ISOSHLD, see
C      references in the documentation. The filename array is also
C      initialized.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 10-Nov-87 RAP
C-----
C
C      BREMI = Internal Tables
C      BRME10 - 90 = External Tables
C-----

      INCLUDE 'FILES.CMN'
      INCLUDE 'ISO.CMN'

      DATA FILN /'FILENAME.DAT', 49* ' '/

      DATA (BREMI( 1, 1,I),I=1,25) /
      X3.37E -1,1.87E -1,1.08E -1,6.92E -2,6.03E -2,1.56E -2,7.22E -3,
      X3.94E -3,2.32E -3,1.42E -3,8.82E -4,5.52E -4,3.44E -4,2.12E -4,
      X1.28E -4,7.50E -5,4.22E -5,2.25E -5,1.11E -5,4.89E -6,1.82E -6,
      X5.03E -7,7.62E -8,1.48E -9, .00E 0 /
      DATA ((BRME10(I, 1,J),J=1,25),I=1,5) /
      X3.67E -1,2.19E -1,9.67E -2,6.10E -2,3.48E -1,7.12E -2,2.96E -2,
      X1.51E -2,8.44E -3,4.94E -3,2.96E -3,1.79E -3,1.08E -3,6.40E -4,
      X3.72E -4,2.09E -4,1.12E -4,5.65E -5,2.60E -5,1.05E -5,3.51E -6,
      X8.34E -7,9.94E -8,1.14E -9, .00E 0,1.34E 1,5.68E 0,2.65E 0,
      X1.48E 0,1.13E 0,2.40E -1,1.03E -1,5.44E -2,3.13E -2,1.88E -2,
      X1.16E -2,7.16E -3,4.41E -3,2.68E -3,1.59E -3,9.15E -4,5.02E -4,
      X2.58E -4,1.21E -4,5.00E -5,1.70E -5,4.11E -6,4.97E -7,5.75E -9,
      X .00E 0,2.26E 1,9.74E 0,4.46E 0,2.50E 0,2.01E 0,4.26E -1,
      X1.84E -1,9.70E -2,5.60E -2,3.38E -2,2.08E -2,1.29E -2,8.01E -3,
      X4.88E -3,2.91E -3,1.68E -3,9.22E -4,4.75E -4,2.24E -4,9.28E -5,
      X3.15E -5,7.65E -6,9.28E -7,1.08E -8, .00E 0,3.16E 1,1.38E 1,
      X6.24E 0,3.49E 0,2.92E 0,6.20E -1,2.67E -1,1.41E -1,8.14E -2,
      X4.91E -2,3.03E -2,1.88E -2,1.17E -2,7.11E -3,4.24E -3,2.44E -3,
      X1.34E -3,6.93E -4,3.27E -4,1.35E -4,4.60E -5,1.12E -5,1.36E -6,
      X1.57E -8, .00E 0,4.05E 1,1.80E 1,7.98E 0,4.46E 0,3.89E 0,
      XB.24E -1,3.55E -1,1.87E -1,1.08E -1,6.51E -2,4.02E -2,2.49E -2,
      X1.54E -2,9.41E -3,5.61E -3,3.23E -3,1.78E -3,9.16E -4,4.32E -4,
```

EXTDF

```

X1.79E -4,6.08E -5,1.48E -5,1.79E -6,2.08E -8, .00E 0 /
DATA (BREMI( 1, 2,I),I=1,25) /
X3.37E -1,1.87E -1,1.08E -1,6.92E -2,6.35E -2,1.66E -2,7.82E -3,
X4.34E -3,2.60E -3,1.62E -3,1.03E -3,6.58E -4,4.21E -4,2.67E -4,
X1.67E -4,1.01E -4,5.94E -5,3.30E -5,1.70E -5,7.89E -6,3.09E -6,
X9.03E -7,1.45E -7,2.98E -9, .00E 0 /
DATA ((BRME10(I, 2,J),J=1,25),I=1,5) /
X3.67E -1,2.19E -1,9.67E -2,6.10E -2,3.49E -1,6.97E -2,2.84E -2,
X1.42E -2,7.84E -3,4.52E -3,2.67E -3,1.59E -3,9.46E -4,5.55E -4,
X3.18E -4,1.77E -4,9.35E -5,4.65E -5,2.11E -5,8.42E -6,2.76E -6,
X6.45E -7,7.55E -8,8.49E-10, .00E 0,1.34E 1,5.68E 0,2.65E 0,
X1.48E 0,1.13E 0,2.36E -1,1.00E -1,5.20E -2,2.95E -2,1.75E -2,
X1.06E -2,6.49E -3,3.95E -3,2.37E -3,1.39E -3,7.93E -4,4.30E -4,
X2.19E -4,1.02E -4,4.18E -5,1.41E -5,3.38E -6,4.07E -7,4.69E -9,
X .00E 0,2.26E 1,9.74E 0,4.46E 0,2.50E 0,2.00E 0,4.20E -1,
X1.79E -1,9.35E -2,5.34E -2,3.19E -2,1.95E -2,1.20E -2,7.33E -3,
X4.43E -3,2.62E -3,1.49E -3,8.15E -4,4.17E -4,1.95E -4,8.02E -5,
X2.71E -5,6.53E -6,7.88E -7,9.08E -9, .00E 0,3.16E 1,1.38E 1,
X6.24E 0,3.49E 0,2.90E 0,6.09E -1,2.60E -1,1.36E -1,7.77E -2,
X4.65E -2,2.84E -2,1.75E -2,1.07E -2,6.49E -3,3.83E -3,2.19E -3,
X1.20E -3,6.12E -4,2.87E -4,1.18E -4,3.99E -5,9.63E -6,1.16E -6,
X1.34E -8, .00E 0,4.05E 1,1.80E 1,7.98E 0,4.46E 0,3.85E 0,
X8.07E -1,3.44E -1,1.80E -1,1.03E -1,6.14E -2,3.75E -2,2.31E -2,
X1.42E -2,8.57E -3,5.07E -3,2.90E -3,1.58E -3,8.09E -4,3.79E -4,
X1.56E -4,5.27E -5,1.27E -5,1.54E -6,1.77E -8, .00E 0 /
DATA (BREMI( 1, 3,I),I=1,25) /
X3.37E -1,1.87E -1,1.08E -1,6.92E -2,6.67E -2,1.79E -2,8.59E -3,
X4.90E -3,3.02E -3,1.95E -3,1.28E -3,8.57E -4,5.73E -4,3.80E -4,
X2.49E -4,1.59E -4,9.76E -5,5.69E -5,3.08E -5,1.50E -5,6.13E -6,
X1.87E -6,3.12E -7,6.68E -9, .00E 0 /
DATA ((BRME10(I, 3,J),J=1,25),I=1,5) /
X3.67E -1,2.19E -1,9.67E -2,6.10E -2,3.53E -1,6.79E -2,2.69E -2,
X1.31E -2,7.06E -3,3.99E -3,2.32E -3,1.36E -3,7.94E -4,4.59E -4,
X2.60E -4,1.42E -4,7.43E -5,3.64E -5,1.63E -5,6.40E -6,2.06E -6,
X4.70E -7,5.35E -8,5.80E-10, .00E 0,1.34E 1,5.68E 0,2.65E 0,
X1.48E 0,1.14E 0,2.28E -1,9.31E -2,4.67E -2,2.57E -2,1.49E -2,
X8.81E -3,5.27E -3,3.15E -3,1.86E -3,1.08E -3,6.03E -4,3.23E -4,
X1.63E -4,7.52E -5,3.06E -5,1.02E -5,2.45E -6,2.93E -7,3.37E -9,
X .00E 0,2.26E 1,9.74E 0,4.46E 0,2.50E 0,2.00E 0,4.05E -1,
X1.67E -1,8.47E -2,4.70E -2,2.74E -2,1.64E -2,9.86E -3,5.93E -3,
X3.53E -3,2.05E -3,1.16E -3,6.25E -4,3.17E -4,1.47E -4,6.02E -5,
X2.02E -5,4.86E -6,5.85E -7,6.74E -9, .00E 0,3.16E 1,1.38E 1,
X6.24E 0,3.49E 0,2.89E 0,5.86E -1,2.43E -1,1.23E -1,6.86E -2,
X4.01E -2,2.40E -2,1.45E -2,8.74E -3,5.20E -3,3.04E -3,1.72E -3,
X9.27E -4,4.70E -4,2.19E -4,8.95E -5,3.01E -5,7.24E -6,8.72E -7,
X1.00E -8, .00E 0,4.05E 1,1.80E 1,7.98E 0,4.46E 0,3.81E 0,
X7.73E -1,3.20E -1,1.62E -1,9.05E -2,5.29E -2,3.17E -2,1.91E -2,
X1.15E -2,6.87E -3,4.01E -3,2.27E -3,1.22E -3,6.21E -4,2.89E -4,
X1.18E -4,3.98E -5,9.57E -6,1.15E -6,1.33E -8, .00E 0 /

```

EXTDF

```

DATA (BREMI( 1, 4,I),I=1,25) /
X3.37E -1,1.87E -1,1.08E -1,6.92E -2,6.62E -2,1.81E -2,8.87E -3,
X5.18E -3,3.28E -3,2.17E -3,1.48E -3,1.01E -3,6.99E -4,4.78E -4,
X3.22E -4,2.11E -4,1.33E -4,7.99E -5,4.43E -5,2.20E -5,9.17E -6,
X2.85E -6,4.84E -7,1.05E -8, .00E 0 /
DATA ((8RME10(I, 4,J),J=1,25),I=1,5) /
X3.67E -1,2.19E -1,9.67E -2,6.10E -2,3.61E -1,6.75E -2,2.62E -2,
X1.26E -2,6.74E -3,3.79E -3,2.19E -3,1.28E -3,7.53E -4,4.37E -4,
X2.48E -4,1.36E -4,7.17E -5,3.53E -5,1.58E -5,6.23E -6,2.00E -6,
X4.54E -7,5.07E -8,5.29E -10, .00E 0,1.34E 1,5.68E 0,2.65E 0,
X1.48E 0,1.15E 0,2.21E -1,8.74E -2,4.28E -2,2.32E -2,1.32E -2,
X7.76E -3,4.61E -3,2.75E -3,1.62E -3,9.38E -4,5.27E -4,2.83E -4,
X1.43E -4,6.63E -5,2.70E -5,9.07E -6,2.18E -6,2.62E -7,3.02E -9,
X .00E 0,2.26E 1,9.74E 0,4.46E 0,2.50E 0,2.00E 0,3.89E -1,
X1.56E -1,7.68E -2,4.18E -2,2.40E -2,1.42E -2,8.48E -3,5.08E -3,
X3.02E -3,1.76E -3,9.94E -4,5.38E -4,2.74E -4,1.28E -4,5.26E -5,
X1.78E -5,4.30E -6,5.21E -7,6.05E -9, .00E 0,3.16E 1,1.38E 1,
X6.24E 0,3.49E 0,2.87E 0,5.61E -1,2.25E -1,1.11E -1,6.07E -2,
X3.49E -2,2.07E -2,1.24E -2,7.44E -3,4.42E -3,2.58E -3,1.46E -3,
X7.93E -4,4.04E -4,1.89E -4,7.78E -5,2.64E -5,6.38E -6,7.74E -7,
X8.98E -9, .00E 0,4.05E 1,1.80E 1,7.98E 0,4.46E 0,3.76E 0,
X7.35E -1,2.95E -1,1.46E -1,7.97E -2,4.59E -2,2.71E -2,1.63E -2,
X9.77E -3,5.81E -3,3.39E -3,1.92E -3,1.04E -3,5.31E -4,2.48E -4,
X1.02E -4,3.46E -5,8.38E -6,1.01E -6,1.18E -8, .00E 0 /
DATA (8REMI( 1, 5,I),I=1,25) /
X3.37E -1,1.87E -1,1.08E -1,6.92E -2,6.09E -2,1.69E -2,8.47E -3,
X5.06E -3,3.28E -3,2.23E -3,1.55E -3,1.09E -3,7.71E -4,5.39E -4,
X3.71E -4,2.48E -4,1.60E -4,9.72E -5,5.47E -5,2.75E -5,1.16E -5,
X3.66E -6,6.26E -7,1.37E -8, .00E 0 /
DATA ((BRME10(I, 5,J),J=1,25),I=1,5) /
X3.67E -1,2.19E -1,9.67E -2,6.10E -2,3.73E -1,6.91E -2,2.68E -2,
X1.30E -2,7.01E -3,4.00E -3,2.35E -3,1.41E -3,8.40E -4,4.97E -4,
X2.87E -4,1.61E -4,8.58E -5,4.28E -5,1.94E -5,7.67E -6,2.46E -6,
X5.54E -7,6.05E -8,5.94E -10, .00E 0,1.34E 1,5.68E 0,2.65E -0,
X1.48E 0,1.16E 0,2.17E -1,8.50E -2,4.15E -2,2.25E -2,1.30E -2,
X7.69E -3,4.63E -3,2.79E -3,1.67E -3,9.80E -4,5.57E -4,3.02E -4,
X1.54E -4,7.17E -5,2.93E -5,9.80E -6,2.34E -6,2.78E -7,3.16E -9,
X .00E 0,2.26E 1,9.74E 0,4.46E 0,2.50E 0,1.99E 0,3.77E -1,
X1.48E -1,7.25E -2,3.95E -2,2.28E -2,1.36E -2,8.19E -3,4.96E -3,
X2.98E -3,1.76E -3,1.00E -3,5.49E -4,2.81E -4,1.32E -4,5.45E -5,
X1.85E -5,4.46E -6,5.38E -7,6.21E -9, .00E 0,3.16E 1,1.38E 1,
X6.24E 0,3.49E 0,2.83E 0,5.36E -1,2.11E -1,1.03E -1,5.63E -2,
X3.25E -2,1.94E -2,1.17E -2,7.11E -3,4.28E -3,2.52E -3,1.44E -3,
X7.90E -4,4.06E -4,1.91E -4,7.90E -5,2.68E -5,6.49E -6,7.85E -7,
X9.06E -9, .00E 0,4.05E 1,1.80E 1,7.98E 0,4.46E 0,3.68E 0,
X6.96E -1,2.73E -1,1.34E -1,7.30E -2,4.21E -2,2.51E -2,1.52E -2,
X9.20E -3,5.53E -3,3.26E -3,1.87E -3,1.02E -3,5.24E -4,2.47E -4,
X1.02E -4,3.46E -5,8.37E -6,1.01E -6,1.17E -8, .00E 0 /
DATA (BREMI( 1, 6,I),I=1,25) /

```

EXTDF

```

X3.37E -1,1.87E -1,1.08E -1,6.92E -2,5.05E -2,1.42E -2,7.25E -3,
X4.40E -3,2.91E -3,2.01E -3,1.43E -3,1.02E -3,7.33E -4,5.21E -4,
X3.63E -4,2.46E -4,1.60E -4,9.86E -5,5.60E -5,2.84E -5,1.21E -5,
X3.85E -6,6.65E -7,1.47E -8, .00E 0 /
DATA ((BRME10(I, 6,J),J=1,25),I=1,5) /
X3.67E -1,2.19E -1,9.67E -2,6.10E -2,3.88E -1,7.30E -2,2.89E -2,
X1.44E -2,7.97E -3,4.67E -3,2.82E -3,1.73E -3,1.06E -3,6.38E -4,
X3.76E -4,2.14E -4,1.16E -4,5.83E -5,2.66E -5,1.05E -5,3.36E -6,
X7.45E -7,7.87E -8,7.14E -10, .00E 0,1.34E 1,5.68E 0,2.65E 0,
X1.48E 0,1.17E 0,2.20E -1,8.72E -2,4.34E -2,2.40E -2,1.41E -2,
X8.56E -3,5.26E -3,3.23E -3,1.96E -3,1.16E -3,6.67E -4,3.64E -4,
X1.86E -4,8.63E -5,3.50E -5,1.15E -5,2.69E -6,3.09E -7,3.34E -9,
X .00E 0,2.26E 1,9.74E 0,4.46E 0,2.50E 0,1.97E 0,3.70E -1,
X1.47E -1,7.30E -2,4.05E -2,2.38E -2,1.44E -2,8.86E -3,5.45E -3,
X3.31E -3,1.97E -3,1.13E -3,6.21E -4,3.19E -4,1.49E -4,6.08E -5,
X2.03E -5,4.80E -6,5.64E -7,6.28E -9, .00E 0,3.16E 1,1.38E 1,
X6.24E 0,3.49E 0,2.75E 0,5.16E -1,2.04E -1,1.01E -1,5.62E -2,
X3.30E -2,2.00E -2,1.23E -2,7.54E -3,4.59E -3,2.73E -3,1.57E -3,
X8.60E -4,4.41E -4,2.07E -4,8.46E -5,2.83E -5,6.72E -6,7.93E -7,
X8.87E -9, .00E 0,4.05E 1,1.80E 1,7.98E 0,4.46E 0,3.52E 0,
X6.58E -1,2.60E -1,1.29E -1,7.12E -2,4.17E -2,2.52E -2,1.55E -2,
X9.50E -3,5.77E -3,3.43E -3,1.97E -3,1.08E -3,5.53E -4,2.59E -4,
X1.06E -4,3.54E -5,8.41E -6,9.92E -7,1.11E -8, .00E 0 /
DATA (BREMI( 2, 1,I),I=1,25) /
X3.63E -1,1.92E -1,9.04E -2,6.77E -2,5.49E -2,1.40E -2,6.37E -3,
X3.44E -3,2.00E -3,1.21E -3,7.46E -4,4.63E -4,2.86E -4,1.75E -4,
X1.05E -4,6.10E -5,3.41E -5,1.81E -5,8.85E -6,3.88E -6,1.43E -6,
X3.95E -7,5.94E -8,1.15E -9, .00E 0 /
DATA ((8RME30(I, 1,J),J=1,25),I=1,5) /
X4.39E 0,1.78E 0,8.64E -1,4.83E -1,3.15E -1,6.37E -2,2.62E -2,
X1.32E -2,7.30E -3,4.23E -3,2.51E -3,1.50E -3,8.97E -4,5.29E -4,
X3.05E -4,1.70E -4,9.07E -5,4.54E -5,2.08E -5,8.36E -6,2.76E -6,
X6.54E -7,7.75E -8,8.82E -10, .00E 0,1.32E 1,5.49E 0,2.60E 0,
X1.45E 0,1.03E 0,2.15E -1,9.14E -2,4.75E -2,2.71E -2,1.61E -2,
X9.82E -3,6.02E -3,3.68E -3,2.22E -3,1.31E -3,7.45E -4,4.05E -4,
X2.07E -4,9.66E -5,3.97E -5,1.34E -5,3.22E -6,3.88E -7,4.46E -9,
X .00E 0,2.22E 1,9.42E 0,4.38E 0,2.45E 0,1.82E 0,3.81E -1,
X1.63E -1,8.48E -2,4.84E -2,2.89E -2,1.77E -2,1.09E -2,6.68E -3,
X4.04E -3,2.39E -3,1.37E -3,7.45E -4,3.81E -4,1.79E -4,7.35E -5,
X2.48E -5,6.00E -6,7.24E -7,8.35E -9, .00E 0,3.10E 1,1.34E 1,
X6.12E 0,3.42E 0,2.65E 0,5.55E -1,2.37E -1,1.23E -1,7.05E -2,
X4.21E -2,2.57E -2,1.58E -2,9.71E -3,5.88E -3,3.48E -3,1.99E -3,
X1.09E -3,5.56E -4,2.60E -4,1.07E -4,3.63E -5,8.76E -6,1.06E -6,
X1.22E -8, .00E 0,3.98E 1,1.74E 1,7.83E 0,4.38E 0,3.53E 0,
X7.38E -1,3.14E -1,1.64E -1,9.34E -2,5.58E -2,3.41E -2,2.10E -2,
X1.29E -2,7.78E -3,4.60E -3,2.63E -3,1.44E -3,7.35E -4,3.44E -4,
X1.42E -4,4.80E -5,1.16E -5,1.40E -6,1.61E -8, .00E 0 /
DATA (BREMI( 2, 2,I),I=1,25) /
X3.63E -1,1.92E -1,9.04E -2,6.77E -2,5.73E -2,1.48E -2,6.84E -3,

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EXTDF

```
X3.75E -3,2.22E -3,1.37E -3,8.65E -4,5.50E -4,3.50E -4,2.20E -4,
X1.37E -4,8.26E -5,4.81E -5,2.66E -5,1.37E -5,6.30E -6,2.45E -6,
X7.13E -7,1.14E -7,2.33E -9, .00E 0 /
DATA ((BRME30(I, 2,J),J=1,25),I=1,5) /
X4.39E 0,1.78E 0,8.64E -1,4.83E -1,3.12E -1,6.16E -2,2.48E -2,
X1.23E -2,6.71E -3,3.84E -3,2.25E -3,1.33E -3,7.84E -4,4.57E -4,
X2.61E -4,1.44E -4,7.56E -5,3.74E -5,1.69E -5,6.71E -6,2.19E -6,
X5.09E -7,5.93E -8,6.64E-10, .00E 0,1.32E 1,5.49E 0,2.60E 0,
X1.45E 0,1.02E 0,2.09E -1,8.78E -2,4.50E -2,2.53E -2,1.49E -2,
X8.95E -3,5.43E -3,3.28E -3,1.96E -3,1.14E -3,6.45E -4,3.48E -4,
X1.76E -4,8.17E -5,3.33E -5,1.12E -5,2.67E -6,3.20E -7,3.67E -9,
X .00E 0,2.22E 1,9.42E 0,4.38E 0,2.45E 0,1.79E 0,3.72E -1,
X1.57E -1,8.10E -2,4.58E -2,2.71E -2,1.64E -2,1.00E -2,6.09E -3,
X3.66E -3,2.14E -3,1.22E -3,6.60E -4,3.35E -4,1.56E -4,6.39E -5,
X2.15E -5,5.15E -6,6.19E -7,7.11E -9, .00E 0,3.10E 1,1.34E 1,
X6.12E 0,3.42E 0,2.61E 0,5.40E -1,2.28E -1,1.18E -1,6.67E -2,
X3.95E -2,2.39E -2,1.46E -2,8.90E -3,5.35E -3,3.14E -3,1.78E -3,
X9.68E -4,4.93E -4,2.29E -4,9.40E -5,3.16E -5,7.60E -6,9.13E -7,
X1.05E -8, .00E 0,3.98E 1,1.74E 1,7.83E 0,4.38E 0,3.45E 0,
X7.15E -1,3.02E -1,1.56E -1,8.82E -2,5.22E -2,3.17E -2,1.93E -2,
X1.18E -2,7.07E -3,4.15E -3,2.36E -3,1.28E -3,6.51E -4,3.03E -4,
X1.24E -4,4.18E -5,1.00E -5,1.21E -6,1.39E -8, .00E 0 /
DATA (BREMI( 2, 3,I),I=1,25) /
X3.63E -1,1.92E -1,9.04E -2,6.77E -2,6.13E -2,1.62E -2,7.73E -3,
X4.38E -3,2.68E -3,1.72E -3,1.13E -3,7.49E -4,4.98E -4,3.29E -4,
X2.14E -4,1.36E -4,8.35E -5,4.85E -5,2.62E -5,1.27E -5,5.17E -6,
X1.57E -6,2.62E -7,5.59E -9, .00E 0 /
DATA ((BRME30(I, 3,J),J=1,25),I=1,5) /
X4.39E 0,1.78E 0,8.64E -1,4.83E -1,3.23E -1,6.14E -2,2.41E -2,
X1.17E -2,6.25E -3,3.51E -3,2.03E -3,1.18E -3,6.88E -4,3.96E -4,
X2.23E -4,1.22E -4,6.34E -5,3.09E -5,1.38E -5,5.41E -6,1.73E -6,
X3.95E -7,4.48E -8,4.85E-10, .00E 0,1.32E 1,5.49E 0,2.60E 0,
X1.45E 0,1.04E 0,2.06E -1,8.37E -2,4.17E -2,2.28E -2,1.31E -2,
X7.72E -3,4.59E -3,2.73E -3,1.61E -3,9.26E -4,5.17E -4,2.76E -4,
X1.39E -4,6.38E -5,2.58E -5,8.61E -6,2.05E -6,2.46E -7,2.82E -9,
X .00E 0,2.22E 1,9.42E 0,4.38E 0,2.45E 0,1.83E 0,3.67E -1,
X1.50E -1,7.56E -2,4.17E -2,2.42E -2,1.43E -2,8.60E -3,5.15E -3,
X3.05E -3,1.77E -3,9.94E -4,5.34E -4,2.70E -4,1.25E -4,5.08E -5,
X1.70E -5,4.08E -6,4.90E -7,5.63E -9, .00E 0,3.10E 1,1.34E 1,
X6.12E 0,3.42E 0,2.64E 0,5.31E -1,2.18E -1,1.10E -1,6.09E -2,
X3.53E -2,2.10E -2,1.26E -2,7.58E -3,4.50E -3,2.61E -3,1.47E -3,
X7.91E -4,4.00E -4,1.85E -4,7.56E -5,2.54E -5,6.08E -6,7.30E -7,
X8.39E -9, .00E 0,3.98E 1,1.74E 1,7.83E 0,4.38E 0,3.48E 0,
X7.00E -1,2.88E -1,1.45E -1,8.03E -2,4.66E -2,2.78E -2,1.67E -2,
X1.00E -2,5.94E -3,3.45E -3,1.94E -3,1.05E -3,5.29E -4,2.45E -4,
X9.99E -5,3.35E -5,8.04E -6,9.65E -7,1.11E -8, .00E 0 /
DATA (BREMI( 2, 4,I),I=1,25) /
X3.63E -1,1.92E -1,9.04E -2,6.77E -2,6.26E -2,1.70E -2,8.28E -3,
X4.81E -3,3.03E -3,2.00E -3,1.36E -3,9.29E -4,6.38E -4,4.35E -4,
```

EXTDF

```

X2.92E -4,1.91E -4,1.20E -4,7.19E -5,3.98E -5,1.97E -5,8.20E -6,
X2.54E -6,4.31E -7,9.34E -9, .00E 0 /
DATA ((BRME30(I, 4,J),J=1,25),I=1,5) /
X4.39E 0,1.78E 0,8.64E -1,4.83E -1,3.39E -1,6.30E -2,2.44E -2,
X1.17E -2,6.20E -3,3.47E -3,2.00E -3,1.17E -3,6.84E -4,3.96E -4,
X2.24E -4,1.23E -4,6.45E -5,3.17E -5,1.42E -5,5.57E -6,1.78E -6,
X4.04E -7,4.51E -8,4.69E -10, .00E 0,1.32E 1,5.49E 0,2.60E 0,
X1.45E 0,1.08E 0,2.06E -1,8.13E -2,3.96E -2,2.14E -2,1.21E -2,
X7.10E -3,4.21E -3,2.50E -3,1.47E -3,8.49E -4,4.75E -4,2.55E -4,
X1.29E -4,5.94E -5,2.42E -5,8.09E -6,1.94E -6,2.33E -7,2.68E -9,
X .00E 0,2.22E 1,9.42E 0,4.38E 0,2.45E 0,1.88E 0,3.64E -1,
X1.45E -1,7.12E -2,3.86E -2,2.21E -2,1.30E -2,7.74E -3,4.62E -3,
X2.74E -3,1.59E -3,8.97E -4,4.84E -4,2.46E -4,1.15E -4,4.70E -5,
X1.59E -5,3.83E -6,4.64E -7,5.37E -9, .00E 0,3.10E 1,1.34E 1,
X6.12E 0,3.42E 0,2.70E 0,5.25E -1,2.09E -1,1.03E -1,5.60E -2,
X3.21E -2,1.89E -2,1.13E -2,6.77E -3,4.01E -3,2.34E -3,1.32E -3,
X7.14E -4,3.63E -4,1.69E -4,6.96E -5,2.35E -5,5.69E -6,6.88E -7,
X7.97E -9, .00E 0,3.98E 1,1.74E 1,7.83E 0,4.38E 0,3.54E 0,
X6.88E -1,2.74E -1,1.35E -1,7.35E -2,4.21E -2,2.49E -2,1.49E -2,
X8.89E -3,5.27E -3,3.07E -3,1.73E -3,9.37E -4,4.77E -4,2.22E -4,
X9.14E -5,3.09E -5,7.46E -6,9.03E -7,1.04E -8, .00E 0 /
DATA (8REMI( 2, 5,I),I=1,25) /
X3.63E -1,1.92E -1,9.04E -2,6.77E -2,5.91E -2,1.63E -2,8.16E -3,
X4.86E -3,3.14E -3,2.13E -3,1.48E -3,1.04E -3,7.32E -4,5.11E -4,
X3.51E -4,2.34E -4,1.50E -4,9.12E -5,5.12E -5,2.57E -5,1.08E -5,
X3.41E -6,5.83E -7,1.28E -8, .00E 0 /
DATA ((BRME30(I, 5,J),J=1,25),I=1,5) /
X4.39E 0,1.78E 0,8.64E -1,4.83E -1,3.60E -1,6.64E -2,2.57E -2,
X1.24E -2,6.67E -3,3.80E -3,2.23E -3,1.33E -3,7.93E -4,4.68E -4,
X2.71E -4,1.51E -4,8.05E -5,4.01E -5,1.81E -5,7.17E -6,2.30E -6,
X5.16E -7,5.62E -8,5.52E -10, .00E 0,1.32E 1,5.49E 0,2.60E 0,
X1.45E 0,1.12E 0,2.09E -1,8.15E -2,3.97E -2,2.15E -2,1.23E -2,
X7.29E -3,4.38E -3,2.64E -3,1.58E -3,9.23E -4,5.24E -4,2.84E -4,
X1.44E -4,6.71E -5,2.74E -5,9.14E -6,2.18E -6,2.58E -7,2.94E -9,
X .00E 0,2.22E 1,9.42E 0,4.38E 0,2.45E 0,1.93E 0,3.62E -1,
X1.42E -1,6.93E -2,3.76E -2,2.16E -2,1.29E -2,7.76E -3,4.69E -3,
X2.82E -3,1.66E -3,9.45E -4,5.15E -4,2.64E -4,1.24E -4,5.09E -5,
X1.72E -5,4.15E -6,5.00E -7,5.77E -9, .00E 0,3.10E 1,1.34E 1,
X6.12E 0,3.42E 0,2.74E 0,5.16E -1,2.02E -1,9.89E -2,5.37E -2,
X3.09E -2,1.84E -2,1.11E -2,6.73E -3,4.04E -3,2.38E -3,1.36E -3,
X7.42E -4,3.81E -4,1.79E -4,7.38E -5,2.50E -5,6.04E -6,7.30E -7,
X8.41E -9, .00E 0,3.98E 1,1.74E 1,7.83E 0,4.38E 0,3.55E 0,
X6.69E -1,2.62E -1,1.28E -1,6.96E -2,4.01E -2,2.38E -2,1.44E -2,
X8.70E -3,5.22E -3,3.07E -3,1.75E -3,9.58E -4,4.91E -4,2.31E -4,
X9.52E -5,3.22E -5,7.79E -6,9.41E -7,1.08E -8, .00E 0 /
DATA (BREMI( 2, 6,I),I=1,25) /
X3.63E -1,1.92E -1,9.04E -2,6.77E -2,4.97E -2,1.40E -2,7.11E -3,
X4.31E -3,2.84E -3,1.96E -3,1.39E -3,9.93E -4,7.11E -4,5.04E -4,
X3.51E -4,2.37E -4,1.54E -4,9.47E -5,5.38E -5,2.72E -5,1.16E -5,

```

EXTDF

```

X3.67E -6,6.34E -7,1.40E -8, .00E 0 /
DATA ((BRME30(I, 6,J),J=1,25),I=1,5) /
X4.39E 0,1.78E 0,8.64E -1,4.83E -1,3.80E -1,7.13E -2,2.82E -2,
X1.40E -2,7.74E -3,4.53E -3,2.73E -3,1.67E -3,1.02E -3,6.15E -4,
X3.62E -4,2.06E -4,1.11E -4,5.59E -5,2.55E -5,1.01E -5,3.21E -6,
X7.11E -7,7.50E -8,6.80E -10, .00E 0,1.32E 1,5.49E 0,2.60E 0,
X1.45E 0,1.14E 0,2.15E -1,8.50E -2,4.22E -2,2.34E -2,1.37E -2,
X8.29E -3,5.09E -3,3.12E -3,1.89E -3,1.12E -3,6.42E -4,3.50E -4,
X1.78E -4,8.27E -5,3.35E -5,1.10E -5,2.57E -6,2.94E -7,3.18E -9,
X .00E 0,2.22E 1,9.42E 0,4.38E 0,2.45E 0,1.93E 0,3.62E -1,
X1.43E -1,7.11E -2,3.93E -2,2.31E -2,1.40E -2,8.57E -3,5.26E -3,
X3.20E -3,1.90E -3,1.09E -3,5.97E -4,3.06E -4,1.43E -4,5.82E -5,
X1.94E -5,4.58E -6,5.37E -7,5.98E -9, .00E 0,3.10E 1,1.34E 1,
X6.12E 0,3.42E 0,2.70E 0,5.05E -1,1.99E -1,9.88E -2,5.46E -2,
X3.20E -2,1.94E -2,1.19E -2,7.29E -3,4.42E -3,2.63E -3,1.51E -3,
X8.26E -4,4.23E -4,1.98E -4,8.09E -5,2.70E -5,6.41E -6,7.55E -7,
X8.44E -9, .00E 0,3.98E 1,1.74E 1,7.83E 0,4.38E 0,3.45E 0,
X6.44E -1,2.54E -1,1.25E -1,6.92E -2,4.05E -2,2.45E -2,1.50E -2,
X9.18E -3,5.57E -3,3.30E -3,1.89E -3,1.04E -3,5.31E -4,2.48E -4,
X1.01E -4,3.38E -5,8.03E -6,9.45E -7,1.06E -8, .00E 0 /
DATA (BREMI( 3, 1,I),I=1,25) /
X3.56E -1,1.87E -1,8.90E -2,6.55E -2,5.43E -2,1.38E -2,6.26E -3,
X3.37E -3,1.96E -3,1.18E -3,7.26E -4,4.49E -4,2.77E -4,1.69E -4,
X1.01E -4,5.86E -5,3.27E -5,1.73E -5,8.45E -6,3.70E -6,1.36E -6,
X3.74E -7,5.62E -8,1.08E -9, .00E 0 /
DATA ((BRME50(I, 1,J),J=1,25),I=1,5) /
X4.27E 0,1.72E 0,8.40E -1,4.69E -1,3.11E -1,6.28E -2,2.57E -2,
X1.29E -2,7.14E -3,4.13E -3,2.44E -3,1.46E -3,8.69E -4,5.11E -4,
X2.94E -4,1.64E -4,8.70E -5,4.34E -5,1.98E -5,7.96E -6,2.63E -6,
X6.20E -7,7.33E -8,8.32E -10, .00E 0,1.28E 1,5.31E 0,2.53E 0,
X1.41E 0,1.01E 0,2.12E -1,8.99E -2,4.67E -2,2.65E -2,1.57E -2,
X9.56E -3,5.85E -3,3.57E -3,2.14E -3,1.26E -3,7.17E -4,3.89E -4,
X1.98E -4,9.22E -5,3.78E -5,1.27E -5,3.05E -6,3.67E -7,4.21E -9,
X .00E 0,2.16E 1,9.12E 0,4.26E 0,2.38E 0,1.80E 0,3.76E -1,
X1.60E -1,8.32E -2,4.74E -2,2.83E -2,1.72E -2,1.06E -2,6.47E -3,
X3.90E -3,2.30E -3,1.31E -3,7.15E -4,3.65E -4,1.71E -4,7.00E -5,
X2.36E -5,5.69E -6,6.84E -7,7.88E -9, .00E 0,3.03E 1,1.30E 1,
X5.96E 0,3.33E 0,2.62E 0,5.48E -1,2.33E -1,1.21E -1,6.90E -2,
X4.11E -2,2.51E -2,1.54E -2,9.42E -3,5.68E -3,3.35E -3,1.91E -3,
X1.04E -3,5.32E -4,2.49E -4,1.02E -4,3.45E -5,8.30E -6,1.00E -6,
X1.15E -8, .00E 0,3.88E 1,1.68E 1,7.63E 0,4.26E 0,3.49E 0,
X7.28E -1,3.09E -1,1.61E -1,9.15E -2,5.45E -2,3.32E -2,2.04E -2,
X1.25E -2,7.52E -3,4.44E -3,2.53E -3,1.38E -3,7.04E -4,3.29E -4,
X1.35E -4,4.56E -5,1.10E -5,1.32E -6,1.52E -8, .00E 0 /
DATA (BREMI( 3, 2,I),I=1,25) /
X3.56E -1,1.87E -1,8.90E -2,6.55E -2,5.58E -2,1.43E -2,6.60E -3,
X3.60E -3,2.13E -3,1.31E -3,8.21E -4,5.20E -4,3.30E -4,2.07E -4,
X1.28E -4,7.71E -5,4.48E -5,2.47E -5,1.26E -5,5.80E -6,2.25E -6,
X6.54E -7,1.04E -7,2.12E -9, .00E 0 /

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EXTDF

```

DATA ((BRME50(I, 2,J),J=1,25),I=1,5) /
X4.27E 0,1.72E 0,8.40E -1,4.69E -1,3.04E -1,5.96E -2,2.39E -2,
X1.18E -2,6.41E -3,3.65E -3,2.13E -3,1.26E -3,7.39E -4,4.29E -4,
X2.44E -4,1.34E -4,7.03E -5,3.46E -5,1.56E -5,6.18E -6,2.01E -6,
X4.66E -7,5.41E -8,6.05E-10, .00E 0,1.28E 1,5.31E 0,2.53E 0,
X1.41E 0,9.88E -1,2.03E -1,8.47E -2,4.33E -2,2.42E -2,1.42E -2,
X8.50E -3,5.13E -3,3.09E -3,1.84E -3,1.07E -3,6.02E -4,3.24E -4,
X1.63E -4,7.55E -5,3.07E -5,1.02E -5,2.45E -6,2.92E -7,3.34E -9,
X .00E 0,2.16E 1,9.12E 0,4.26E 0,2.38E 0,1.75E 0,3.60E -1,
X1.51E -1,7.79E -2,4.39E -2,2.59E -2,1.56E -2,9.48E -3,5.74E -3,
X3.43E -3,2.01E -3,1.14E -3,6.13E -4,3.11E -4,1.44E -4,5.88E -5,
X1.97E -5,4.72E -6,5.65E -7,6.47E -9, .00E 0,3.03E 1,1.30E 1,
X5.96E 0,3.33E 0,2.54E 0,5.23E -1,2.20E -1,1.13E -1,6.38E -2,
X3.77E -2,2.27E -2,1.38E -2,8.39E -3,5.02E -3,2.94E -3,1.67E -3,
X9.00E -4,4.57E -4,2.12E -4,8.66E -5,2.90E -5,6.96E -6,8.34E -7,
X9.55E -9, .00E 0,3.88E 1,1.68E 1,7.63E 0,4.26E 0,3.36E 0,
X6.93E -1,2.91E -1,1.50E -1,8.44E -2,4.98E -2,3.01E -2,1.83E -2,
X1.11E -2,6.64E -3,3.89E -3,2.20E -3,1.19E -3,6.04E -4,2.80E -4,
X1.14E -4,3.84E -5,9.20E -6,1.10E -6,1.26E -8, .00E 0 /
DATA (BREMI( 3, 3,I),I=1,25) /
X3.56E -1,1.87E -1,8.90E -2,6.55E -2,5.89E -2,1.55E -2,7.33E -3,
X4.13E -3,2.52E -3,1.61E -3,1.05E -3,6.94E -4,4.60E -4,3.03E -4,
X1.97E -4,1.25E -4,7.60E -5,4.41E -5,2.37E -5,1.14E -5,4.65E -6,
X1.41E -6,2.34E -7,4.98E -9, .00E 0 /
DATA ((BRME50(I, 3,J),J=1,25),I=1,5) /
X4.27E 0,1.72E 0,8.40E -1,4.69E -1,3.08E -1,5.83E -2,2.28E -2,
X1.10E -2,5.84E -3,3.27E -3,1.88E -3,1.09E -3,6.33E -4,3.63E -4,
X2.04E -4,1.11E -4,5.76E -5,2.80E -5,1.25E -5,4.87E -6,1.56E -6,
X3.54E -7,4.01E -8,4.32E-10, .00E 0,1.28E 1,5.31E 0,2.53E 0,
X1.41E 0,9.95E -1,1.96E -1,7.92E -2,3.92E -2,2.14E -2,1.22E -2,
X7.17E -3,4.25E -3,2.52E -3,1.48E -3,8.47E -4,4.72E -4,2.51E -4,
X1.26E -4,5.76E -5,2.33E -5,7.74E -6,1.84E -6,2.20E -7,2.51E -9,
X .00E 0,2.16E 1,9.12E 0,4.26E 0,2.38E 0,1.75E 0,3.49E -1,
X1.42E -1,7.12E -2,3.91E -2,2.25E -2,1.33E -2,7.96E -3,4.75E -3,
X2.80E -3,1.62E -3,9.06E -4,4.86E -4,2.44E -4,1.13E -4,4.58E -5,
X1.53E -5,3.66E -6,4.38E -7,5.03E -9, .00E 0,3.03E 1,1.30E 1,
X5.96E 0,3.33E 0,2.53E 0,5.06E -1,2.07E -1,1.04E -1,5.71E -2,
X3.30E -2,1.95E -2,1.17E -2,6.99E -3,4.13E -3,2.39E -3,1.34E -3,
X7.20E -4,3.63E -4,1.68E -4,6.82E -5,2.28E -5,5.46E -6,6.53E -7,
X7.49E -9, .00E 0,3.88E 1,1.68E 1,7.63E 0,4.26E 0,3.33E 0,
X6.67E -1,2.72E -1,1.37E -1,7.53E -2,4.35E -2,2.58E -2,1.54E -2,
X9.23E -3,5.46E -3,3.16E -3,1.77E -3,9.51E -4,4.79E -4,2.21E -4,
X9.01E -5,3.01E -5,7.21E -6,8.63E -7,9.89E -9, .00E 0 /
DATA (BREMI( 3, 4,I),I=1,25) /
X3.56E -1,1.87E -1,8.90E -2,6.55E -2,6.02E -2,1.62E -2,7.88E -3,
X4.56E -3,2.86E -3,1.88E -3,1.27E -3,8.67E -4,5.94E -4,4.04E -4,
X2.70E -4,1.76E -4,1.11E -4,6.59E -5,3.63E -5,1.79E -5,7.45E -6,
X2.30E -6,3.89E -7,8.41E -9, .00E 0 /
DATA ((BRME50(I, 4,J),J=1,25),I=1,5) /

```

EXTDF

```

X4.27E 0,1.72E 0,8.40E -1,4.69E -1,3.24E -1,5.99E -2,2.30E -2,
X1.10E -2,5.82E -3,3.25E -3,1.87E -3,1.09E -3,6.34E -4,3.66E -4,
X2.07E -4,1.13E -4,5.91E -5,2.89E -5,1.29E -5,5.07E -6,1.62E -6,
X3.66E -7,4.07E -8,4.23E-10, .00E 0,1.28E 1,5.31E 0,2.53E 0,
X1.41E 0,1.03E 0,1.96E -1,7.70E -2,3.74E -2,2.01E -2,1.14E -2,
X6.62E -3,3.91E -3,2.32E -3,1.36E -3,7.82E -4,4.37E -4,2.34E -4,
X1.18E -4,5.42E -5,2.20E -5,7.35E -6,1.75E -6,2.10E -7,2.42E -9,
X .00E 0,2.16E 1,9.12E 0,4.26E 0,2.38E 0,1.80E 0,3.47E -1,
X1.37E -1,6.72E -2,3.63E -2,2.07E -2,1.21E -2,7.21E -3,4.29E -3,
X2.53E -3,1.47E -3,8.25E -4,4.44E -4,2.25E -4,1.04E -4,4.28E -5,
X1.44E -5,3.47E -6,4.19E -7,4.84E -9, .00E 0,3.03E 1,1.30E 1,
X5.96E 0,3.33E 0,2.59E 0,5.00E -1,1.98E -1,9.73E -2,5.27E -2,
X3.01E -2,1.77E -2,1.05E -2,6.28E -3,3.71E -3,2.15E -3,1.21E -3,
X6.55E -4,3.32E -4,1.55E -4,6.33E -5,2.13E -5,5.15E -6,6.22E -7,
X7.18E -9, .00E 0,3.88E 1,1.68E 1,7.63E 0,4.26E 0,3.39E 0,
X6.55E -1,2.60E -1,1.28E -1,6.92E -2,3.95E -2,2.32E -2,1.38E -2,
X8.25E -3,4.88E -3,2.83E -3,1.59E -3,8.60E -4,4.36E -4,2.03E -4,
X8.31E -5,2.80E -5,6.75E -6,8.15E -7,9.41E -9, .00E 0 /
DATA (BREMI( 3, 5,I),I=1,25) /
X3.56E -1,1.87E -1,8.90E -2,6.55E -2,5.74E -2,1.58E -2,7.86E -3,
X4.66E -3,3.01E -3,2.03E -3,1.41E -3,9.85E -4,6.91E -4,4.81E -4,
X3.29E -4,2.19E -4,1.40E -4,8.49E -5,4.76E -5,2.38E -5,1.00E -5,
X3.13E -6,5.34E -7,1.17E -8, .00E 0 /
DATA ((BRME50(I, 5,J),J=1,25),I=1,5) /
X4.27E 0,1.72E 0,8.40E -1,4.69E -1,3.47E -1,6.37E -2,2.45E -2,
X1.18E -2,6.34E -3,3.60E -3,2.11E -3,1.25E -3,7.45E -4,4.39E -4,
X2.53E -4,1.41E -4,7.48E -5,3.72E -5,1.68E -5,6.61E -6,2.11E -6,
X4.74E -7,5.15E -8,5.04E-10, .00E 0,1.28E 1,5.31E 0,2.53E 0,
X1.41E 0,1.08E 0,2.01E -1,7.79E -2,3.78E -2,2.04E -2,1.17E -2,
X6.89E -3,4.13E -3,2.48E -3,1.48E -3,8.63E -4,4.88E -4,2.64E -4,
X1.34E -4,6.21E -5,2.53E -5,8.42E -6,2.00E -6,2.37E -7,2.68E -9,
X .00E 0,2.16E 1,9.12E 0,4.26E 0,2.38E 0,1.86E 0,3.48E -1,
X1.36E -1,6.61E -2,3.58E -2,2.05E -2,1.22E -2,7.32E -3,4.41E -3,
X2.64E -3,1.55E -3,8.81E -4,4.79E -4,2.45E -4,1.14E -4,4.70E -5,
X1.59E -5,3.81E -6,4.59E -7,5.27E -9, .00E 0,3.03E 1,1.30E 1,
X5.96E 0,3.33E 0,2.64E 0,4.96E -1,1.94E -1,9.43E -2,5.11E -2,
X2.93E -2,1.74E -2,1.05E -2,6.33E -3,3.79E -3,2.22E -3,1.27E -3,
X6.91E -4,3.53E -4,1.65E -4,6.81E -5,2.30E -5,5.55E -6,6.69E -7,
X7.69E -9, .00E 0,3.88E 1,1.68E 1,7.63E 0,4.26E 0,3.43E 0,
X6.43E -1,2.51E -1,1.22E -1,6.62E -2,3.80E -2,2.25E -2,1.36E -2,
X8.18E -3,4.90E -3,2.87E -3,1.64E -3,8.92E -4,4.56E -4,2.14E -4,
X8.79E -5,2.97E -5,7.16E -6,8.62E -7,9.90E -9, .00E 0 /
DATA (BREMI( 3, 6,I),I=1,25) /
X3.56E -1,1.87E -1,8.90E -2,6.55E -2,4.88E -2,1.37E -2,6.92E -3,
X4.18E -3,2.75E -3,1.89E -3,1.34E -3,9.53E -4,6.80E -4,4.80E -4,
X3.33E -4,2.25E -4,1.46E -4,8.91E -5,5.04E -5,2.54E -5,1.08E -5,
X3.41E -6,5.87E -7,1.29E -8, .00E 0 /
DATA ((BRME50(I, 6,J),J=1,25),I=1,5) /
X4.27E 0,1.72E 0,8.40E -1,4.69E -1,3.70E -1,6.90E -2,2.72E -2,

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EXTDF

```

X1.35E -2,7.42E -3,4.33E -3,2.61E -3,1.59E -3,9.68E -4,5.82E -4,
X3.42E -4,1.94E -4,1.04E -4,5.23E -5,2.38E -5,9.39E -6,2.98E -6,
X6.59E -7,6.94E -8,6.27E-10, .00E 0,1.28E 1,5.31E 0,2.53E 0,
X1.41E 0,1.11E 0,2.08E -1,8.20E -2,4.06E -2,2.24E -2,1.31E -2,
X7.91E -3,4.84E -3,2.96E -3,1.79E -3,1.06E -3,6.04E -4,3.29E -4,
X1.67E -4,7.73E -5,3.12E -5,1.03E -5,2.38E -6,2.72E -7,2.94E -9,
X .00E 0,2.16E 1,9.12E 0,4.26E 0,2.38E 0,1.88E 0,3.51E -1,
X1.38E -1,6.84E -2,3.77E -2,2.21E -2,1.33E -2,8.16E -3,5.00E -3,
X3.03E -3,1.79E -3,1.03E -3,5.61E -4,2.86E -4,1.33E -4,5.43E -5,
X1.80E -5,4.25E -6,4.97E -7,5.52E -9, .00E 0,3.03E 1,1.30E 1,
X5.96E 0,3.33E 0,2.62E 0,4.89E -1,1.92E -1,9.51E -2,5.24E -2,
X3.06E -2,1.85E -2,1.13E -2,6.92E -3,4.19E -3,2.48E -3,1.42E -3,
X7.76E -4,3.97E -4,1.85E -4,7.55E -5,2.51E -5,5.95E -6,6.99E -7,
X7.79E -9, .00E 0,3.88E 1,1.68E 1,7.63E 0,4.26E 0,3.36E 0,
X6.24E -1,2.45E -1,1.21E -1,6.65E -2,3.88E -2,2.34E -2,1.43E -2,
X8.72E -3,5.27E -3,3.12E -3,1.78E -3,9.74E -4,4.97E -4,2.32E -4,
X9.44E -5,3.15E -5,7.45E -6,8.75E -7,9.74E -9, .00E 0 /
DATA (BREMI( 4, 1,I),I=1,25) /
X3.46E -1,1.79E -1,8.65E -2,6.49E -2,5.43E -2,1.37E -2,6.25E -3,
X3.36E -3,1.95E -3,1.17E -3,7.22E -4,4.46E -4,2.75E -4,1.67E -4,
X1.00E -4,5.81E -5,3.24E -5,1.71E -5,8.35E -6,3.65E -6,1.34E -6,
X3.69E -7,5.53E -8,1.07E -9, .00E 0 /
DATA ((BRME70(I, 1,J),J=1,25),I=1,5) /
X4.12E 0,1.66E 0,8.08E -1,4.51E -1,3.11E -1,6.26E -2,2.57E -2,
X1.29E -2,7.11E -3,4.11E -3,2.43E -3,1.45E -3,8.63E -4,5.07E -4,
X2.91E -4,1.62E -4,8.61E -5,4.29E -5,1.96E -5,7.85E -6,2.59E -6,
X6.10E -7,7.21E -8,8.18E-10, .00E 0,1.24E 1,5.11E 0,2.43E 0,
X1.36E 0,1.01E 0,2.11E -1,8.97E -2,4.65E -2,2.64E -2,1.57E -2,
X9.52E -3,5.82E -3,3.54E -3,2.13E -3,1.25E -3,7.10E -4,3.85E -4,
X1.96E -4,9.11E -5,3.73E -5,1.25E -5,3.01E -6,3.61E -7,4.14E -9,
X .00E 0,2.09E 1,8.78E 0,4.11E 0,2.29E 0,1.79E 0,3.75E -1,
X1.60E -1,8.30E -2,4.72E -2,2.81E -2,1.71E -2,1.05E -2,6.43E -3,
X3.87E -3,2.28E -3,1.30E -3,7.07E -4,3.61E -4,1.68E -4,6.91E -5,
X2.33E -5,5.60E -6,6.73E -7,7.74E -9, .00E 0,2.92E 1,1.25E 1,
X5.75E 0,3.21E 0,2.62E 0,5.47E -1,2.32E -1,1.21E -1,6.87E -2,
X4.09E -2,2.49E -2,1.53E -2,9.35E -3,5.64E -3,3.32E -3,1.89E -3,
X1.03E -3,5.26E -4,2.46E -4,1.01E -4,3.40E -5,8.17E -6,9.84E -7,
X1.13E -8, .00E 0,3.75E 1,1.62E 1,7.36E 0,4.11E 0,3.48E 0,
X7.27E -1,3.08E -1,1.60E -1,9.11E -2,5.43E -2,3.30E -2,2.03E -2,
X1.24E -2,7.46E -3,4.40E -3,2.51E -3,1.36E -3,6.96E -4,3.25E -4,
X1.33E -4,4.49E -5,1.08E -5,1.30E -6,1.50E -8, .00E 0 /
DATA (BREMI( 4, 2,I),I=1,25) /
X3.46E -1,1.79E -1,8.65E -2,6.49E -2,5.54E -2,1.42E -2,6.52E -3,
X3.55E -3,2.09E -3,1.28E -3,8.05E -4,5.09E -4,3.22E -4,2.02E -4,
X1.25E -4,7.49E -5,4.34E -5,2.39E -5,1.22E -5,5.60E -6,2.17E -6,
X6.28E -7,9.95E -8,2.03E -9, .00E 0 /
DATA ((BRME70(I, 2,J),J=1,25),I=1,5) /
X4.12E 0,1.66E 0,8.08E -1,4.51E -1,3.01E -1,5.90E -2,2.36E -2,
X1.17E -2,6.31E -3,3.59E -3,2.09E -3,1.23E -3,7.21E -4,4.18E -4,

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EXTDF

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X2.37E -4,1.30E -4,6.81E -5,3.35E -5,1.51E -5,5.95E -6,1.93E -6,
X4.47E -7,5.19E -8,5.79E-10, .00E 0,1.24E 1,5.11E 0,2.43E 0,
X1.36E 0,9.79E -1,2.01E -1,8.37E -2,4.27E -2,2.38E -2,1.39E -2,
X8.33E -3,5.03E -3,3.02E -3,1.79E -3,1.04E -3,5.85E -4,3.14E -4,
X1.58E -4,7.29E -5,2.96E -5,9.85E -6,2.35E -6,2.80E -7,3.19E -9,
X .00E 0,2.09E 1,8.78E 0,4.11E 0,2.29E 0,1.73E 0,3.57E -1,
X1.50E -1,7.68E -2,4.32E -2,2.54E -2,1.53E -2,9.28E -3,5.61E -3,
X3.35E -3,1.95E -3,1.10E -3,5.94E -4,3.01E -4,1.39E -4,5.67E -5,
X1.90E -5,4.53E -6,5.42E -7,6.19E -9, .00E 0,2.92E 1,1.25E 1,
X5.75E 0,3.21E 0,2.51E 0,5.18E -1,2.17E -1,1.12E -1,6.28E -2,
X3.70E -2,2.23E -2,1.35E -2,8.20E -3,4.90E -3,2.86E -3,1.62E -3,
X8.73E -4,4.42E -4,2.05E -4,8.35E -5,2.79E -5,6.68E -6,7.99E -7,
X9.14E -9, .00E 0,3.75E 1,1.62E 1,7.36E 0,4.11E 0,3.33E 0,
X6.86E -1,2.88E -1,1.48E -1,8.31E -2,4.90E -2,2.95E -2,1.79E -2,
X1.08E -2,6.48E -3,3.78E -3,2.14E -3,1.15E -3,5.84E -4,2.71E -4,
X1.10E -4,3.69E -5,8.83E -6,1.06E -6,1.21E -8, .00E 0 /
DATA (BREMI( 4, 3,I),I=1,25) /
X3.46E -1,1.79E -1,8.65E -2,6.49E -2,5.76E -2,1.51E -2,7.10E -3,
X3.98E -3,2.42E -3,1.54E -3,1.00E -3,6.61E -4,4.37E -4,2.87E -4,
X1.86E -4,1.17E -4,7.13E -5,4.12E -5,2.21E -5,1.06E -5,4.31E -6,
X1.30E -6,2.16E -7,4.57E -9, .00E 0 /
DATA ((BRME70(I, 3,J),J=1,25),I=1,5) /
X4.12E 0,1.66E 0,8.08E -1,4.51E -1,3.01E -1,5.66E -2,2.20E -2,
X1.06E -2,5.61E -3,3.13E -3,1.79E -3,1.04E -3,6.00E -4,3.43E -4,
X1.92E -4,1.04E -4,5.39E -5,2.62E -5,1.16E -5,4.52E -6,1.44E -6,
X3.27E -7,3.69E -8,3.97E-10, .00E 0,1.24E 1,5.11E 0,2.43E 0,
X1.36E 0,9.71E -1,1.91E -1,7.67E -2,3.78E -2,2.05E -2,1.17E -2,
X6.84E -3,4.04E -3,2.39E -3,1.39E -3,7.98E -4,4.43E -4,2.35E -4,
X1.17E -4,5.36E -5,2.16E -5,7.16E -6,1.70E -6,2.02E -7,2.31E -9,
X .00E 0,2.09E 1,8.78E 0,4.11E 0,2.29E 0,1.71E 0,3.39E -1,
X1.38E -1,6.87E -2,3.76E -2,2.16E -2,1.27E -2,7.57E -3,4.50E -3,
X2.65E -3,1.52E -3,8.51E -4,4.55E -4,2.28E -4,1.05E -4,4.25E -5,
X1.42E -5,3.38E -6,4.03E -7,4.61E -9, .00E 0,2.92E 1,1.25E 1,
X5.75E 0,3.21E 0,2.47E 0,4.91E -1,2.00E -1,1.00E -1,5.49E -2,
X3.16E -2,1.87E -2,1.11E -2,6.63E -3,3.91E -3,2.25E -3,1.26E -3,
X6.74E -4,3.39E -4,1.56E -4,6.33E -5,2.11E -5,5.03E -6,6.01E -7,
X6.87E -9, .00E 0,3.75E 1,1.62E 1,7.36E 0,4.11E 0,3.25E 0,
X6.48E -1,2.64E -1,1.32E -1,7.24E -2,4.17E -2,2.46E -2,1.47E -2,
X8.75E -3,5.16E -3,2.98E -3,1.66E -3,8.90E -4,4.48E -4,2.06E -4,
X8.36E -5,2.79E -5,6.65E -6,7.94E -7,9.07E -9, .00E 0 /
DATA (BREMI( 4, 4,I),I=1,25) /
X3.46E -1,1.79E -1,8.65E -2,6.49E -2,5.84E -2,1.56E -2,7.55E -3,
X4.35E -3,2.72E -3,1.78E -3,1.20E -3,8.15E -4,5.56E -4,3.77E -4,
X2.51E -4,1.63E -4,1.02E -4,6.05E -5,3.32E -5,1.63E -5,6.76E -6,
X2.08E -6,3.50E -7,7.55E -9, .00E 0 /
DATA ((BRME70(I, 4,J),J=1,25),I=1,5) /
X4.12E 0,1.66E 0,8.08E -1,4.51E -1,3.12E -1,5.74E -2,2.20E -2,
X1.04E -2,5.50E -3,3.06E -3,1.75E -3,1.02E -3,5.90E -4,3.39E -4,
X1.91E -4,1.04E -4,5.42E -5,2.65E -5,1.18E -5,4.61E -6,1.47E -6,

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EXTDF

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X3.31E -7,3.67E -8,3.79E-10, .00E 0,1.24E 1,5.11E 0,2.43E 0,
X1.36E 0,9.95E -1,1.88E -1,7.36E -2,3.56E -2,1.90E -2,1.07E -2,
X6.22E -3,3.66E -3,2.16E -3,1.26E -3,7.24E -4,4.03E -4,2.15E -4,
X1.08E -4,4.94E -5,2.00E -5,6.66E -6,1.59E -6,1.89E -7,2.17E -9,
X .00E 0,2.09E 1,8.78E 0,4.11E 0,2.29E 0,1.74E 0,3.33E -1,
X1.31E -1,6.39E -2,3.44E -2,1.95E -2,1.14E -2,6.74E -3,4.00E -3,
X2.35E -3,1.36E -3,7.60E -4,4.08E -4,2.06E -4,9.53E -5,3.89E -5,
X1.31E -5,3.13E -6,3.77E -7,4.34E -9, .00E 0,2.92E 1,1.25E 1,
X5.75E 0,3.21E 0,2.50E 0,4.80E -1,1.90E -1,9.26E -2,4.99E -2,
X2.84E -2,1.66E -2,9.85E -3,5.86E -3,3.45E -3,1.99E -3,1.12E -3,
X6.01E -4,3.04E -4,1.41E -4,5.76E -5,1.94E -5,4.65E -6,5.60E -7,
X6.45E -9, .00E 0,3.75E 1,1.62E 1,7.36E 0,4.11E 0,3.27E 0,
X6.29E -1,2.49E -1,1.21E -1,6.55E -2,3.73E -2,2.18E -2,1.29E -2,
X7.69E -3,4.53E -3,2.62E -3,1.47E -3,7.90E -4,3.99E -4,1.85E -4,
X7.56E -5,2.54E -5,6.10E -6,7.34E -7,8.45E -9, .00E 0 /
DATA (8REMI( 4, 5,I),I=1,25) /
X3.46E -1,1.79E -1,8.65E -2,6.49E -2,5.56E -2,1.52E -2,7.53E -3,
X4.44E -3,2.85E -3,1.92E -3,1.32E -3,9.24E -4,6.45E -4,4.47E -4,
X3.05E -4,2.02E -4,1.29E -4,7.75E -5,4.32E -5,2.15E -5,9.02E -6,
X2.81E -6,4.78E -7,1.04E -8, .00E 0 /
DATA ((BRME70(I, 5,J),J=1,25),I=1,5) /
X4.12E 0,1.66E 0,8.08E -1,4.51E -1,3.33E -1,6.07E -2,2.33E -2,
X1.12E -2,5.95E -3,3.37E -3,1.96E -3,1.16E -3,6.89E -4,4.04E -4,
X2.32E -4,1.29E -4,6.82E -5,3.38E -5,1.52E -5,5.97E -6,1.90E -6,
X4.25E -7,4.61E -8,4.49E-10, .00E 0,1.24E 1,5.11E 0,2.43E 0,
X1.36E 0,1.04E 0,1.91E -1,7.40E -2,3.57E -2,1.92E -2,1.09E -2,
X6.43E -3,3.84E -3,2.30E -3,1.36E -3,7.93E -4,4.47E -4,2.41E -4,
X1.22E -4,5.62E -5,2.28E -5,7.58E -6,1.79E -6,2.12E -7,2.39E -9,
X .00E 0,2.09E 1,8.78E 0,4.11E 0,2.29E 0,1.78E 0,3.32E -1,
X1.29E -1,6.25E -2,3.37E -2,1.92E -2,1.14E -2,6.81E -3,4.09E -3,
X2.44E -3,1.42E -3,8.07E -4,4.38E -4,2.23E -4,1.04E -4,4.25E -5,
X1.43E -5,3.42E -6,4.10E -7,4.70E -9, .00E 0,2.92E 1,1.25E 1,
X5.75E 0,3.21E 0,2.54E 0,4.74E -1,1.84E -1,8.92E -2,4.81E -2,
X2.75E -2,1.62E -2,9.75E -3,5.86E -3,3.50E -3,2.05E -3,1.16E -3,
X6.30E -4,3.21E -4,1.50E -4,6.16E -5,2.07E -5,4.98E -6,5.98E -7,
X6.85E -9, .00E 0,3.75E 1,1.62E 1,7.36E 0,4.11E 0,3.30E 0,
X6.15E -1,2.39E -1,1.16E -1,6.24E -2,3.56E -2,2.10E -2,1.26E -2,
X7.58E -3,4.52E -3,2.64E -3,1.50E -3,8.14E -4,4.15E -4,1.94E -4,
X7.94E -5,2.67E -5,6.42E -6,7.71E -7,8.82E -9, .00E 0 /
DATA (8REMI( 4, 6,I),I=1,25) /
X3.46E -1,1.79E -1,8.65E -2,6.49E -2,4.75E -2,1.32E -2,6.67E -3,
X4.01E -3,2.63E -3,1.80E -3,1.26E -3,8.98E -4,6.37E -4,4.48E -4,
X3.09E -4,2.07E -4,1.34E -4,8.14E -5,4.58E -5,2.30E -5,9.73E -6,
X3.06E -6,5.23E -7,1.15E -8, .00E 0 /
DATA ((BRME70(I, 6,J),J=1,25),I=1,5) /
X4.12E 0,1.66E 0,8.08E -1,4.51E -1,3.55E -1,6.58E -2,2.58E -2,
X1.27E -2,6.98E -3,4.06E -3,2.43E -3,1.48E -3,8.96E -4,5.37E -4,
X3.14E -4,1.77E -4,9.51E -5,4.75E -5,2.15E -5,8.46E -6,2.68E -6,
X5.89E -7,6.18E -8,5.57E-10, .00E 0,1.24E 1,5.11E 0,2.43E 0,

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EXTDF

```
X1.36E 0,1.07E 0,1.99E -1,7.79E -2,3.84E -2,2.11E -2,1.23E -2,
X7.40E -3,4.51E -3,2.74E -3,1.65E -3,9.73E -4,5.54E -4,3.00E -4,
X1.52E -4,6.99E -5,2.81E -5,9.21E -6,2.13E -6,2.43E -7,2.61E -9,
X .00E 0,2.09E 1,8.78E 0,4.11E 0,2.29E 0,1.80E 0,3.35E -1,
X1.31E -1,6.48E -2,3.56E -2,2.07E -2,1.25E -2,7.60E -3,4.64E -3,
X2.80E -3,1.65E -3,9.41E -4,5.12E -4,2.60E -4,1.21E -4,4.89E -5,
X1.62E -5,3.80E -6,4.43E -7,4.90E -9, .00E 0,2.92E 1,1.25E 1,
X5.75E 0,3.21E 0,2.52E 0,4.68E -1,1.83E -1,9.01E -2,4.95E -2,
X2.88E -2,1.73E -2,1.05E -2,6.42E -3,3.87E -3,2.28E -3,1.30E -3,
X7.09E -4,3.61E -4,1.67E -4,6.81E -5,2.26E -5,5.32E -6,6.23E -7,
X6.92E -9, .00E 0,3.75E 1,1.62E 1,7.36E 0,4.11E 0,3.23E 0,
X5.97E -1,2.33E -1,1.14E -1,6.27E -2,3.64E -2,2.19E -2,1.33E -2,
X8.09E -3,4.87E -3,2.87E -3,1.64E -3,8.89E -4,4.52E -4,2.10E -4,
X8.52E -5,2.83E -5,6.66E -6,7.80E -7,8.65E -9, .00E 0 /
DATA (BREMI( 5, 1,I),I=1,25) /
X3.33E -1,1.71E -1,9.60E -2,6.02E -2,5.42E -2,1.37E -2,6.23E -3,
X3.35E -3,1.94E -3,1.17E -3,7.17E -4,4.43E -4,2.73E -4,1.66E -4,
X9.91E -5,5.75E -5,3.20E -5,1.69E -5,8.25E -6,3.60E -6,1.32E -6,
X3.64E -7,5.45E -8,1.05E -9, .00E 0 /
DATA ((BRME90(I, 1,J),J=1,25),I=1,5) /
X3.91E 0,1.58E 0,7.64E -1,4.25E -1,3.10E -1,6.25E -2,2.56E -2,
X1.29E -2,7.08E -3,4.09E -3,2.42E -3,1.44E -3,8.57E -4,5.03E -4,
X2.89E -4,1.61E -4,8.52E -5,4.24E -5,1.93E -5,7.76E -6,2.55E -6,
X6.02E -7,7.10E -8,8.05E -10, .00E 0,1.18E 1,4.87E 0,2.30E 0,
X1.28E 0,1.01E 0,2.11E -1,8.94E -2,4.64E -2,2.63E -2,1.56E -2,
X9.46E -3,5.78E -3,3.52E -3,2.11E -3,1.24E -3,7.03E -4,3.81E -4,
X1.94E -4,9.00E -5,3.68E -5,1.24E -5,2.96E -6,3.55E -7,4.07E -9,
X .00E 0,1.98E 1,8.36E 0,3.89E 0,2.17E 0,1.79E 0,3.74E -1,
X1.59E -1,8.27E -2,4.70E -2,2.80E -2,1.70E -2,1.04E -2,6.38E -3,
X3.84E -3,2.26E -3,1.29E -3,7.00E -4,3.57E -4,1.66E -4,6.82E -5,
X2.30E -5,5.52E -6,6.63E -7,7.62E -9, .00E 0,2.78E 1,1.19E 1,
X5.45E 0,3.03E 0,2.61E 0,5.45E -1,2.31E -1,1.20E -1,6.84E -2,
X4.07E -2,2.48E -2,1.52E -2,9.28E -3,5.59E -3,3.30E -3,1.88E -3,
X1.02E -3,5.20E -4,2.43E -4,9.96E -5,3.35E -5,8.06E -6,9.69E -7,
X1.11E -8, .00E 0,3.57E 1,1.55E 1,6.98E 0,3.89E 0,3.48E 0,
X7.25E -1,3.07E -1,1.60E -1,9.08E -2,5.40E -2,3.29E -2,2.01E -2,
X1.23E -2,7.41E -3,4.36E -3,2.48E -3,1.35E -3,6.88E -4,3.21E -4,
X1.32E -4,4.43E -5,1.07E -5,1.28E -6,1.47E -8, .00E 0 /
DATA (BREMI( 5, 2,I),I=1,25) /
X3.33E -1,1.71E -1,9.60E -2,6.02E -2,5.50E -2,1.40E -2,6.45E -3,
X3.51E -3,2.06E -3,1.26E -3,7.91E -4,5.00E -4,3.16E -4,1.98E -4,
X1.22E -4,7.31E -5,4.23E -5,2.32E -5,1.19E -5,5.42E -6,2.10E -6,
X6.06E -7,9.59E -8,1.95E -9, .00E 0 /
DATA ((BRME90(I, 2,J),J=1,25),I=1,5) /
X3.91E 0,1.58E 0,7.64E -1,4.25E -1,2.99E -1,5.84E -2,2.34E -2,
X1.15E -2,6.22E -3,3.53E -3,2.06E -3,1.21E -3,7.07E -4,4.09E -4,
X2.32E -4,1.27E -4,6.63E -5,3.26E -5,1.46E -5,5.76E -6,1.87E -6,
X4.32E -7,5.00E -8,5.57E -10, .00E 0,1.18E 1,4.87E 0,2.30E 0,
X1.28E 0,9.71E -1,1.99E -1,8.28E -2,4.22E -2,2.35E -2,1.37E -2,
```

EXTDF

```

X8.20E -3,4.94E -3,2.96E -3,1.75E -3,1.02E -3,5.70E -4,3.06E -4,
X1.54E -4,7.07E -5,2.86E -5,9.53E -6,2.27E -6,2.70E -7,3.07E -9,
X .00E 0,1.98E 1,8.36E 0,3.89E 0,2.17E 0,1.72E 0,3.53E -1,
X1.48E -1,7.59E -2,4.26E -2,2.50E -2,1.50E -2,9.11E -3,5.50E -3,
X3.28E -3,1.91E -3,1.08E -3,5.79E -4,2.92E -4,1.35E -4,5.49E -5,
X1.83E -5,4.37E -6,5.22E -7,5.96E -9, .00E 0,2.78E 1,1.19E 1,
X5.45E 0,3.03E 0,2.49E 0,5.13E -1,2.15E -1,1.10E -1,6.20E -2,
X3.65E -2,2.19E -2,1.33E -2,8.04E -3,4.80E -3,2.80E -3,1.58E -3,
X8.50E -4,4.30E -4,1.99E -4,8.09E -5,2.70E -5,6.45E -6,7.70E -7,
X8.79E -9, .00E 0,3.57E 1,1.55E 1,6.98E 0,3.89E 0,3.31E 0,
X6.80E -1,2.85E -1,1.46E -1,8.20E -2,4.82E -2,2.90E -2,1.76E -2,
X1.06E -2,6.34E -3,3.70E -3,2.09E -3,1.12E -3,5.68E -4,2.63E -4,
X1.07E -4,3.57E -5,8.53E -6,1.02E -6,1.16E -8, .00E 0 /
DATA (BREMI( 5, 3,I),I=1,25) /
X3.33E -1,1.71E -1,9.60E -2,6.02E -2,5.64E -2,1.47E -2,6.90E -3,
X3.85E -3,2.33E -3,1.48E -3,9.60E -4,6.31E -4,4.15E -4,2.72E -4,
X1.75E -4,1.10E -4,6.69E -5,3.85E -5,2.06E -5,9.86E -6,3.98E -6,
X1.20E -6,1.98E -7,4.18E -9, .00E 0 /
DATA ((BRME90(I, 3,J),J=1,25),I=1,5) /
X3.91E 0,1.58E 0,7.64E -1,4.25E -1,2.93E -1,5.50E -2,2.13E -2,
X1.02E -2,5.39E -3,3.00E -3,1.71E -3,9.87E -4,5.69E -4,3.24E -4,
X1.81E -4,9.77E -5,5.04E -5,2.44E -5,1.08E -5,4.19E -6,1.33E -6,
X3.01E -7,3.38E -8,3.63E -10, .00E 0,1.18E 1,4.87E 0,2.30E 0,
X1.28E 0,9.48E -1,1.86E -1,7.43E -2,3.66E -2,1.98E -2,1.12E -2,
X6.54E -3,3.85E -3,2.27E -3,1.32E -3,7.53E -4,4.16E -4,2.20E -4,
X1.09E -4,4.99E -5,2.00E -5,6.62E -6,1.57E -6,1.86E -7,2.11E -9,
X .00E 0,1.98E 1,8.36E 0,3.89E 0,2.17E 0,1.67E 0,3.30E -1,
X1.34E -1,6.64E -2,3.62E -2,2.07E -2,1.22E -2,7.22E -3,4.27E -3,
X2.50E -3,1.44E -3,8.00E -4,4.26E -4,2.13E -4,9.76E -5,3.94E -5,
X1.31E -5,3.11E -6,3.70E -7,4.22E -9, .00E 0,2.78E 1,1.19E 1,
X5.45E 0,3.03E 0,2.41E 0,4.78E -1,1.94E -1,9.66E -2,5.28E -2,
X3.03E -2,1.78E -2,1.06E -2,6.29E -3,3.70E -3,2.12E -3,1.18E -3,
X6.31E -4,3.16E -4,1.45E -4,5.86E -5,1.95E -5,4.63E -6,5.52E -7,
X6.29E -9, .00E 0,3.57E 1,1.55E 1,6.98E 0,3.89E 0,3.18E 0,
X6.31E -1,2.56E -1,1.27E -1,6.97E -2,4.00E -2,2.36E -2,1.40E -2,
X8.31E -3,4.88E -3,2.81E -3,1.56E -3,8.34E -4,4.18E -4,1.92E -4,
X7.75E -5,2.57E -5,6.12E -6,7.29E -7,8.30E -9, .00E 0 /
DATA (BREMI( 5, 4,I),I=1,25) /
X3.33E -1,1.71E -1,9.60E -2,6.02E -2,5.65E -2,1.50E -2,7.21E -3,
X4.13E -3,2.57E -3,1.68E -3,1.12E -3,7.60E -4,5.16E -4,3.48E -4,
X2.31E -4,1.49E -4,9.28E -5,5.48E -5,2.99E -5,1.46E -5,6.02E -6,
X1.85E -6,3.09E -7,6.63E -9, .00E 0 /
DATA ((BRME90(I, 4,J),J=1,25),I=1,5) /
X3.91E 0,1.58E 0,7.64E -1,4.25E -1,3.00E -1,5.48E -2,2.08E -2,
X9.85E -3,5.16E -3,2.85E -3,1.63E -3,9.39E -4,5.43E -4,3.11E -4,
X1.74E -4,9.46E -5,4.90E -5,2.38E -5,1.06E -5,4.11E -6,1.30E -6,
X2.93E -7,3.23E -8,3.33E -10, .00E 0,1.18E 1,4.87E 0,2.30E 0,
X1.28E 0,9.56E -1,1.80E -1,6.99E -2,3.36E -2,1.79E -2,1.00E -2,
X5.79E -3,3.39E -3,1.99E -3,1.16E -3,6.61E -4,3.66E -4,1.94E -4,

```

EXTDF

```

X9.70E -5,4.44E -5,1.79E -5,5.92E -6,1.40E -6,1.67E -7,1.90E -9,
X .00E 0,1.98E 1,8.36E 0,3.89E 0,2.17E 0,1.67E 0,3.18E -1,
X1.25E -1,6.04E -2,3.23E -2,1.82E -2,1.06E -2,6.25E -3,3.69E -3,
X2.16E -3,1.24E -3,6.92E -4,3.69E -4,1.86E -4,8.56E -5,3.48E -5,
X1.16E -5,2.78E -6,3.32E -7,3.81E -9, .00E 0,2.78E 1,1.19E 1,
X5.45E 0,3.03E 0,2.40E 0,4.59E -1,1.80E -1,8.76E -2,4.70E -2,
X2.66E -2,1.55E -2,9.14E -3,5.40E -3,3.17E -3,1.82E -3,1.02E -3,
X5.45E -4,2.74E -4,1.27E -4,5.15E -5,1.72E -5,4.12E -6,4.94E -7,
X5.66E -9, .00E 0,3.57E 1,1.55E 1,6.98E 0,3.89E 0,3.15E 0,
X6.01E -1,2.36E -1,1.15E -1,6.17E -2,3.49E -2,2.03E -2,1.20E -2,
X7.09E -3,4.16E -3,2.39E -3,1.34E -3,7.15E -4,3.60E -4,1.66E -4,
X6.76E -5,2.26E -5,5.41E -6,6.47E -7,7.42E -9, .00E 0 /
DATA (BREMI( 5, 5,I),I=1,25) /
X3.33E -1,1.71E -1,9.60E -2,6.02E -2,5.33E -2,1.45E -2,7.12E -3,
X4.18E -3,2.67E -3,1.78E -3,1.22E -3,8.48E -4,5.89E -4,4.06E -4,
X2.74E -4,1.81E -4,1.14E -4,6.85E -5,3.80E -5,1.88E -5,7.83E -6,
X2.43E -6,4.10E -7,8.86E -9, .00E 0 /
DATA ((8RME90(I, 5,J),J=1,25),I=1,5) /
X3.91E 0,1.58E 0,7.64E -1,4.25E -1,3.15E -1,5.70E -2,2.17E -2,
X1.03E -2,5.48E -3,3.08E -3,1.79E -3,1.05E -3,6.21E -4,3.62E -4,
X2.07E -4,1.14E -4,6.02E -5,2.96E -5,1.33E -5,5.19E -6,1.64E -6,
X3.66E -7,3.94E -8,3.83E -10, .00E 0,1.18E 1,4.87E 0,2.30E 0,
X1.28E 0,9.82E -1,1.80E -1,6.91E -2,3.32E -2,1.77E -2,1.00E -2,
X5.86E -3,3.48E -3,2.07E -3,1.22E -3,7.08E -4,3.97E -4,2.13E -4,
X1.07E -4,4.92E -5,1.98E -5,6.55E -6,1.54E -6,1.81E -7,2.04E -9,
X .00E 0,1.98E 1,8.36E 0,3.89E 0,2.17E 0,1.69E 0,3.13E -1,
X1.21E -1,5.81E -2,3.11E -2,1.77E -2,1.04E -2,6.18E -3,3.69E -3,
X2.19E -3,1.27E -3,7.17E -4,3.87E -4,1.96E -4,9.07E -5,3.69E -5,
X1.23E -5,2.95E -6,3.51E -7,4.00E -9, .00E 0,2.78E 1,1.19E 1,
X5.45E 0,3.03E 0,2.41E 0,4.46E -1,1.72E -1,8.29E -2,4.45E -2,
X2.53E -2,1.48E -2,8.85E -3,5.29E -3,3.14E -3,1.83E -3,1.03E -3,
X5.57E -4,2.82E -4,1.31E -4,5.35E -5,1.79E -5,4.29E -6,5.12E -7,
X5.84E -9, .00E 0,3.57E 1,1.55E 1,6.98E 0,3.89E 0,3.13E 0,
X5.79E -1,2.23E -1,1.08E -1,5.76E -2,3.27E -2,1.92E -2,1.15E -2,
X6.85E -3,4.06E -3,2.36E -3,1.33E -3,7.19E -4,3.65E -4,1.69E -4,
X6.91E -5,2.31E -5,5.53E -6,6.60E -7,7.52E -9, .00E 0 /
DATA (BREMI( 5, 6,I),I=1,25) /
X3.33E -1,1.71E -1,9.60E -2,6.02E -2,4.56E -2,1.26E -2,6.31E -3,
X3.77E -3,2.45E -3,1.67E -3,1.16E -3,8.21E -4,5.79E -4,4.04E -4,
X2.77E -4,1.84E -4,1.18E -4,7.13E -5,3.98E -5,1.99E -5,8.33E -6,
X2.60E -6,4.42E -7,9.64E -9, .00E 0 /
DATA ((BRME90(I, 6,J),J=1,25),I=1,5) /
X3.91E 0,1.58E 0,7.64E -1,4.25E -1,3.34E -1,6.14E -2,2.39E -2,
X1.17E -2,6.39E -3,3.69E -3,2.20E -3,1.33E -3,8.01E -4,4.77E -4,
X2.77E -4,1.56E -4,8.30E -5,4.12E -5,1.86E -5,7.26E -6,2.29E -6,
X5.00E -7,5.22E -8,4.67E -10, .00E 0,1.18E 1,4.87E 0,2.30E 0,
X1.28E 0,1.01E 0,1.86E -1,7.23E -2,3.54E -2,1.93E -2,1.12E -2,
X6.69E -3,4.05E -3,2.45E -3,1.47E -3,8.60E -4,4.86E -4,2.62E -4,
X1.32E -4,6.04E -5,2.42E -5,7.86E -6,1.81E -6,2.05E -7,2.19E -9,

```


EXTDF

X .00E 0,1.98E 1,8.36E 0,3.89E 0,2.17E 0,1.70E 0,3.13E -1,
X1.22E -1,5.97E -2,3.26E -2,1.89E -2,1.13E -2,6.84E -3,4.15E -3,
X2.49E -3,1.46E -3,8.27E -4,4.47E -4,2.26E -4,1.04E -4,4.20E -5,
X1.38E -5,3.23E -6,3.74E -7,4.11E -9, .00E 0,2.78E 1,1.19E 1,
X5.45E 0,3.03E 0,2.39E 0,4.38E -1,1.70E -1,8.32E -2,4.54E -2,
X2.62E -2,1.57E -2,9.49E -3,5.75E -3,3.45E -3,2.02E -3,1.15E -3,
X6.19E -4,3.13E -4,1.45E -4,5.85E -5,1.93E -5,4.52E -6,5.26E -7,
X5.81E -9, .00E 0,3.57E 1,1.55E 1,6.98E 0,3.89E 0,3.06E 0,
X5.59E -1,2.17E -1,1.06E -1,5.75E -2,3.32E -2,1.98E -2,1.20E -2,
X7.25E -3,4.34E -3,2.54E -3,1.44E -3,7.77E -4,3.93E -4,1.81E -4,
X7.32E -5,2.41E -5,5.66E -6,6.58E -7,7.26E -9, .00E 0 /

C

C-----

END

EXTDF

```
C-----
C
C   SUBROUTINE ADJUST (ARG)
C
C   This module adjusts the thickness of last shield or adds
C   a dummy shield so the total shield distance equals the
C   distance to the detector.
C
C   This module was taken from ISOSHL, see references in the
C   documentation.
C
C   This module is called by the IGEOM Subroutines ( POINT, LINE
C   SPHERE, TCONE, DISC, CYL, ENDCYL, ANCYL, RETL )
C
C   Module of Program EXTDF of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Last modification: 17-June-87  RAP
C   Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C   INCLUDE 'ISO.CMN'
C
C   TOTT = 0.
C   IF(IGEOM.EQ.12) TOTT=T(3)
C
C   DO 10 I=1,NSHLD
C   TOTT = TOTT + T(I)
C   IF (ARG.LT.TOTT) GO TO 20
10  CONTINUE
C
C   NSHLDA= NSHLD + 1
C   T(NSHLDA) = ARG - TOTT
C   GO TO 30
20  NSHLDA= I
C   T(I) = T(I) - TOTT + ARG
30  CONTINUE
C
C   RETURN
C-----
C
C   END
```

EXTDF

```
C-----
C
C      SUBROUTINE ANCYL
C
C      This module calculates the gamma attenuation for annular
C      cylindrical source with cylindrical and slab shields using
C      Simpsons rule for integration of point kernel ( specify
C      IGEOM=12). This module was taken from ISOSHL, see references
C      in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modificattion: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      TSUM1 IS THE RADIAL DISTANCE TO THE OUTER EDGE OF THE SOURCE
C      REGION.
C      TSUM2 IS THE RADIAL DISTANCE TO THE INNER EDGE OF THE SOURCE REGIO
C      TSUM3 IS THE RADIAL DISTANCE TO THE OUTER EDGE OF OUTER SHIELD 3.
C      * SSV2 IS THE ENERGY FLUX PER UNIT VOLUME.
C      * TH1 IS THE ANGLE TO THE OUTER EDGE OF SHIELD REGION 1.
C      * TH2 IS THE ANGLE TO THE OUTER EDGE OF INNER SHIELD REGION 3.
C      * TH3 IS THE ANGLE TO THE OUTER EDGE OF THE SOURCE REGION (SHIELD 2)
C      * CON IS ONE HALF THE LENGTH OF THE CHORD THROUGH SHIELD 1 AT ANGLE
C      THETA
C      * CON1 IS HALF THE LENGTH OF THE CHORD THROUGH SHIELD 2, INNER SHIELD
C      3 AND SHIELD 1 AT ANGLE THETA.
C      * CON2 IS HALF THE LENGTH OF THE CHORD THROUGH SHIELD 1 AND INNER
C      SHIELD 3 AT ANGLE THETA.
C      * CON3 IS HALF THE LENGTH OF THE CHORD THROUGH SHIELD 1, SHIELD 2 AND
C      INNER AND OUTER SHIELD 3 AT ANGLE THETA.
C      * KREG IS A KEYING VARIABLE THAT INDICATES WHICH INTERIOR SHIELD
C      REGIONS RHO PASSES THROUGH. (KREG=1, SHIELDS 1, 2, AND INNER 3)
C      (KREG=2, SHIELDS 2, AND INNER 3) (KREG=3, SHIELD 2)
C      * TM1 IS THE DISTANCE FROM THE DOSE POINT TO THE NEAREST EDGE OF
C      SHIELD 2, AT ANGLE THETA
C      * TM3 IS THE DISTANCE FROM THE DOSE POINT TO THE NEAREST EDGE OF
C      OUTER SHIELD 3 AT ANGLE THETA
C      * TM2 IS THE DISTANCE FROM THE DOSE POINT TO THE NEAREST EDGE OF
C      INNER SHIELD 3 AT ANGLE THETA
C      * L3 IS THE DISTANCE FROM THE DOSE POINT TO THE OPPOSITE INNER EDGE
C      OF SHIELD 2 AT ANGLE THETA.
C      * TM IS THE DISTANCE FROM THE DOSE POINT TO THE NEAREST EDGE OF
C      SHIELD 1 AT ANGLE THETA.
C      * BIMFS IS THE NUMBER OF MEAN FREE PATHS THROUGH SHIELD 1 AND INNER
C      SHIELD 3 AT ANGLE THETA.
```

EXTDF

```
C * B2MFS IS THE NUMBER OF MEAN FREE PATHS THROUGH INNER SHIELD 3
C AT ANGLE THETA.
C SOURCE AND OUTER SHIELD REGIONS
C * TT IS THE DISTANCE THROUGH OUTER SHIELD 3 AT ANGLE THETA.
C * PSI2 IS THE MAXIMUM VERTICAL ANGLE FOR INTEGRATION.
C * RHO IS THE DISTANCE FROM THE DOSE POINT TO THE NEAREST EDGE OF
C SHIELD 2 AT ANGLES THETA AND PSI.
C * RHO2 IS THE DISTANCE FROM THE DOSE POINT TO THE NEAREST EDGE OF
C INNER SHIELD 3 AT ANGLES THETA AND PSI (RHO2=0 IF THETA IS SUCH
C THAT THE LINE OF SIGHT TO THE DIFFERENTIAL VOLUME DOES NOT PASS
C THROUGH THE SHIELD 1 AND INNER SHIELD 3).
C * RHO3 IS THE DISTANCE FROM THE DOSE POINT TO THE OPPOSITE OUTER
C EDGE OF INNER SHIELD 3 (RHO3=0 UNDER PREVIOUS CONDITIONS).
C * RHO4 IS THE DISTANCE FROM THE DOSE POINT TO THE OPPOSITE OUTER
C EDGE OF SHIELD 2 AT ANGLES THETA AND PSI.
C * Q1 IS THE NUMBER OF MEAN FREE PATHS THROUGH SHIELD 1 AND INNER
C SHIELD 3 AT ANGLE THETA.
C * Q2 IS THE DISTANCE THROUGH SHIELD 1 AND INNER SHIELD 3 AT ANGLES
C THETA AND PSI.
C * Q1 IS THE NUMBER OF MEAN FREE PATHS THROUGH SHIELD 3 AT ANGLE THET
C * Q2 IS THE DISTANCE THROUGH SHIELD 3 AT ANGLES THETA AND PSI.
```

C

```
-----
INCLUDE 'ISO.CMN'
REAL L3,L4
```

C

```
CALL ADJUST (X)
IF (MOD(NTHETA,2).EQ.0) NTHETA = NTHETA + 1
NTHETA = MAX0(5,NTHETA)
IF (MOD(NPSI,2).EQ.0) NPSI=NPSI+1
NPSI = MAX0(5,NPSI)
XS = X*X
```

```
TSUM1=T(1)+T(3)+T(2)
TSUM2=T(1)+T(3)
TSUM3=TSUM1+T(3)
```

```
VOLUME=PI*(TSUM1**2-TSUM2**2)*SLTH
SSV2=SOURCE(1,JPH)*SOURCE(2,JPH)/VOLUME
```

```
TH1=ATAN2(T(1),SQRT(ABS(XS-T(1)**2)))
TH2=ATAN2(TSUM2,SQRT(ABS(XS-TSUM2**2)))
TH3=ATAN2(TSUM1,SQRT(ABS(XS-TSUM1**2)))
```

```
DELTH=TH3/FLOAT(NTHETA-1)
IF(Y.GT.SLTH) Y=0.
HMAX=AMAX1(Y,SLTH-Y)
AMID=AMIN1(Y,SLTH-Y)
```

EXTDF

```
THETA=0.
SUMI=0.
FLIPI=2.

C    SUM OVER HORIZONTAL ANGLE THETA.
DO 400 I=1,NTHETA
  SINT=SIN(THETA)
  COST=COS(THETA)
  XCOS=X*COST
  XSINS=(X*SINT)**2
  B1MFS=0.
  B2MFS=0.
  B3MFS=0.

  CON=SQRT(ABS(T(1)**2-XSINS))
  CON1=SQRT(ABS(TSUM1**2-XSINS))
  CON2=SQRT(ABS(TSUM2**2-XSINS))
  CON3=SQRT(ABS(TSUM3**2-XSINS))
  KREG=3
  TM2=0.
  L3=0.
  TTMFS=0.
  TM1=XCOS-CON1
  TM3=XCOS-CON3
  IF(THETA.LT.TH1) GO TO 70
  IF( THETA.LT.TH2) GO TO 90
  GO TO 120
C    CENTRAL REGION
70  KREG=1
  TM2=XCOS-CON2
  L3=2.*XCOS-TM2
  TM=XCOS-CON
  B1MFS=2.*( TM-TM2)*MU(3,JPH)+2.*CON*MU(1,JPH)
  GO TO 120
C    SECOND REGION
90  KREG=2
  TM2=XCOS-CON2
  L3=2.*XCOS-TM2
  B2MFS=2.*CON2*MU(3,JPH)
120 TT=TM1-TM3
  TTMFS=TT*COST
  B3MFS=TT*MU(3,JPH)
C    B3MFS CONTAINS THE NO. OF MF PATHS IN OUTER SHIELD REGION 3
  IF (COST.EQ.0.) GO TO 144
  IF(NSHLDA.LT.5) GO TO 140
  DO 130 J=5,NSHLDA
    TTMFS=TTMFS+T(J)
130 B3MFS=B3MFS+MU(J,JPH)*T(J)/COST
```

EXTDF

```
C      B3MFS NOW CONTAINS THE NO. MF PATHS THROUGH ALL SHIELDS EXCEPT
C      SHIELD 4 ALONG RHO
140 B3MFS=B3MFS-MU(4,JPH)*TTMFS/COST+TM1*(MU(4,JPH)-MU(2,JPH))
C      B3MFS NOW CONTAINS THE TOTAL MF PATHS OUTSIDE THE SOURCE REGION
C      * L4 IS THE DISTANCE FROM THE DOSE POINT TO THE OPPOSITE OUTER EDGE
C      OF SHIELD 2 AT ANGLE THETA.
144 L4 = 2.*XCOS-TM1
      L4=2.*XCOS-TM1
      PSI2=ATAN2(HMAX,TM1)
      SUMJ=0.
      DELPSI=PSI2/FLOAT(NPSI-1)
      PSI=0.
      FLIPJ=2.

C      * DO LOOP OVER THE VERTICAL ANGLE PSI.
      DO 300 J=1,NPSI
      COSPSI=COS(PSI)
      IF (COSPSI.EQ.0.) GO TO 146
      SECPSI=1./COSPSI
146 IF (COSPSI.EQ.0.) SECPSI = 1.E20
      SINPSI=SIN(PSI)
      IF (SINPSI.EQ.0.) GO TO 148
      UPLIM=HMAX/SINPSI
148 IF (SINPSI.EQ.0.) UPLIM = HMAX*1.E20
      RHO=TM1*SECPSI
      IF(PSI.GT.0.) GO TO 150
      RHO2=TM2*SECPSI
      RHO3=L3*SECPSI
      RHO4=L4*SECPSI
      GO TO 160
150 RHO2=AMIN1(SECPSI*TM2,UPLIM)
      RHO3=AMIN1(L3*SECPSI,UPLIM)
      RHO4=AMIN1(L4*SECPSI,UPLIM)
      IF (DELR.EQ.0.) GO TO 170
160 NRHO=INT((RHO2-RHO+RHO4-RHO3)/DELR)
170 IF (DELR.EQ.0.) NRHO = 0
      IF(MOD(NRHO,2).EQ.0) NRHO=NRHO+1
      NRHO=MAX0(NRHO,5)
      DELRHO=(RHO4-RHO3+RHO2-RHO)/FLOAT(NRHO-1)
      FLIPK=2.
      SUMK=0.
      JUMP=0
      Q1=0.
      Q2=0.
      DO 260 K=1,NRHO
      GO TO (210,220,230), KREG
```

EXTDF

```
C      CENTRAL REGION
210 IF(RHO.LT.RHO2.OR.JUMP.NE.0) GO TO 230
C      * THESE CALCULATIONS ARE MADE ONLY ONCE FOR EACH VALUE OF THETA AND
C      PSI WHEN RHO REACHES THE NEAREST EDGE OF INNER SHIELD 3.
C      * RHO IS INCREASED BY THE DISTANCE ACROSS INNER SHIELD 3 AND
C      SHIELD 1.
      RHO=RHO+2.*CON2*SECPSI
      JUMP=1
      Q1=B1MFS
      Q2=2.*CON2*SECPSI
      GO TO 230

C      SECOND REGION
220 IF(RHO.LT.RHO2.OR.JUMP.NE.0) GO TO 230
      JUMP=1
C      * RHO IS INCREASED BY THE DISTANCE ACROSS INNER SHIELD 3.
      RHO=RHO+2.*CON2*SECPSI
      Q1=B2MFS
      Q2=2.*CON2*SECPSI

C      TOTAL MEAN FREE PATHS
230 B1=(B3MFS+Q1)*SECPSI+(RHO-Q2)*MU(2,JPH)
      FACT=1.
      B=BFUNC(BUIF,B1)
      IF (K.EQ.1.OR.K.EQ.NRHO) GO TO 240
      FLIPK=6.-FLIPK
      FACT=FLIPK
240 IF (SINPSI.NE.0.) GO TO 250
      IF (RHO.LT.DELRHO/2.) FACT = FACT*2.
      GO TO 252
250 IF(RHO.LT.AMID/SINPSI+DELRHO/2.) FACT=FACT*2.
252 IF (ABS(B1).LT.200.) GO TO 254
      VAL = 0.
      IF (B1.GT.0.) GO TO 256
      VAL = 100000.
      GO TO 256
254 VAL = FACT*B*SSV2*XPN(-B1)
256 SUMK = SUMK + VAL
      IF(K.EQ.1) FRST=VAL
      IF (FRST.EQ.0.) GO TO 260
      IF(ABS(VAL/FRST).LT.1.E-04) GO TO 265
260 RHO=RHO+DELRHO
265 SUMK=SUMK*DELRHO*ABS(COSPSI)
      FACT=1.
      IF(J.EQ.1.OR.J.EQ.NPSI) GO TO 270
      FLIPJ=6.-FLIPJ
      FACT=FLIPJ
270 SUMJ=SUMJ+FACT*SUMK
```

EXTDF

```
300 PSI=PSI+DELPSI
   SUMJ=SUMJ*DELPSI
   FACT=1.
   IF(I.EQ.1.OR.I.EQ.NTHETA) GO TO 340
   FLIPI=6.-FLIPI
   FACT=FLIPI
340 SUMI=SUMI+FACT*SUMJ
400 THETA=THETA+DELTH
   SUMI=SUMI/54./PI*DELTH
   SOURCE(3,JPH)=SUMI
```

C

C-----

END

EXTDF

```
C-----
C
C      FUNCTION BFUNC
C
C      This module interpolates calculated buildup factors.  This
C      module was taken from ISOSHL, see references in the
C      documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----

      INCLUDE 'ISO.CMN'

      DIMENSION BMUZ(7),BGE(5),BZABS(7)

      DATA(BMUZ(I),I=1,7)/ 1.,2.,4.,7.,10.,15.,20./
      DATA(BGE(I),I=1,5)/ .01,.02,.05,.1,.2/
      DATA(BZABS(I),I=1,7)/4.,13.,26.,50.,74.,82.,92./

C      BMUZ IS AN ARRAY OF MEAN FREE PATHS FOR BUPLWE.
C      BGE IS THE GAMMA RAY ENERGY GROUPS FOR BUPLWE.
C      BZABS IS THE EFFECTIVE ATOMIC NUMBER FOR DEFINING BUPLWE

      IF(SOURCE(2,JPH)-.1) 9001,50,50
C      TEST THE ENERGY GROUP UNDER CONSIDERATION TO SEE IF IT IS
C      LESS THAN .1 MEV, IF IT IS THEN CALCULATE THE BUILDUP FACTOR
C      FROM THE ARRAY BUPLWE(6,5,7).

9001 IF(ABAN-BZABS(1)) 9002,9002,9003
9002 IB1=1
      IB2=1
      GO TO 9008
9003 IF (ABAN-BZABS(7)) 9005,9004,9004
9004 IB1=7
      IB2=7
      GO TO 9008
9005 DO 9007 IB1=2,7
      IF(ABAN-BZABS(IB1)) 9006,9006,9007
9006 IB2=IB1-1
      GO TO 9008
9007 CONTINUE

C      THE ABOVE STATEMENTS ARE USED TO BRACKET THE ATOMIC NUMBER.
```

EXTDF

```
9008 IF(SOURCE(2,JPH)-BGE(1)) 9999,9999,9908
9999 IBB1=1
      IBB2=1
      GO TO 9013
```

C

```
9908 DO 9012 IBB1=2,5
      IF(SOURCE(2,JPH)-BGE(IBB1))9010,9009,9012
9009 IBB2=IBB1
      GO TO 9013
9010 IBB2=IBB1-1
      GO TO 9013
9012 CONTINUE
      IBB1=6
      IBB2=6
```

C THE ABOVE LOOPS LOCATE THE GAMMA RAY INDEX FOR INTERPOLATION.

```
9013 IF(D-BMUZ(1)) 9014,9015,9016
9014 BFUNC=1.
      RETURN
```

```
9015 IBBB1=1
      IBBB2=1
      GO TO 9020
9016 DO 9019 IBBB1=2,7
      IF(D-BMUZ(IBBB1)) 9018,9017,9019
9017 IBBB2=IBBB1
      GO TO 9020
9018 IBBB2=IBBB1-1
      GO TO 9020
9019 CONTINUE
      IBBB1=7
      IBBB2=7
```

```
9020 CONTINUE
      Y1 = 0
      Y2=0
      Y3 = 0
      Y4 = 0
      Y1A = 0
      Y2A = 0
      BFUNC = 0.
```

```
      IF (IBBB1.EQ.IBBB2) GO TO 9021
      Y1 = (BUPLWE(IB1,IBB2,IBBB1)-BUPLWE(IB1,IBB2,IBBB2))/(BMUZ(IBBB1)-
1 BMUZ(IBBB2))*(D-BMUZ(IBBB2))
9021 Y1 = Y1 + BUPLWE(IB1,IBB2,IBBB2)
```

C Y1 IS THE BFUNC VALUE AT D MFP, LOW ENERGY, AND HIGH Z.

```
      IF (IBBB1.EQ.IBBB2) GO TO 9022
      Y2 = (BUPLWE(IB1,IBB1,IBBB1)-BUPLWE(IB1,IBB1,IBBB2))/(BMUZ(IBBB1)-
1 BMUZ(IBBB2))*(D-BMUZ(IBBB2))
```

EXTDF

```
9022 Y2 = Y2 + BUPLWE(IB1,IBB2,IBBB2)
C      Y2 IS THE BFUNC VALUE AT D MFP,HIGH ENERGY,AND HIGH Z.
      IF (IBBB1.EQ.IBBB2) GO TO 9023
      Y3 = (BUPLWE(IB1,IBB1,IBBB1)-BUPLWE(IB1,IBB1,IBBB2))/(BMUZ(IBBB1)-
1      BMUZ(IBBB2))*(D-BMUZ(IBBB2))
9023 Y3 = Y3 + BUPLWE(IB1,IBB2,IBBB2)

C      Y3 IS THE BFUNC VALUE AT DIMFP,LOW ENERGY,LOW Z.
      IF (IBBB1.EQ.IBBB2) GO TO 9024
      Y4 = (BUPLWE(IB1,IBB1,IBBB1)-BUPLWE(IB1,IBB1,IBBB2))/(BMUZ(IBBB1)-
1      BMUZ(IBBB2))*(D-BMUZ(IBBB2))
9024 Y4 = Y4 + BUPLWE(IB1,IBB2,IBBB2)

C      Y4 IS THE BFUNC VALUE AT D MFP,HIGH ENERGY, AND LOW Z.
      IF (IBB1.EQ.IBB2) GO TO 9025
      Y2A = (Y2-Y1)*(SOURCE(2,JPH)-BGE(IBB2))/(BGE(IBB1)-BGE(IBB2))
9025 Y2 = Y2A + Y1
      IF (IBB1.EQ.IBB2) GO TO 9026
      Y1A = (Y4-Y3)*(SOURCE(2,JPH)-BGE(IBB2))/(BGE(IBB1)-BGE(IBB2))
9026 Y1 = Y1A + Y3

C      Y1 AND Y2 ARE BFUNC VALUES AT D MFP,SOURCE ENERGY,AND HIGH AND
C      LOW ABSORBER Z.
      IF (IB1.EQ.IB2) GO TO 9027
      BFUNC = (Y2-Y1)*(ABAN-BZABS(IB1))/(BZABS(IB1)-BZABS(IB2))
9027 BFUNC = BFUNC + Y2
      RETURN
50 CONTINUE
      B = 0.
      B2 = 0.
      DO 400 J=1,2
      IF (C) 100,350,100
100 ARG = -BUF(J+2,2)* D
      IF (ARG.LT.88.027) GO TO 340
      ARG = 88.027
340 B2 = B2 + BUF(J,2) * XPN(ARG)
350 ARG = -BUF(J+2,1) * D
      IF (ARG.LT.88.027) GO TO 400
      ARG = 88.027
400 B = B + BUF(J,1) * XPN(ARG)
      BFUNC = B + C * (B2-B)
      RETURN
C-----
      END
```

EXTDF

```
C-----
C
C      SUBROUTINE BYIELD (ZSOURCE)
C
C      This module calculates the gamma ray yield for BREMSSTRAHLUNG-
C      ISOSHL groups. This module was taken from ISOSHL, see
C      references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 25-June-87 RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      ZSOURCE - Atomic number, Z, of the source nuclide
C      BETAEP  - Array of the beta end points for ZSOURCE--max 20
C      NBETEP  - The number of values in BETAEP. NBETEP is the same
C                as JOUNT in subroutine BETA
C      ZABS    - Array of the Z of shield region 1.--max 20
C      NZABS   - The number of values in ZABS
C      YIELD   - Gamma ray yield for BREMSSTRAHLUNG-ISOSHL groups
C      ZNUM    - Array containing source and absorber definitions.
C      ENDPT   - Array for beta end point definition.
C-----
C
C      INCLUDE 'ISO.CMN'
C
C      DIMENSION ZNUM(5),ENDPT(6),IPTZ(2,20),GETOBE(25)
C      DIMENSION GRANGE(25),A(5,6,25),B(5,6,25),R(25)
C      EQUIVALENCE (KOUNT,NBETEP)
C
C      DATA(ZNUM(I),I=1,5)/ 10.,30.,50.,70.,90./
C      DATA (ENDPT(I),I=1,6)/ .1,.2,.5,1.0,2.0,4.0/
C      DATA (GETOBE(I),I=1,25)/
C      1 .00375,.00750,.01375,.02125, .0250,.0750,.125,.175,.225,
C      1 .275,.325,.375,.425,.475,.525,.575,.625,.675,.725,.775,.825,
C      1 .875,.925,.975,1.0 /
C      DATA (GRANGE(I),I=1,25)/
C      X .015,.025,.035,.045,.055,.065,.075,.085,.095,.15,
C      X .25,.35,.475,.65,.825,1.0,1.225,1.475,1.70,1.9,2.1,2.3,2.5,
C      X 2.7,3.0/
C
C      DO 1 I=1,25
C      1 YIELD(I)=0
C      IF(ZSOURCE.GT.10.) GO TO 20
C      DO 10 I=1,25
```

EXTDF

```
DO 10 J=1,6
DO 10 K=1,5
A(K,J,I)=BRME10(K,J,I)
10 B(K,J,I)=BRME10(K,J,I)
L1=1
L2=1
GO TO 100
C THE SOURCE Z IS LESS THAN OR EQUAL TO 10
20 IF(ZSORCE-30.)21,30,30
21 DO 25 I=1,25
DO 25 J=1,6
DO 25 K=1,5
A(K,J,I)=BRME10(K,J,I)
25 B(K,J,I)=BRME30(K,J,I)
L1=1
L2=2
GO TO 100
C THE SOURCE Z IS GREATER THAN 10,BUT LESS THAN 30.
30 IF(ZSORCE.GT.30.) GO TO 40
DO 35 I=1,25
DO 35 J=1,6
DO 35 K=1,5
A(K,J,I)=BRME30(K,J,I)
35 B(K,J,I)=BRME30(K,J,I)
L1=2
L2=2
GO TO 100
C THE SOURCE Z IS EQUAL TO 30
40 IF(ZSORCE-50.) 41,50,50
41 DO 45 I=1,25
DO 45 J=1,6
DO 45 K=1,5
A(K,J,I)=BRME30(K,J,I)
45 B(K,J,I)=BRME50(K,J,I)
L1=2
L2=3
GO TO 100
C THE SOURCE Z IS GREATER THAN 30, BUT LESS THAN 50.
50 IF(ZSORCE.GT.50.) GO TO 60
DO 55 I=1,25
DO 55 J=1,6
DO 55 K=1,5
A(K,J,I)=BRME50(K,J,I)
55 B(K,J,I)=BRME50(K,J,I)
L1=3
L2=3
```

EXTDF

```
GO TO 100

C    THE SOURCE Z IS EQUAL TO 50
60  IF(ZSORCE-70.) 61,70,70
61  DO 65 I=1,25
    DO 65 J=1,6
    DO 65 K=1,5
    A(K,J,I)=BRME50(K,J,I)
65  B(K,J,I)=BRME70(K,J,I)
    L1=3
    L2=4
    GO TO 100

C    THE SOURCE Z IS GREATER THAN 50, BUT LESS THAN 70.
70  IF(ZSORCE.GT.70.) GO TO 80
    DO 75 I=1,25
    DO 75 J=1,6
    DO 75 K=1,5
    A(K,J,I)=BRME70(K,J,I)
75  B(K,J,I)=BRME70(K,J,I)
    L1=4
    L2=4
    GO TO 100

C    THE SOURCE Z IS EQUAL TO 70.
80  IF(ZSORCE-90.) 81,90,90
81  DO 85 I=1,25
    DO 85 J=1,6
    DO 85 K=1,5
    A(K,J,I)=BRME70(K,J,I)
85  B(K,J,I)=BRME90(K,J,I)
    L1=4
    L2=5
    GO TO 100

C    THE SOURCE Z IS GREATER THAN 70, BUT LESS THAN 90.
90  DO 95 I=1,25
    DO 95 J=1,6
    DO 95 K=1,5
    A(K,J,I)=BRME90(K,J,I)
95  B(K,J,I)=BRME90(K,J,I)
    L1=5
    L2=5

C    THE SOURCE Z IS GREATER THAN OR EQUAL TO 90. A AND B NOW BRACKET
C    THE SOURCE Z
100 DO 110 I=1,NZABS
    IF(ZABS(I)-10.) 101,101,102
101 IPTZ(1,I)=1
```

EXTDF

```
      IPTZ(2,I)=1
      GO TO 110
102 IF(ZABS(I)-90.) 104,103,103
103 IPTZ(1,I)=5
      IPTZ(2,I)=5
      GO TO 110
104 DO 109 J=2,5

      IF(ZABS(I)-ZNUM(J)) 105,106,109
105 IPTZ(1,I)=J-1
      IPTZ(2,I)=J
      GO TO 110
106 IPTZ(1,I)=J
      IPTZ(2,I)=J
      GO TO 110
109 CONTINUE
110 CONTINUE

C      IPTZ IS AN ARRAY THAT POINTS TO ARRAYS THAT BRACKET THE
C      Z OF THE ABSORBER.

      DO 500 LBETA=1,NBETEP
      IF(BETAEP(LBETA)-.010)500,9110,9110

C      IF THE BETA END ENERGY IS LESS THAN 5 KEV, THEN NO
C      CONTRIBUTION IS RECORDED.

9110 IF(BETAEP(LBETA)-.1) 111,111,112
111 MB1=1
      MB2=1
      GO TO 121
112 IF(BETAEP(LBETA)-4.) 114,113,113
113 MB1=6
      MB2=6
      GO TO 121
114 DO 120 J=2,6
      IF(BETAEP(LBETA)-ENDPT(J)) 115,116,120
115 MB1=J-1
      MB2=J
      GO TO 121
116 MB1=J
      MB2=J
      GO TO 121
120 CONTINUE

C      MB1 AND MB2 ARE THE LOWER AND UPPER ENDPOINT INDEXES.

121 ME1=MB1
      ME2=MB2
```

EXTDF

```
      IF(ME1-ME2) 123,122,123
122 XSL1=0
      GO TO 124
123 XSL1=(BETAEP(LBETA)-ENDPT(ME1))/(ENDPT(ME2)-ENDPT(ME1))
C      XSL1 IS THE SLOPE FOR INTERPOLATING ON BETA END POINT ENERGY.
124 I=(L1-L2) 126,125,126
125 XSL2=0
      GO TO 127
126 XSL2=(ZSOURCE-ZNUM(L1))*0.05
C      XSL2 IS THE SLOPE FOR INTERPOLATING ON SOURCE Z.
C      L1 IS THE INDEX OF THE LOWER Z NUMBER
127 DO 128 I=1,24
      Y1=(BREMI(L2,ME1,I)-BREMI(L1,ME1,I))*XSL2+BREMI(L1,ME1,I)
      Y2=(BREMI(L2,ME2,I)-BREMI(L1,ME2,I))*XSL2+BREMI(L1,ME2,I)
128 R(I)=(Y2-Y1)*XSL1+Y1
      R(25)=0

C      R NOW CONTAINS THE INTERNAL BREMSSTRAHLUNG CONTRIBUTION FOR
C      THE BETA END UNDER CONSIDERATION.

      DO 150 J=1,NZABS
      IF(IPTZ(1,J)-IPTZ(2,J)) 132,131,132
131 XSL3=0
      N1 = 1
      N2 = 1
      GO TO 133
132 N1=IPTZ(1,J)
      N2=IPTZ(2,J)
      XSL3=(ZABS(J)-ZNUM(N1))*0.05

C      XSL1 IS THE SLOPE FOR INTERPOLATING ON BETA END POINT ENERGY.
C      XSL2 IS THE SLOPE FOR INTERPOLATING ON THE SOURCE Z.
C      XSL3 IS THE SLOPE FOR INTERPOLATING ON THE ABSORBER Z.
C      MB1 AND MB2 ARE INDEXES THE BETA END POINT ENERGY.
C      N1 AND N2 BRACKET THE ABSORBER Z.

133 DO 135 I=1,24
      Y1B1=(A(N2,MB1,I)-A(N1,MB1,I))*XSL3+A(N1,MB1,I)
      Y1B2=(A(N2,MB2,I)-A(N1,MB2,I))*XSL3+A(N1,MB2,I)
      Y1=(Y1B2-Y1B1)*XSL1+Y1B1
      Y1B1=(B(N2,MB1,I)-B(N1,MB1,I))*XSL3+B(N1,MB1,I)
      Y1B2=(B(N2,MB2,I)-B(N1,MB2,I))*XSL3+B(N1,MB2,I)
      Y2=(Y1B2-Y1B1)*XSL1+Y1B1
      Y1=(Y2-Y1)*XSL2+Y1
135 R(I)=R(I)+Y1*FRACT(J)
150 CONTINUE

C      R CONTAINS THE TOTAL BREMSSTRAHLUNG CONTRIBUTION FOR THE
C      PARTICULAR SOURCE Z AND ALL ABSORBER Z, AT ONE BETA END
```


EXTDF

C POINT ENERGY.

```
      DO 155 I=1,25
      IF(BETAEP(LBETA)-GRANGE(I)) 151,152,155
151  IFIND=I-1
      GO TO 156
152  IFIND=I-1
      GO TO 156
155  CONTINUE
      IFIND=25
156  DO 200 I=1,IFIND
      RATIO=GRANGE(I)/BETAEP(LBETA)
      IF(RATIO-GETOBE(1)) 160,160,161
160  IN1=1
      GO TO 170
161  IF(RATIO-1.) 163,162,162
162  IN1=25
      GO TO 170
163  DO 169 J=1,25
      IF(RATIO-GETOBE(J)) 165,164,169
164  IN1=J
      GO TO 170
165  IN1=J-1
      IN2=J
      IF(IN2.EQ.25) GO TO 9165
      GO TO 171
9165 YIELD(I)=YIELD(I)+(RATIO-GETOBE(IN1))*(-R(IN1)/(1.-GETOBE(IN1)))+
1    R(IN1)
      GO TO 200
169  CONTINUE
170  YIELD(I)=YIELD(I)+R(IN1)*BETAPR(LBETA)
      GO TO 200
171  Q=(R(IN2)-R(IN1))*(RATIO-GETOBE(IN1))/(GETOBE(IN2)-GETOBE(IN1))+
1    R(IN1)
      YIELD(I)=YIELD(I)+Q*BETAPR(LBETA)
200  CONTINUE
500  CONTINUE
```

RETURN

C-----
END

EXTDF

```
C-----
C
C      SUBROUTINE CYL
C
C      This module calculates gamma attenuation for cylindrical
C      source using Simpsons rule for integration of point kernel.
C      This module was taken from ISOSHL, see references in the
C      documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----

      INCLUDE 'ISO.CMN'

      DIMENSION TM(6)
      REAL L2

C
      CALL ADJUST (X)

      IF (SLTH.EQ.0.) GO TO 410
      IF (MOD(NTHETA,2).EQ.0) NTHETA = NTHETA + 1
      NTHETA = MAX0 (5,NTHETA)
      IF (MOD(NPSI,2).EQ.0)NPSI=NPSI+1
      NPSI = MAX0(5,NPSI)
      XS = X*X
      VOLUME = PI*SLTH*T(1)**2
      IF (SSV1) 50,60,50

C      EXPONENTIAL SOURCE STRENGTH DISTRIBUTION

      50 SSV2 = SOURCE(1,JPH) * SOURCE(2,JPH) * SSV1**2 / 2. / PI /
        1 SLTH / (1.+XPN(SSV1*T(1))*(SSV1*T(1)-1.))
      GO TO 65

C      CONSTANT SOURCE STRENGTH

      60 SSV2 = SOURCE(1,JPH) * SOURCE(2,JPH) / VOLUME
      65 TH2 = ATAN2(T(1),SQRT(ABS(XS-T(1)**2)))
      DELTH = TH2 / FLOAT(NTHETA - 1)
      IF (Y.GT.SLTH) Y=0.
      HMAX = AMAX1(Y,SLTH-Y)
      AMID = AMIN1 ( Y, SLTH-Y)
      THETA = 0.
      SUMI = 0.
      FLIPI = 2.
```

EXTDF

```
DO 400 I=1,NTHETA
SINT = SIN(THETA)
COST = COS(THETA)
XCOS = X * COST
XSINS=(X * SINT)**2
SUM = 0.
IF(IGEOM=8) 99,120,144

C   CYLINDRICAL SHIELD
99 DO 100 J=1,NSHLDA
SUM = SUM + T(J)
100 TM(J) = XCOS - SQRT(ABS(SUM*SUM - XSINS))
B1MFS = TM(1) * MU(1,JPH)
DO 110 J=2,NSHLDA
110 B1MFS = B1MFS + (TM(J)-TM(J-1))*MU( J,JPH)
B1MFS = - B1MFS
GO TO 150

C   SLAB SHIELDS
120 TTMFS = 0.
B1MFS = 0.
TM(1) = XCOS - SQRT(ABS(T(1)*T(1) - XSINS))
IF (NSHLDA.LT.3) GO TO 135
DO 130 J=3,NSHLDA
TTMFS = TTMFS + T(J)
130 B1MFS = B1MFS + MU(J,JPH)* T(J)
135 IF (COST.EQ.0.) GO TO 142
140 B1MFS = (B1MFS-MU(2,JPH)*TTMFS) / COST + TM(1)*(MU(2,JPH) -
1 MU(1,JPH))
GO TO 150
142 B1MFS = TM(1)*(MU(2,JPH)-MU(1,JPH))
GO TO 150

C   SECOND SHIELD IS CYLINDRICAL, THE THIRD SHIELD SURROUNDS THE FIRST
C   AND SECOND SHIELDS, THE REMAINING SHIELDS ARE SLAB.
C   ( SPECIFY IGEOM=11 )

144 TTMFS=0.
B1MFS=0.
DO 145 J=1,2
SUM=SUM+T(J)
145 TM(J)=XCOS-SQRT(ABS(SUM*SUM-XSINS))
B1MFS=(TM(1)-TM(2))*MU(2,JPH)
IF (COST.EQ.0.) GO TO 152
IF(NSHLDA.LT.4) GO TO 148
DO 147 J=4,NSHLDA
TTMFS=TTMFS+T(J)
147 B1MFS=B1MFS+T(J)*MU(J,JPH)/COST
148 B1MFS=B1MFS-MU(3,JPH)*TTMFS/COST+TM(1)*(MU(3,JPH)-MU(1,JPH))
```

EXTDF

```
GO TO 150
152 IF (NSHLDA.LT.4) GO TO 156
DO 154 J=4,NSHLDA
154 TTMFS = TTMFS + T(J)
156 B1MFS = B1MFS + TM(1)*(MU(3,JPH)-MU(1,JPH))
150 L2 = 2.*XCOS-TM(1)
PSI2 = ATAN2(HMAX, TM(1))
SUMJ = 0.
DELPST = PSI2 / FLOAT(NPSI - 1)
PSI = 0.
FLIPJ = 2.
DO 300 J=1, NPSI
COSPSI = COS(PSI)
IF(COSPSI.EQ.0.) GO TO 157
SECPSI = 1. / COSPSI
157 IF (COSPSI.EQ.0.) SECPSI = 1.E20
SINPSI = SIN(PSI)
COSPSS = COSPSI * COSPSI
IF (COSPSI.EQ.0.) GO TO 158
TANPSI = SINPSI / COSPSI
158 IF (COSPSI.EQ.0.) TANPSI = SINPSI*1.E20
RHO = TM(1) * SECPSI
IF (PSI.GT.0.) GO TO 160
RHO2 = SECPSI * L2
GO TO 165
160 RHO2 = AMIN1(SECPSI*L2, HMAX/SINPSI/COST)
165 IF (DELR.EQ.0.) GO TO 175
170 NRHO = INT ((RHO2-RHO) / DELR)
175 IF (DELR.EQ.0.) NRHO = 0
IF (MOD (NRHO,2).EQ. 0) NRHO = NRHO+1
NRHO = MAX0(5,NRHO)
DELRHO = (RHO2 - RHO) / FLOAT(NRHO-1)
FLIPK = 2.
SUMK = 0.
DO 260 K=1,NRHO
IF (SSV1) 190,180,190
180 SS = SSV2
GO TO 200
190 SS = SSV2 * XPN(SQRT(ABS(XS - 2.*RHO*XCOS*COSPSI + RHO*RHO*COSPSS
1 ))* SSV1)
200 B1 = RHO * MU(1,JPH) + B1MFS*SECPSI
FACT = 1.
B = 8FUNC(BUIF,B1)
IF (K.EQ.1.OR.K.EQ.NRHO) GO TO 240
IF (K.EQ.1 .OR.K.EQ.NRHO) GO TO 250
FLIPK = 6.-FLIPK
FACT = FLIPK
240 IF (SINPSI.NE.0.) GO TO 250
IF (RHO.LT.DELRHO/2.) FACT = FACT*2.
```

EXTDF

```
GO TO 252
250 IF(RHO.LT.AMID/SINPSI+DELRHO/2.) FACT = FACT*2.
252 IF (ABS(B1).LT.200.) GO TO 254
    VAL = 0.
    IF (B1.GT.0.) GO TO 256
    VAL = 100000.
    GD TO 256
254 VAL = FACT * B * SS * XPN(-B1)
256 SUMK = SUMK + VAL
    IF (K.EQ.1) FRST = VAL
    IF (FRST.EQ.0.) GO TO 260
    IF (ABS(VAL/FRST).LT.1.E-4) GO TO 265
260 RHO = RHO + DELRHO
265 SUMK = SUMK * DELRHO * ABS(COSPSI)
    FACT = 1.
    IF (J.EQ.1.OR. J.EQ. NPSI) GO TO 270
    FLIPJ = 6.-FLIPJ
    FACT = FLIPJ
270 SUMJ = SUMJ + FACT * SUMK
300 PSI = PSI + DELPSI
    SUMJ = SUMJ * DELPSI
    FACT = 1.
    IF (I.EQ.1.OR. I.EQ.NTHETA) GO TO 340
    FLIPI=6.-FLIPI
    FACT = FLIPI
340 SUMI = SUMI + FACT * SUMJ
400 THETA = THETA + DELTH
    SUMI = SUMI/ 54./ PI * DELTH
    SOURCE (3,JPH) = SUMI
    RETURN

410 WRITE (*,*) 'SLTH = 0.  EXECUTION TERMINATED IN SUBROUTINE CYL'
    STOP
```

C-----
END

EXTDF

```
C-----
C
C      SUBROUTINE DISC
C
C      This module calculates attenuation for disc source using
C      SIMPS integration function and DSCSRC is the function which
C      is integrated over the source. This module was taken from
C      ISOSHLDA, see references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      INCLUDE 'ISO.CMN'
C
C      EXTERNAL DSCSRC
C
C      CALL ADJUST(X)
C      IF (SLTH.EQ.0.) GO TO 40
C      B1 = 0.
C      DO 10 J=1,NSHLDA
10  B1 = B1 + T(J)*MU(J,JPH)
C      IF (SSV1) 25,20,25
C
C      CONSTANT SOURCE DIST.
20  SSV2 = SOURCE(1,JPH)* SOURCE(2,JPH)/PI/SLTH**2
C      GO TO 30
C
C      EXPONENTIAL SOURCE DIST.
25  SSV2 = SOURCE(1,JPH) * SSV1**2 / 2. / PI / (1.+(SSV1*SLTH-1.) *
1    XPN(SSV1*SLTH)) * SOURCE(2,JPH)
30  SOURCE (3,JPH) = .5 * SIMPS(0,SLTH,.001,DSCSRC)
C      RETURN
C
40  WRITE (*,*) 'SLTH = 0. EXECUTION TERMINATED IN SUBROUTINE DISC'
C      STOP
C-----
C      END
```

EXTDF

```
C-----
C
C      FUNCTION DSCSRC (ARG)
C
C      This function integrates over the DISC source.  This module was
C      taken from ISOSHL, see references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      INCLUDE 'ISO.CMN'
C
C      IF (X.EQ.0.) GO TO 10
C      RHOSQ = X * X + ARG * ARG
C      RHO = SQRT (RHOSQ)
C      B = BFUNC (BUIF,B1*RHO/X)
C      DSCSRC = B * SSV2 * XPN(SSV1*ARG - B1*RHO/X) * ARG / RHOSQ
C
C      RETURN
C
C      10 WRITE (*,*) 'X=0.  EXECUTION TERMINATED IN SUBROUTINE DSCSRC'
C-----
C      END
```

EXTDF

```
C-----
C
C      FUNCTION E1 (ARG)
C
C      This module is called by the functions E2 or F1 and the TCONE
C      subroutine to approximate the integral of  $XPN(-T)/T$  DT for
C      positive arg. This module was taken from ISOSHL, see references
C      in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----

      VALUE = 0.
      IF (ARG .GT. 0.0) GO TO 10

      4 WRITE (*,5) ARG
      5 FORMAT (19H0 INVALID ARGUMENT ,E10.3,36H FOR FUNCTION E1.  RESULT
      1 SET TO 0.)
      GO TO 100

      10 IF (1.0 .LT. ARG) GO TO 20
      VALUE = -0.57721566 - ALOG(ARG)
      FACT = 1.
      DIV = -1.
      DO 15 I=1,10
      FI = FLOAT(I)
      FACT = FACT * FI
      DIV = -DIV* ARG
      15 VALUE = VALUE + DIV/FI/FACT
      GO TO 100

      20 IF (ARG .GT. 88.)GO TO 100
      VALUE = XPN(-ARG)/ARG* (0.2372905+ ARG*(4.5307924 + ARG*(5.1266902
      1 + ARG))) / (2.476631+ARG*(8.6660126+ARG*(6.1265272+ARG)))
      100 E1 = VALUE

      RETURN

C-----
      END
```


EXTDF

```
C-----
C
C      FUNCTION E2 (ARG)
C
C      This module is called by the TCONE subroutine to approximate
C      ARG * INTEGRAL(ARG,INF) OF XPN(-T)/T**2 DT. This module was
C      taken from ISOSHL, see references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      VALUE = 1.
C      IF(ARG.GT.88.) GO TO 9
C      IF (ARG ) 5,10,5
C 5 VALUE = XPN(-ARG) - ARG* E1(ARG)
C      GO TO 10
C 9 VALUE=0.
C 10 E2 = VALUE
C      RETURN
C-----
C
C      END
```

EXTDF

```
C-----
C
C      SUBROUTINE ENDCYL
C
C      This module calculates the attenuation of CYL source with
C      detector at end using Simpsons rule for integraton of point
C      kernel. This module was taken from ISOSHLDA, see references
C      in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----

      INCLUDE 'ISO.CMN'

      CALL ADJUST(X)
      FLIPI = 2.
      B1MFS = 0.
      TTMFS = 0.
      DO 5 I=2,NSHLDA
      TTMFS = TTMFS + T(I)
5  B1MFS = B1MFS + MU(I,JPH) * T(I)
      IF (MOD(NTHETA,2).EQ.0) NTHETA=NTHETA+1
      NTHETA=MAX0(5,NTHETA)
      THETA = 0.
      TH2 = ATAN2(SLTH,X-T(1))
      DELTH=TH2/FLOAT(NTHETA-1)
      VOLUME = PI * SLTH**2 * T(1)
      IF (VOLUME.EQ.0.) GO TO 210
      IF (SSV1) 15,10,15
10  SSV2 = SOURCE(1,JPH)* SOURCE(2,JPH)/ VOLUME
      GO TO 20
15  SSV2 = SOURCE(1,JPH) * SOURCE(2,JPH) * SSV1**2 / 2. / PI / T(1) /
1  (1. + XPN(SSV1*SLTH) * (SSV1* SLTH - 1.))
20  SUMI = 0.
      DO 200 I=1,NTHETA
      SINT = SIN(THETA)
      IF (COS(THETA).EQ.0.) GO TO 25
      SECANT = 1. / COS(THETA)
25  IF (COS(THETA).EQ.0.) SECANT = 1.E20
      RHO = (X-T(1)) * SECANT
      IF (SINT.EQ.0.) GO TO 26
      RHO2 = AMIN1 (X * SECANT, SLTH / SINT )
26  IF (SINT.EQ.0.) RHO2 = X
      IF (DELR.EQ.0.) GO TO 27
```

EXTDF

```
NRHO = INT ( (RHO2- RHO) / DELR )
27 IF (DELR.EQ.0.) NRHO = 0
   IF (MOD(NRHO,2).EQ.0) NRHO = NRHO + 1
   NRHO=MAX0(5,NRHO)
   DELRHO=(RHO2-RHO)/FLOAT(NRHO-1)
   SUMJ = 0.
   FLIPJ = 2.
   TT = TTMFS * SECANT
   B1 = BIMFS * SECANT
   DO 100 J=1,NRHO
     IF (SSV1) 35,30,35
30 SS= SSV2
   GO TO 40
35 SS = SSV2 * XPN (RHO*SINT*SSV1)
40 B2 = (RHO - TT)* MU(1,JPH) + B1
   B = BFUNC (BUIF,B2)
   FACT = 1.
   IF (J.EQ.1.OR.J.EQ.NRHO) GO TO 45
   IF (J.EQ.1 .OR. J.EQ.NRHO) GO TO 50
   FLIPJ = 6. - FLIPJ
   FACT = FLIPJ
45 IF (B2.LT.200..AND.B2.GE.0.) GO TO 50
   VAL = 0.
   IF (B2.GE.0.) GO TO 55
   VAL = 100000.
   GO TO 55
50 VAL = FACT * B * SS * XPN(-B2)
55 IF (J.EQ.1) FRST = VAL
   IF (FRST.EQ.0.) GO TO 110
   IF ( ABS(VAL / FRST) .LT. 1.E-4) GO TO 110
   SUMJ = SUMJ + VAL
100 RHO = RHO + DELRHO
110 SUMJ = SUMJ * DELRHO
   FACT = 1.
   IF ( I.EQ.1 .OR. I.EQ.NTHETA) GO TO 150
   FLIPI = 6.-FLIPI
   FACT = FLIPI
150 SUMI = SUMI + FACT * SUMJ * SINT
200 THETA = THETA + DELTH
   SOURCE (3,JPH) = SUMI * DELTH / 18.
   RETURN

210 WRITE (*,*) 'VOLUME=0, EXECUTION TERMINATED IN SUBROUTINE ENDCYL'
   STOP
```

C-----
END

EXTDF

```
C-----
C
C      FUNCTION F1 (T,A)
C
C      This module performs an approximation for integral from 0 to T
C      of  $XPN(A*X)*E1(X)$  DX. This module was taken from ISOSHL, see
C      references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----

      VALUE = 0.
      IF (T) 5,100,5
5     IF (A.GT.0. .OR. A.LT.0. .OR. ABS(T).GT.88.) GO TO 9
      VALUE = 1. - E2(T)
      GO TO 100
9     IF (A) 10,20,10
10    IF (1.0 .LT. A .OR. ABS(T*(1.-A)).GT.88.) GO TO 20
11    VALUE = (XPN(A*T)* E1(T) - E1(T*(1.-A)) -ALOG(ABS(1.-A))) / A
      GO TO 100
20    IF (ABS(A-1.).GT.1.E-10 .OR. T.LT.1.E-37 .OR. T.GT.88.) GO TO 30
      VALUE = XPN(T)* E1(T) +ALOG(T) + 0.57721566
      GO TO 100
30    IF ( A.GT.1.0 .AND.ABS(A*T).LT. 88.) GO TO 11

      WRITE (*,40) T,A
40    FORMAT (40H0 F1 INTEGRATION FUNCTION FAILED. TAU =, E11.3,
1     5H, A= ,E11.3)
100   F1 = VALUE
      RETURN
C-----
      END
```

EXTDF

```
C-----
C
C      SUBROUTINE LINE
C
C      This module calculates the gamma attenuation for a line source
C      such that one end is considered origin using Simps integration
C      function. This module was taken from ISOSHL, see references
C      in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      ANG1 = angle shield normal makes with the line source
C      ANG2 = angle to detector
C      X = dist to detector from origin
C      SLTH = source length
C-----
C
C      INCLUDE 'ISO.CMN'
C
C      EXTERNAL LINSRC
C
C      XNORM = X * COS (ABS(ANG2-ANG1 ))
C      IF (ANG1.LT.PI/2.) T(1) = AMAX1(T(1),SLTH*COS(ANG1))
C      CALL ADJUST (XNORM)
C      B1MFS = 0.
C      TTMFS = 0.
C      DO 105 K=2,NSHLDA
C      TTMFS = TTMFS + T(K)
105  B1MFS = B1MFS + T(K)* MU(K,JPH)
C      IF (SLTH.EQ.0.) GO TO 109
C      IF (SSV1) 106, 107,106
C
C      EXPONENTIAL SOURCE DIST.
106  SSV2 = SOURCE(1,JPH)* SOURCE(2,JPH)* SSV1/(XPN(SSV1*SLTH)-1.)
C      GO TO 108
C      CONSTANT SOURCE DIST.
107  SSV2 = SOURCE(1,JPH)* SOURCE(2,JPH) / SLTH
109  IF (SLTH.EQ.0.) SSV2 = 0.
108  SOURCE (3,JPH) = SIMPS (0,SLTH,.001, LINSRC)
120  RETURN
C-----
C      END
```

EXTDF

```
C-----
C
C      FUNCTION LINSRC (ARG)
C
C      This function is integrated by Function SIMPS to calculate
C      attenuation for a line source. This function was taken from
C      ISOSHL, see references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 10-June-87 MDT
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      INCLUDE 'ISO.CMN'
C
C      RHOSQ = ARG**2 + X**2 - 2. *ARG*X*COS(ANG2)
C      RHO = SQRT(RHOSQ)
C      SINOM = ARG * SIN(ANG2) / RHO
C      COSOM = (X**2 + RHOSQ - ARG**2) / 2. / X / RHO
C      OMEG= ATAN2 (SINOM,COSOM)
C      THETA = ABS (ANG1 - ANG2- OMEG)
C      SECANT = 1. / COS (THETA)
C      B1 = (RHO- TTMFS* SECANT) * MU(1,JPH) + 81MFS * SECANT
C      IF (SSV1) 200,150,200
150 SS=SSV2
C      GO TO 300
200 SS = SSV2 * XPN(SSV1*ARG)
300 B = BFUNC(BUIF,B1)
C      LINSRC = 8 * SS * XPN(-B1) / 4. / PI / RHOSQ
C
C      RETURN
C-----
C
C      END
```

EXTDF

```
C-----
C
C      SUBROUTINE POINT
C
C      This module calculates gamma attenuation of a point source
C      through multiple slab shields. This module was taken from
C      ISOSHLDA, see references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      INCLUDE 'ISO.CMN'
C
C      CALL ADJUST (X)
C      IF (COS(ATAN2(Y,X)).EQ.0.) GO TO 10
C      SECANT = 1. / COS(ATAN2(Y,X))
10 IF (COS(ATAN2(Y,X)).EQ.0.) SECANT = 1.E20
C
C      CALCULATE B1 = SUM MU * THICKNESS OF SHIELDS, MU = ATTEN. COEF
C
C      B1 = 0.
C      DO 20 J=1,NSHLDA
20 B1 = B1 + MU(J,JPH) * T(J)
C      B1 = B1 * SECANT
C      B = BFUNC(BUIF,B1)
C      SOURCE(3,JPH) = B * SOURCE(1,JPH) * SOURCE(2,JPH) * XPN(-B1)
1 / 4. / PI / (X * SECANT) **2
C
C      RETURN
C-----
C
C      END
```

EXTDF

```
C-----
C
C      SUBROUTINE RECT
C
C      This module calculates the attenuation for a rectangular
C      source using Simpsons rule for numerical integration of a
C      point kernel. This module was taken from ISOSHLDA, see
C      references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----

      INCLUDE 'ISO.CMN'

      VOLUME = SLTH*Y*T(1)

C      CONSTANT SOURCE STRENGTH ONLY FOR RECT. SOURCE

      SSV2 = SOURCE(1,JPH) * SOURCE(2,JPH) / VOLUME
      IF (MOD(NPSI,2).EQ.0) NPSI = NPSI+1
      NPSI = MAX0(5,NPSI)
      DELPSI = Y/FLOAT(NPSI-1)/2.
      FLIPI = 2.
      SUMI = 0.
      CALL ADJUST(X)
      B1MFS = 0.
      TTMFS = 0.
      DO 10 I=2,NSHLDA
      TTMFS = TTMFS + T(I)
10  B1MFS = B1MFS + T(I)* MU(I,JPH)
      IF (MOD(NTHETA,2).EQ.0) NTHETA = NTHETA +1
      NTHETA = MAX0(5,NTHETA)
      THETA = 0.
      DELTH = SLTH / 2. / FLOAT(NTHETA-1)
      IF (DELR.EQ.0.) GO TO 20
      NZ = INT(T(1)/DELR)
      IF (MOD(NZ,2).EQ.0) NZ= NZ + 1
      NZ = MAX0 (5,NZ)
20  IF (DELR.EQ.0.) NZ = 0
      DZ = T(1)/FLOAT(NZ-1)
      DO 300      I=1,NTHETA
      FLIPJ = 2.
      SUMJ = 0.
      PSI = 0.
```


EXTDF

```
THSQ = THETA**2
DO 200 J=1,NPSI
  TSPS = THSQ + PSI**2
  SUMK = 0.
  FLIPK = 2.
  Z = 0.
  DO 100 K=1,NZ
    RHOSQ = TSPS + (TTMFS+Z)**2
    RHO = SQRT (RHOSQ)
    SECANT = RHO / (TTMFS + Z )
    B1 = (RHO-TTMFS*SECANT)* MU(1,JPH) + B1MFS * SECANT
    B = BFUNC (BUIF,B1)
    FACT = 1.
    IF (K.EQ.1.OR. K.EQ.NZ) GOTO 50
    FLIPK =6.-FLIPK
    FACT = FLIPK
40  IF (B1.LT.200..AND.B1.GE.0..AND.RHOSQ.NE.0.) GO TO 50
    VAL = 0.
    IF (B1.GE.0.) GO TO 60
    VAL = 100000.
    GO TO 60
50  VAL = FACT * B * SSV2 * XPN(-B1) / RHOSQ
60  IF (K.EQ.1) FRST = VAL
    IF (K.EQ.1) FRST=VAL
    IF (ABS(VAL).LT.1.0E-4*ABS(FRST)) GOTO 110
    SUMK = SUMK + VAL
100 Z = Z + DZ
110 FACT = 1.
    IF (J.EQ.1.OR.J.EQ.NPSI) GO TO 150
    FLIPJ = 6. - FLIPJ
    FACT = FLIPJ
150 SUMJ = SUMJ + FACT * SUMK
200 PSI = PSI + DELPSI
    FACT = 1.
    IF (I.EQ.1.OR.I.EQ.NTHETA) GO TO 250
    FLIPI = 6.-FLIPI
    FACT = FLIPI
250 SUMI = SUMI + FACT * SUMJ
300 THETA = THETA + DELTH
    SOURCE (3,JPH) = SUMI * DZ * DELTH * DELPSI / PI / 27.

    RETURN
```

C-----
END

EXTDF

```
C-----
C
C      FUNCTION SIMPS (A, B, DELTA, F00000)
C
C      This fuction uses Function F00000 ( F00000 = SPHERE or
C      LINSRC or DSCSRC depending on the calling subroutine )
C      where A and B are min and max of the definite integral.
C      Delta is the permissible difference between two successive
C      sums. This module was taken from ISOSHL, see references in
C      the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 30-Jul-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
```

EXTERNAL F00000

```
      N=1
      H=(B-A)/2.
      TEMPA = F00000(A)
      TEMPB = F00000(B)
      FJAY = H * (TEMPA + TEMPB)
C      FJAY=H*(F00000(A)+F00000(B))
C
C      A MAXIMUM OF 2049 POINTS WILL BE USED WHEN L=11
C
      DO 35 L=1,11
10  S=0.0
      DO 20 K=1,N
20  S=S+F00000(A+(2.0*FLOAT (K)-1.0)*H)
      FI=FJAY+4.0*H*S
      IF(L-3)26,26,23
23  CONTINUE
      IF (FI.EQ.0.) GO TO 40
      IF(DELTA-ABS ((FI-BAR)/FI))30,40,40
26  CONTINUE
30  BAR=FI
      FJAY=(FI+FJAY)/4.0
      N=2*N
      H=H/2.0
35  CONTINUE
C      CALL SLITE (1)
40  SIMPS =FI/3.0
C
      RETURN
```

EXTDF

C

C

END

EXTDF

```
C-----
C
C      SUBROUTINE SPHERE
C
C      This module calculates gamma attenuation of a spherical
C      source or slab shields using Function SIMPS to integrate
C      Function SPHSRC. This module was taken from ISOSHL, see
C      references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      INCLUDE 'ISO.CMN'
C
C      EXTERNAL SPHSRC
C
C      CALL ADJUST (X)
C      THETA2 = ATAN2(T(1),SQRT(ABS(X**2-T(1)**2)))
C      VOLUME = 4.189*T(1)**3
C      IF (IGEOM-4) 10,8,8
C
C      SLAB SHIELDS
C
C      8 TTMFS = 0.
C      81MFS = 0.
C      IF(NSHLDA.LT.3)GO TO 10
C      DO 9 K=3,NSHLDA
C      TTMFS = TTMFS + T(K)
C      9 BIMFS = BIMFS + T(K)*MU(K,JPH)
C
C      CONSTANT SOURCE STRENGTH ONLY FOR SPHERICAL SOURCE
C      10 SSV2 = SOURCE(2,JPH) * SOURCE(1,JPH) / VOLUME
C      SOURCE (3,JPH) = .5 * SIMPS(0,THETA2,.001,SPHSRC) * SSV2
C
C      120 RETURN
C-----
C      END
```

EXTDF

```
C-----
C
C      FUNCTION SPHSRC (ARG)
C
C      This function is called by the SPHERE subroutine. This function
C      was taken from ISOSHLDA, see references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
```

```
      INCLUDE 'ISO.CMN'
```

```
      DIMENSION VAL(2)
      REAL L1, L2
      DIMENSION TM(6)
```

```
      XCOS = X * COS(ARG)
      SINA = SIN(ARG)
      XSINS = (X*SINA)**2
      XX = SQRT (ABS( T(1) **2 - XSINS))
      L1 = XCOS - XX
      L2 = XCOS + XX
      IF (IGEOM-3) 5,9,5
```

```
C      SLAB SHIELDS
5      TT = TTMFS * X/XCOS
      B1 = L1*MU(1,JPH) - (L1-TT)*MU(2,JPH) - B1MFS*X/XCOS
      GO TO 21
```

```
C      SPHERICAL SHIELDS
9      XX = T(1)
      DO 10 I=2,NSHLDA
      XX=XX + T(I)
10      TM(I) = XCOS - SQRT (ABS( XX**2 - XSINS) )
      B1 = L1 * MU(1,JPH)
      TM(1) = L1
      DO 20 I=2,NSHLDA
20      B1 = B1 - (TM(I-1)-TM(I)) * MU(I,JPH)
21      SPHSRC = 0.
      FRED1 = B1-L1*MU(1,JPH)
      FRED2 = B1-L2*MU(1,JPH)
      DO 30 K=1,2
      VAL(K) =0.
      DO 30 I=1,2
```

EXTDF

```
A = 1. + BUF(I+2,K)
30 VAL(K) = VAL(K) - BUF(I,K) / (A*MU(1,JPH)) * (XPN(A*FRED2) - XPN(A*FRED1))
SPHSRC = (VAL(1) + BUIF*(VAL(2) - VAL(1))) * SINA
RETURN
C-----
END
```

EXTDF

```
C-----
C
C      SUBROUTINE TCONE
C
C      This module uses the Functions E1 and E2 to calculate the
C      attenuation for truncated cone source. This module was taken
C      from ISOSHLDA, see references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----

      INCLUDE 'ISO.CMN'
      DIMENSION VAL(2)

      SECANT = 1. / COS(ANG1)
      CALL ADJUST (X)
      B1MFS = 0.
      DO 15 J=2,NSHLDA
15  B1MFS = B1MFS + MU(J,JPH)* T(J)
      B1 = B1MFS + MU(1,JPH) * T(1)
      TANS = (SIN(ANG1)/COS(ANG1))** 2
      VOLUME = 1.047*TANS*(X**3-(X-T(1))**3)
      IF (SSV1) 38,16,38

C      CONSTANT SOURCE STRENGTH DISTRIBUTION
16  IF (ANG1 - PI/2. +0.1) 18,20,20
18  SSV2 = SOURCE(1,JPH) * SOURCE(2,JPH) / VOLUME
      GO TO 25

C      INFINITE SLAB SOURCE
20  SSV2 = SOURCE(1,JPH) * SOURCE(2,JPH)
      VOLUME=9.999E30
      IF (T(1).GT. 0.) GO TO 25

C      INFINITE PLANE SOURCE
      DO 23 K=1,2
      VAL(K) = 0.
      DO 23 J=1,2
      A = 1.0 + BUF(J+2,K)
23  VAL(K) = VAL(K) + BUF(J,K) * E1(A*B1)
      SOURCE(3,JPH) = .5 * SSV2 * (VAL(1) + 8UIF*(VAL(2)-VAL(1)))
      RETURN

25  DO 35 K=1,2
```

EXTDF

```
VAL(K) = 0.  
DO 35 J = 1,2  
A=1.0 + BUF(J+2,K)  
IF (ANG1 .LT. PI/2. - 0.1) GO TO 30  
VAL(K) = VAL(K) + BUF(J,K)/A * (E2(A*B1MFS) - E2(A*B1) )  
GO TO 35  
30 VAL(K) = VAL(K) + BUF(J,K)/A * (E2(A*B1MFS)-E2(A*B1) - E2(A*B1MFS*  
1 SECANT)/ SECANT + E2(A*B1*SECANT)/SECANT)  
35 CONTINUE  
GO TO 100
```

C EXPONENTIAL SOURCE STRENGTH DISTRIBUTION

```
38 IF (ANG1 .LT. PI/2. - 0.1) GO TO 40  
VOLUME=9.999E30  
SSV2 = SOURCE(1,JPH) * SOURCE(2,JPH)  
GO TO 42  
40 SSV2 = SOURCE(1,JPH)*SOURCE(2,JPH)*SSV1/(XPN(SSV1*T(1))*(X*X  
1 - (SSV1*T(1)-1.)*(-2./SSV1*(X+1./SSV1))+T(1)**2)-X**2-2./SSV1 *  
1 . (X + 1./ SSV1))  
42 DO 60 K=1,2  
VAL(K) = 0.  
DO 60 J=1,2  
A =1.0 + BUF(J+2,K)  
IF (PI/2.-0.1 .LT. ANG1) GO TO 55  
45 VAL(K) = VAL(K) + BUF(J,K)/A * (F1(A*B1,BUF(J+2,K)) -  
1 F1(A*B1MFS,BUF(J+2,K)) - F1(A*B1*SECANT,BUF(J+2,K))/SECANT  
2 + F1(A*B1MFS*SECANT,BUF(J+2,K)))  
GO TO 60  
55 VAL(K) = VAL(K) + BUF(J,K)/A * (F1(A*B1,BUF(J+2,K)) -  
1 F1(A*B1MFS,BUF(J+2,K)))  
60 CONTINUE  
100 CONTINUE  
SOURCE (3,JPH) = .5 * SSV2 * XPN(SSV1/MU(1,JPH)*B1)/MU(1,JPH) *  
1 (VAL(1) +BUIF*(VAL(2)-VAL(1)))
```

RETURN

C

C-----

END

EXTDF

```
C-----
C
C      FUNCTION TERP (XER,Y,A)
C
C      This function is a linear interpolation routine used on the
C      original ISOSHL D group structure. This function was taken from
C      ISOSHL D, see references in the documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      DIMENSION XER(25), X(16), Y(16)
C
C      DO 50 I=1,16
50  X(I)=XER(I+9)
      IF(A-AP) 5,30,5
      DO 10 I=1,16
      IF (X(I) .GT. A) GO TO 20
10  CONTINUE
      J=16
      K=16
      GO TO 30
20  K = MAX0 (I,2)
      J = MAX0(I-1,1)
30  TERP = Y(J) + (A-X(J)) / (X(K)-X(K-1)) * (Y(K)-Y(K-1))
      AP=A
C
C      RETURN
C-----
C
C      END
```

EXTDF

```
C-----
C
C      FUNCTION TERPB (X,Y,A)
C
C      This function performs interpolation of a 25 position list.
C      This function was taken from ISOSHL, see references in the
C      documentation.
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 17-June-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      DIMENSION X(25),Y(25)
C
C      IF(AP-A) 5,30,5
C      5 DO 10 I=1,25
C      IF (X(I) .GT. A) GO TO 20
C      10 CONTINUE
C      J=25
C      K=25
C      GO TO 30
C      20 K=MAX0(I,2)
C      J=MAX0(I-1,1)
C      30 TERPB=Y(J)+(A-X(J))/(X(K)-X(K-1))*(Y(K)-Y(K-1))
C      AP=A
C
C      RETURN
C-----
C
C      END
```

EXTDF

```
C-----  
C  
C      FUNCTION XPN (X)  
C  
C      This function sets appropriate system parameters.  
C  
C      This module was taken from ISOSHL D, see references in the  
C      documentation  
C  
C      Module of Program EXTDF of the GENII Software Package  
C      Pacific Northwest Laboratory Environmental Dosimetry System  
C  
C      Last modification: 17-June-87 RAP  
C      Reviewed and Approved: 13-Sept-88 BA Napier  
C-----  
  
      REAL LOW, TOP, XPN  
  
      DATA LOW / 0.0 /  
  
      DATA TOP / 6.08E37 /  
  
      IF (ABS(X) .GT. 87) GO TO 5  
  
      XPN=EXP(X)  
  
      RETURN  
  
5  CONTINUE  
  
      IF(X .LT. -87) XPN=LOW  
  
      IF(X .GT. +87) XPN=TOP  
  
      RETURN  
  
C-----  
      END
```

EXTDF

```
C-----
C
C      SUBROUTINE NRGLIB
C
C      This module reads the DRALIST file as formatted by the CONVER
C      computer program (Kocher 1980).
C
C      Module of Program EXTDF of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last modification: 10-Jul-87  RAP
C      Reviewed and Approved: 13-Sept-88  BA Napier
C-----
C
C      NSKIP      - Input index of number of data sets to skip
C      NBI        - Input number of beta data sets
C      NPHI       - Input number of photon data sets
C      NADDP      - Input number of gamma rays and xrays
C      NADDB      - Input number of Auger and internal conversion electrons
C      NB()       - Number of betas for each RMDLIB member
C      NP()       - Number of photons for each RMDLIB member
C      RDUM       - REAL dummy input variable
C      IBESUB()   - For each RMDLIB member; starting index in beta array
C      IPHSUB()   - For each RMDLIB member; starting index in photon array
C-----
C
C      INCLUDE 'ISO.CMN'
C      INCLUDE 'RMD.CMN'
C
C      INTEGER NSKIP, NBETA, NBI, NPHI, NADDB, NADDP
C      REAL RDUM(300)
C      CHARACTER ELTI*2, AWI*6
C
C      Initialize indices for reading library--
C
C      NPHTN = 1
C      NBETA = 1
C
C      Read a data set for each member of RMDLIB--
C      DO 50 J = 1, NUCS
C
C          READ (26,30) ELTI, AWI, LATNO
C          30  FORMAT (1X, A2,1X, A6, 16X, I3)
C          IF (ELTI .NE. ELTM(J) .OR. AWI .NE. AWM(J)) GOTO 91
C
C      Set starting indices, atomic number and mass number--
C      IPHSUB(J) = NPHTN
```

EXTDF

```
      IBESUB(J) = NBETA
      LA(J) = LATNO
C      ML(J) = check if this is really needed

C      Skip over alpha particles--
      READ (26,*) NSKIP
      IF (NSKIP .GT. 0) READ (26,*) (RDUM(I),I=1,NSKIP*2)

C      Read beta- particles--
      READ (26,*) NBI
      IF (NBI .GT. 0) READ (26,*)
      .   (BETENS(2,NBETA-1+I), RDUM(1), BETENS(1,NBETA-1+I), I=1,NBI)
      NBETA = NBETA + NBI

C      Skip beta+ particles (included in gamma)--
      READ (26,*) NSKIP
      IF (NSKIP .GT. 0) READ (26,*) (RDUM(I),I=1,NSKIP*3)

C      Read Auger and internal conversion electrons--
      READ (26,*) NADDB
      IF (NADDB .GT. 0) READ (26,*)
      .   (BETENS(2,NBETA-1+I), BETENS(1,NBETA-1+I), I=1,NADDB)
      NBETA = NBETA + NADDB

C      Read gamma rays and X-rays--
      READ (26,*) NADDP
      IF (NADDP .GT. 0) READ (26,*)
      .   (PHOTON(2,NPHTN-1+I), PHOTON(1,NPHTN-1+I), I=1,NADDP)
      NPHTN = NPHTN + NADDP

C      Set number of photons and betas for this radionuclide--
      NP(J) = NPHTN + NADDP
      NB(J) = NBI + NADDB

50 CONTINUE
   RETURN

C---- Error conditions -----

91 WRITE (*,*) 'Energy library out of order.'
   WRITE (*,*) 'RMDLIB: ', ELTM(J), AWM(J)
   WRITE (*,*) 'ENERGY: ', ELTI, AWI
   STOP

C-----
END
```


UNFORMAT

```
C-----
C
C      PROGRAM UNFORMAT
C
C      This module reads data sets of inhalation and ingestion dose rate
C      factors and writes an unformatted file
C
C      Utility Module of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 3-Nov-87 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      DUM      - Dummy input variable
C      IN       - Index of the current radionuclide in this case
C      EAIN     - Input element symbol and mass number input string
C      DAT      - Input date
C      TIM      - Input time
C      DFIN()   - Input dose factor for each organ
C      NYRG     - Number of years of ingestion dose factor increments
C      NYRH     - Number of years of inhalation dose factor increments
C      NGORG()  - Number of years of ingestion df's for each organ
C      NHORG()  - Number of years of inhalation df's for each organ
C-----
C
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'DFPAR.CMN'
C      INCLUDE 'RADIN.CMN'
C      INCLUDE 'DOSALL.CMN'
C      INCLUDE 'ORGMAS.CMN'
C      INCLUDE 'TITL.CMN'
C
C      REAL DFIN(70)
C      INTEGER NYRG, NYRH, NGORG(25), NHORG(25), IORG(25),
C      .      NGMAS(25), NHMAS(25)
C      CHARACTER DUM*1, EXCL*1, ASTR*1, E*2, A*6, DAT*10, TIM*10,
C      .      FILNAM*20
C      DATA EXCL /'!'/, ASTR /'*'/
C
C      LIN = 37
C      LOT = 40
C
C      WRITE (*,*) 'Enter input file name: '
C      READ (*,*) FILNAM
C      OPEN (37,FILE=FILNAM)
```

UNFORMAT

```
WRITE (*,*) 'Enter output file name: '
READ (*,*) FILNAM
OPEN (40,FILE=FILNAM,FORM='UNFORMATTED')

READ (LIN,'(A)',ERR=98, END=230) TITLS(LIN)

C   Loop through data sets for all radionuclides--
200 CONTINUE

      DO 201 IO = 1, 25
        NGORG(IO) = 0
        NHORG(IO) = 0
        NHMAS(IO) = 0
        NGMAS(IO) = 0
        DO 202 IY = 1, 70
          DFG(IY,IO) = 0.0
          DFH(IY,IO) = 0.0
202    CONTINUE
201  CONTINUE

      READ (LIN, 1, END=230) E, A, DAT, TIM
      READ (LIN,*) NORGS, (IORG(IO),IO=1,NORGS)

C   Read ingestion dose factors--
      READ (LIN,*) (NGORG(IO),IO=1,NORGS)
      DO 242 IO = 1, NORGS
        NGMAS(IORG(IO)) = NGORG(IO)
        READ (LIN,2) DUM, (DFIN(IY), IY=1,NGORG(IO))
        DO 223 IY = 1, NGORG(IO)
          DFG(IY,IORG(IO)) = DFIN(IY)
223    CONTINUE
242  CONTINUE

C   Read inhalation dose factors--
      READ (LIN,*) (NHORG(IO),IO=1,NORGS)
      DO 241 IO = 1, NORGS
        NHMAS(IORG(IO)) = NHORG(IO)
        READ (LIN,2) DUM, (DFIN(IY), IY=1,NHORG(IO))
        DO 224 IY = 1, NHORG(IO)
          DFH(IY,IORG(IO)) = DFIN(IY)
224    CONTINUE
241  CONTINUE

      WRITE (LOT) E, A, (NGMAS(IO),IO=1,23), (NHMAS(IO),IO=1,23),
      .      ((DFG(IY,IO), IY=1,NGMAS(IO)), IO=1,23),
      .      ((DFH(IY,IO), IY=1,NHMAS(IO)), IO=1,23)
```


UNFORMAT

GOTO 200
230 CONTINUE

CLOSE (LIN)
CLOSE (LOT)
STOP

C---- Format Statements -----

1 FORMAT (2X, A2, A6, 27X, A10, 1X, A10)
2 FORMAT (A1, 15E8.1 / 10(1X, 15E8.1/))

C---- Error Messages -----

98 CALL FILERR (2, LUN, 'In UNFORMAT')
99 CALL FILERR (3, LUN, 'In UNFORMAT')

C-----
END

UNFORMAT

UNSEE

```
C-----
C
C      PROGRAM UNSEE
C
C      This module reads SEE formatted data files and writes unformatted
C      files.
C
C      Utility Module of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 12-Apr-88 RAP
C      Reviewed and Approved: 13-Sept-88 BA Napier
C-----
C
C      DUM      - Dummy input variable
C-----

      INCLUDE 'SEE.CMN'
      CHARACTER TITL*80, EXCH1*1, EXCH2*1, DUM*1, FILNAM*20

C      For the selected file--
      DO 100 ISEE = 1, 1

C      IF (ISEE .EQ. 1) THEN
C      OPEN (1,FILE='SEE1.OUT')
C      OPEN (2,FILE='SEE1.DAT',FORM='UNFORMATTED')
C      ELSEIF (ISEE .EQ. 2) THEN
C      OPEN (1,FILE='SEE2.OUT')
C      OPEN (2,FILE='SEE2.DAT',FORM='UNFORMATTED')
C      ELSEIF (ISEE .EQ. 3) THEN
C      OPEN (1,FILE='SEE3.OUT')
C      OPEN (2,FILE='SEE3.DAT',FORM='UNFORMATTED')
C      ENDIF

      WRITE (*,*) 'Enter input file name:'
      READ (*,*) FILNAM
      OPEN (1,FILE=FILNAM)
      WRITE (*,*) 'Enter output file name:'
      READ (*,*) FILNAM
      OPEN (2,FILE=FILNAM,FORM='UNFORMATTED')

      READ (1, '(A)',ERR=98, END=99) TITL
      WRITE (2) TITL

C      Process until end of file--
102  CONTINUE
```

UNSEE

```
C      Formatted file--
      READ (1,70,ERR=98,END=103) AHO1, EXCH1, LEME1, ZHO1, HLIFE1,
      .                               UNITS1
      READ (1,71) AHO, EXCH, LEME, ZHO, HLIFE, UNITS, NPRS, NPRT,
      .
      IG, IGBAR, TODAY, BONES

      READ (1,72) (IPRS(I),I=1,NPRS), (IPRT(I),I=1,NPRT)
      READ (1,73) ((DBLIN(I,K),I=1,NPRS),K=1,NPRT)
      READ(1,70,END=103) AHO2,EXCH2,LEME2,ZHO2,HLIFE2,UNITS2

      IF (AHO1 .NE. AHO2) GO TO 92

C      Unformatted file--
      WRITE (2) AHO, EXCH, LEME, ZHO, HLIFE, UNITS, NPRS, NPRT,
      .
      IG, IGBAR, TODAY, BONES

      WRITE (2) (IPRS(I),I=1,NPRS), (IPRT(I),I=1,NPRT)
      WRITE (2) ((DBLIN(I,K),I=1,NPRS),K=1,NPRT)

      GOTO 102
103  CONTINUE

      CLOSE (1)
      CLOSE (2)
      STOP

100 CONTINUE

C---- Error Conditions -----
      91 CALL FILERR (2, IUNIT, LEME)

      92 WRITE (*,1) AHO1,AHO2
      CALL FILERR (3, IUNIT, LEME)

      98 CALL FILERR (2, LUN, 'In UNSEE')
      99 CALL FILERR (3, LUN, 'In UNSEE')

C---- Format Statements -----
      70 FORMAT (5X,F5.0,1X,A1,1X,3A4,F5.0,1PE11.4,1X,2A4)
      71 FORMAT (1X,F5.0,1X,A1,3A4,F5.0,E11.4,1X,2A4,8I3,A3,1X,A1)
      72 FORMAT (40I2)
      73 FORMAT (8E10.2)
      1  FORMAT (' UNEXPECTED ERROR:  HEADER=',F5.0,'TRAILER= ',F5.0)

C-----
      END
```

GENERAL MODULES

```
C-----
C
C      SUBROUTINE BIOCAL
C
C      This subroutine pre-calculates biotic transport parameters.
C
C      Module of ENV of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Version of 26-Aug-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      INCLUDE 'SOLPAR.CMN'
C      INCLUDE 'OPT.CMN'
C
C      Set depth index--
C
C      IF (OVRBRD .LE. 0.15) THEN
C        INDW = 1
C      ELSEIF (OVRBRD .LE. 0.5) THEN
C        INDW = 2
C      ELSEIF (OVRBRD .LE. 1.0) THEN
C        INDW = 3
C      ELSEIF (OVRBRD .LE. 1.5) THEN
C        INDW = 4
C      ELSEIF (OVRBRD .LE. 2.0) THEN
C        INDW = 5
C      ELSE
C        INDW = 6
C      ENDIF
C
C      Calculate quantity of soil brought to the surface by animals--
C      IF (BTDSET .EQ. 0) BTDSET = 3
C      EXCAMT = EXCAV(INDW,BTDSET) * TOTEXC(BTDSET)
C
C      IF (DEBUG) WRITE (*,*) 'Biotic TR (INDW, BTDSET, EXCAMT):',
C      .  INDW, BTDSET, EXCAMT
C
C      RETURN
C-----
C      END
```

GENERAL MODULES

```
C-----
C
C   BLOCK DATA BLKORG
C
C   This module initializes organ parameters.
C
C   Module of Programs INTDF and DOSE of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Version of 11-Feb-88  RAP
C   Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C   INCLUDE 'ORGMAS.CMN'
C   INCLUDE 'ORGPARG.CMN'
C   INCLUDE 'MTBPAR.CMN'
C   INCLUDE 'OPT.CMN'
C
C   DATA MORG /25/
C
C   Master organ list--
C   DATA MASORG / 'Lung', 'Lymph', 'Stomach', 'S Int.',
C   .             'UL Int.', 'LL Int.', 'Bone Sur', 'R Marrow',
C   .             'Bone Cor', 'Bone Can', 'Testes', 'Ovaries',
C   .             'Muscle', 'Thyroid', 'Bladder', 'Kidneys',
C   .             'Liver', 'Pancreas', 'Spleen', 'Adrenals',
C   .             'Brain', 'S Wall', 'Other',
C   .             '/'
C
C   Mass of master organs--
C   DATA MASMAS /1000.0, 0.0, 250.0, 400.0,
C   .             250.0, 135.0, 0.0, 1500.0,
C   .             4000.0, 1000.0, 35.0, 11.0,
C   .             28000.0, 20.0, 200.0, 310.0,
C   .             1800.0, 100.0, 180.0, 14.0,
C   .             1400.0, 150.0, 3*0.0/
C
C   Mass of whole body--
C   DATA TOTMAS /70000.0/
C
C   SEE source organ index--
C   DATA SINDX / 10, 11, 2, 3, 4, 5, 0, 17, 15, 16, 21, 13, 12, 22,
C   .             1, 6, 7, 14, 20, 25, 26, 27, 23, 2*0/
C
C   SEE target organ index--
C   DATA TINDX / 8, 12, 2, 3, 4, 5, 33, 19, 17, 18, 27, 14, 13, 29,
C   .             1, 6, 7, 15, 26, 32, 34, 2, 31, 2*0/
```

GENERAL MODULES

```
C   Default master organ index of each organ in standard list--
    DATA IORG /1,2,3,4,5,6,7,8,9,10,11,12,13,14,11*0/

C   Organ weighting factors--
    DATA WT /0.25, 0.15, 0.12, 0.12, 0.03, 0.03, 5*0.06/

C   Semi-infinite to infinite dose correction factor--
    DATA SI2I /2.0/

C   Lung model parameters--
    DATA ADJ / 0.5, 0.5, 0.95, 0.05, 0.8, 0.0, 0.0, 0.2, 0.0,
    .           0.1, 0.9, 0.5, 0.5, 0.15, 0.4, 0.4, 0.05, 0.0,
    .           0.01, 0.99, 0.01, 0.99, 0.05, 0.4, 0.4, 0.135, 0.015/

    DATA XDIV /0.5, 50.0, 500.0/

C-----
    END
```

GENERAL MODULES

```
C-----
C
C   BLOCK DATA BLOCKD
C
C   This module initializes program parameters.
C
C   Module of Programs ENVIN, ENV, DOSE, and INTDF
C   of the GENII Software Package
C   Pacific Northwest Laboratory Environmental Dosimetry System
C
C   Version of 3-Aug-88  RAP
C   Reviewed and Approved: 12-Sept-88 BA Napier
C-----

INCLUDE 'AIRPAR.CMN'
INCLUDE 'ANMPAR.CMN'
INCLUDE 'DFPAR.CMN'
INCLUDE 'EXTPAR.CMN'
INCLUDE 'FILES.CMN'
INCLUDE 'FODPAR.CMN'
INCLUDE 'LABELS.CMN'
INCLUDE 'OPT.CMN'
INCLUDE 'SOLPAR.CMN'
INCLUDE 'SWPAR.CMN'

DATA NAQ /4/, NTF /4/, NAN /4/, NRE /3/, NPATH /23/,
.   NMAX /100/

C   Distances and direction--
DATA NDIST /10/, NDIR /16/, MINDIS /100.0/
DATA IDIR/1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16/

C   Standard distances--
DATA X/ 805., 2414., 4023., 5632., 7241.,
.   12068., 24135., 40255., 56315., 72405./

DATA YRDA /2.74E-3/, AYEAR /365.25/, YRHR /1.14E-4/,
.   SECYR /3.15E7/, YRSEC /3.17E-8/,
.   HRYR /8766.0/, SECDA / 8.64E4/, DAYYR /365.25/,
.   MOYR /12.0/, ONEYR /1.0/,
.   ZERO /0.000/, LM2IN /25.4/,
.   DPVRES /0.001/, DEPFR2 /0.25/,
.   LEAFRS /1.0E-9/, WTIM /14.0/,
.   SURCM /15.0/, SLDN /224.0/, SSLDN /1500.0/, SOLING /410.0/,
.   UNITCF /1.E9/, P /3.1415926/, M3CM3 /1.0E-6/, KGG /1.0E-3/,
.   ALOG2 /0.6931/, DUMMY /9*0.0/, KGMG /1.0E-6/, M3L /1.0E-3/,
.   MEVSV /1.385E-5/
```


GENERAL MODULES

```

C   Initailize inventory flags--
DATA RELTRM /.FALSE./, BASIC /.FALSE./, DERIVE /.FALSE./

C   Air dispersion conservatism factor defaults to 95% percentile--
DATA PRCNTI /2/

C   Exposure labels--
DATA EXPLAB /'Plume ', 'Inhale ', 'Sur Soil', 'Leaf Veg',
.           'Oth. Veg', 'Fruit ', 'Cereals ', 'Meat ',
.           'Poultry ', 'Cow Milk', 'Eggs ', 'Soil Ing',
.           'Swim Ing', 'Swim Ext', 'Boating ', 'Shore ',
.           'Water ', 'Fish ', 'Mollusc ', 'Crustace',
.           'Aqu Plnt', 'Dep Soil', 'Waste ', ' ' /

DATA SEALAB /'Winter', 'Spring', 'Summer', 'Autumn'/

C   Dose factor type for each exposure pathway--
DATA IDF /3,1,3,10*2,3*3,5*2,3,3,0/

C   Inventory units--
DATA NVU /3.7E-2, 3.7E+4, 3.7E+7, 3.7E+10, 1.0/
DATA UNIT1 /'pCi', 'uCi', 'mCi', 'Ci', 'Bq'/
DATA UNIT2 /'m3', 'yr', 'm2', 10*'yr', 3*'L', 5*'yr', 'm3', 'm3', ' '/
DATA UNIT3 /'m2', 'm3', 'kg'/
DATA SVU /1.0, 0.15, 224.0/

C   Inhalation rates--
DATA RINH /270.0/, RINHA /330.0/

C   Animal consumption, harvest removal, standing biomass--
DATA CONSUM / 68.0, 0.12, 55.0, 0.12, 68.0, 55.0/
DATA DWATER /50.0, 0.3, 60., 0.3/
DATA FRACUT /0.0, 0.8, 1.0, 0.8/
DATA HARVST /.TRUE./
DATA BIOMAS /2.0, 2.0, 3.0, 0.8/
DATA BIOMA2 /0.8, 0.8, 1.0, 0.8, 1.0, 1.5/
DATA DRYFAC /0.1, 0.25, 0.18, 0.18/
DATA DRYFA2 /0.18, 0.18, 0.18, 0.18, 0.2, 0.2/

C   Translocation factors--
DATA TRANS /1.0, 3*0.1/, TRANSA /4*0.1, 2*1.0/

C   Biotic transport parameters--
DATA YELDBT /0.4, 5.0, 4.0/
DATA TOTEXC /9.41E-4, 2*7.48E-4/
DATA EXCAV / 1.0, 0.81, 0.19, 0.02, 0.008, 0.002,
.           1.0, 0.90, 0.096, 0.006, 0.0005, 0.0005,
.           1.0, 0.90, 0.096, 0.006, 0.0005, 0.0005/

```

GENERAL MODULES

C Shorewidth factors for different shoreline types--
DATA SHORWI /0.2, 0.3, 0.5, 1.0/,
. TCWS /25295.0/

C Ingestion of swimming water--
DATA INGWT /0.02/

C Surface dose to EDE conversion for photons in energy groups:
C (MeV) 0.15 0.4 0.75 1.25 1.75 2.25
DATA FC /0.67, 0.66, 0.67, 0.71, 0.75, 0.78/

DATA FILN /'FILENAME.DAT', 49*' '/
DATA DASHES /'-----', '-----', 8*' -----'/

C-----
END

GENERAL MODULES

```
C-----
C
C      SUBROUTINE DUMRED (LUN, NLINES)
C
C      Read past an unused data set
C
C      Module of Program ENVIN of the GENII Software Package
C      Last Change: 29-Aug-86  RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C
C-----
C
C      I      - Loop index
C      LUN     - Logical unit device index
C      NLINES  - Number of lines to read past
C
C-----

      INTEGER LUN, NLINES
      CHARACTER*10 DUM

      DO 100 I = 1, NLINES
        READ (LUN,1,ERR=98,END=99) DUM
C      WRITE (*,'(2A)') ' Skipped: ',DUM
100 CONTINUE

      RETURN

C---- Error Messages -----

98 WRITE (*,*) 'DUMRED: Error while reading past unused data set.'
   WRITE (*,*) ' LUN:',LUN, 'Line',I,' of',NLINES
   STOP

99 WRITE (*,*) 'DUMRED: End of file reading past unused data set.'
   WRITE (*,*) ' LUN:',LUN, 'Line',I,' of',NLINES
   STOP

C---- Format Statements -----

      1 FORMAT (A10)

C-----
      END
```

GENERAL MODULES

```
C-----
C
C      SUBROUTINE FILERR (ICODE, LUN, MESSAG)
C
C      This subroutine prints fatal error messages associated with
C      data files and halts program execution
C
C      General Module of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 22-Apr-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----

      INCLUDE 'FILES.CMN'

      CHARACTER LINE*70, FACE*1
      INTEGER ICODE, LUN
      CHARACTER MESSAG*20, ERROR(4)*50

      DATA ERROR /' Error opening file named',
.                ' Premature end-of-file encountered in',
.                ' Error occurred while reading file',
.                ' File out of order or other indexing problem' /
      FACE = CHAR(2)

      DO 100 I = 1, 70
        WRITE (LINE(I:I), '(A)') FACE
100 CONTINUE

      IF (ICODE .EQ. 0) THEN
        WRITE (*,*) 'Error code = 0 in FILERR'
      ELSEIF (LUN .EQ. 0) THEN
        WRITE (*,*) 'Logical unit number = 0 in FILERR'
      ELSE
        WRITE (*,2) LINE, ERROR(ICODE), FILN(LUN), LUN, MESSAG
2      FORMAT (////' ',A70,/A50, A20/
.              ' ',T10, 'Assigned to LUN: ',I3/
.              ' ',T10, 'Message:      ',A20////)
      ENDIF

      CALL EXIT (1)

C-----
      END
```

GENERAL MODULES

```
C-----
C
C      SUBROUTINE HEADNG (LUN)
C
C      This subroutine prints page heading for quality assurance and
C      results reports.
C
C      Module of Programs ENVIN, INTDF, ENV, and DOSE of the GENII
C      Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 30-Aug-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      LUN      - Logical unit device
C      IOS      - Control integer set to a positive number if a file
C                 error occurs
C      IPN      - Page number counter of primary output file
C      CALPRG   - Name of calling program, based on logical unit number
C      PART     - Character part designator, A or B to control page
C                 numbering of ENVIN and DOSE
C-----
C
C      INCLUDE 'TITL.CMN'
C      INCLUDE 'DAYPC.CMN'
C
C      INTEGER LUN, IOS, IPN
C      CHARACTER FF*1, CALPRG*6, PART*2
C      LOGICAL FIRST
C      DATA IPN /0/, FIRST /.TRUE./
C
C      FF = CHAR(12)
C      IF (LUN .GT. 0) IPN = IPN + 1
C
C      IF (LUN .EQ. 15) THEN
C          CALPRG = 'INTDF '
C      ELSEIF (LUN .EQ. 36) THEN
C          CALPRG = 'EXTDF '
C      ELSE
C          CALPRG = 'GENII '
C      ENDIF
C
C      IF (LUN .EQ. 6) THEN
C          PART = 'A.'
C      ELSEIF (LUN .EQ. 28) THEN
C          PART = 'B.'
```

GENERAL MODULES

```
ELSEIF (LUN .EQ. 14) THEN
  PART = 'C.'
ELSE
  PART = ' '
ENDIF

C   Skip if this is not the first call in ENV--
    IF (LUN .EQ. 28 .AND. .NOT. FIRST) GOTO 100

    WRITE (LUN,1,ERR=98,IOSTAT=IOS) FF, CALPRG, TITLS(5)(1:60),
      TITLS(5)(61:80)
    WRITE (LUN,2,ERR=98) TODAY, CLOCK, PART, IPN
    WRITE (LUN,3,ERR=98)

    FIRST = .FALSE.

100  CONTINUE
    RETURN

C---- Error Messages -----
    98 CALL FILERR (2, LUN, 'In HEADNG')

C---- Format Statements -----
    1 FORMAT(A1,1X,78('-'),/,25X,A6,
      .      ' Dose Calculation Program'/,
      .      28X, '(Version 1.351 30-Aug-88)',/,
      .      ' Case title: ',A60/15X,A20)
    2 FORMAT(' Executed on: ',A8,' at ',A8,34X,'Page ',A2,I3)
    3 FORMAT (1X,78('-'))

C-----
    END
```

GENERAL MODULES

```
C-----
C
C      SUBROUTINE IDNUC
C
C      This module attempts to identify the input inventory by checking
C      input against the master radionuclide library.
C
C      General Module of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Apr-88  RAP
C      Reviewed and Approved: 12-Sept-88 BA Napier
C-----
C
C      IN      - Loop index for radionuclides in the input list
C      IL      - Loop index for radionuclides in the master radionuclide
C                library
C      ISTOP   - Count index of unidentified radionuclides
C      FOUND   - Logical set if either; 1-radionuclide is identified,
C                2-radionuclide declared unidentified. Stop search if set.
C-----
C
C      INCLUDE 'RMD.CMN'
C      INCLUDE 'INVIN.CMN'
C
C      LOGICAL FOUND
C      DATA ISTOP /0/
C
C      Loop on input radionuclides, test against master library--
C      DO 3 IN=1,NIN
C
C          FOUND = .FALSE.
C          IL = 0
C
C      1  CONTINUE
C
C          IL = IL+1
C          IF (IL .GT. NUCS) THEN
C              ISTOP=ISTOP+1
C              WRITE (*,100) ELTI(IN),AWI(IN)
C      100  FORMAT (' Unidentified radionuclide in input ',A2,A6)
C              FOUND = .TRUE.
C          ELSE
C
C      C      WRITE (*,88) ELTI(IN),ELTM(IL),AWI(IN),AWM(IL)
C      C      88  FORMAT (2(' #',A2,'##'), 2(' #',A6,'#'))
```

GENERAL MODULES

```
      IF (ELTM(IL) .EQ. ELTI(IN)) THEN
        IF (AWM(IL) .EQ. AWI(IN)) THEN

C          Store input into arrays at proper positions--
          NFLAG(IL) = IN
          NFLAG2(IN) = IL
          NFLAGC(NCHN(IL)) = 1
          FOUND = .TRUE.

          ENDIF
        ENDIF

      ENDIF
      IF (.NOT. FOUND) GO TO 1

3 CONTINUE

C---- Error Conditions -----
      IF (ISTOP .GT. 0) THEN
        WRITE (*, 200) ISTOP
200    FORMAT ('IDNUC: There were ',I4,' unidentified radionuclides.')
        CALL EXIT (1)
      ENDIF

      RETURN
C-----
      END
```


GENERAL MODULES

```
C-----  
C  
C      SUBROUTINE MAKDA2  
C  
C      This subroutine gets system date and time and stores them as  
C      character strings.  
C  
C      General Module of the GENII Software Package  
C      Pacific Northwest Laboratory Environmental Dosimetry System  
C  
C      Version of 15-May-87  RAP  
C      Reviewed and Approved: 12-Sept-88  BA Napier  
C-----  
C  
C      INCLUDE 'DAYPC.CMN'  
  
C      CALL DATE (TODAY)  
C      CALL TIME (CLOCK)  
  
C      RETURN  
C-----  
C      END
```

GENERAL MODULES

```
C-----
C
C      SUBROUTINE OPNFIL (IMODE, IHEAD, LUN)
C
C      This module controls opening of input and output files. This
C      module may also read the file containing filenames and optionally
C      writes titling information to intermediate output files.
C
C      General Module of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 15-Jul-88  RAP
C      Reviewed and Approved: 12-Sept-88
C-----
C
C      IMODE      - Index to specify:
C                  1 - open an existing file,
C                  2 - open a new file,
C                  3 - open and read the filename file
C                  4 - open existing file, read and store title
C                  5 - open existing file for append
C                  6 - open an existing unformatted file
C                  7 - open an unformatted file, read and store title
C                  8 - open a new unformatted file
C                  9 - close file
C      IHEAD      - Index to specify heading type:
C                  0 - no heading,
C                  1 - ENV: output file (includes options)
C                  2 - ENV: Title plus date and time on second line
C                  3 - ENVIN: Title plus date and time on second line
C                  4 - INTDF: Copy title to TITLS(5)
C                  9 - form feed only
C      ILUN       - Logical unit number of the current file
C      IOS        - Status flag returned by system call to OPEN
C      LEXIST     - Logical set if file exists
C-----
C
C      INCLUDE 'FILES.CMN'
C      INCLUDE 'DAYPC.CMN'
C      INCLUDE 'TITL.CMN'
C
C      LOGICAL LEXIST
C      INTEGER IMODE, IHEAD, IOS, LUN
C      CHARACTER FF*1
C      IOS = 0
C      FF = CHAR(12)
```

GENERAL MODULES

```
IF (IMODE .EQ. 3) LUN = 1
IF (LUN .LT. 1 .OR. LUN .GT. 50) GOTO 91

IF (IMODE .EQ. 1) THEN
C   Open existing file--

    OPEN (LUN, FILE=FILN(LUN), STATUS='OLD', IOSTAT=IOS)

ELSEIF (IMODE .EQ. 2) THEN
C   Open new file--

    INQUIRE (FILE=FILN(LUN), EXIST=LEXIST)
    IF (LEXIST) THEN
        OPEN (LUN, FILE=FILN(LUN), STATUS='OLD', IOSTAT=IOS)
    ELSE
        OPEN (LUN, FILE=FILN(LUN), STATUS='NEW', IOSTAT=IOS)
    ENDIF

ELSEIF (IMODE .EQ. 3) THEN
C   Open and read filename file, check first in default directory--

    INQUIRE (FILE=FILN(1), EXIST=LEXIST, IOSTAT=IOS)

    IF (LEXIST) THEN
        OPEN (1, FILE=FILN(1), STATUS='OLD', IOSTAT=IOS)
    ELSE
        OPEN (1, '\GENII\FILENAME.DAT', STATUS='OLD', IOSTAT=IOS)
    ENDIF

    DO 100 I = 2, 50
        READ (1,1000,ERR=98,END=101) FILN(I)
100   CONTINUE
101   CONTINUE

ELSEIF (IMODE .EQ. 4) THEN
C   Open existing file, read and store title--

    OPEN (LUN, FILE=FILN(LUN), STATUS='OLD', IOSTAT=IOS)
    READ (LUN,'(A80)',ERR=98, END=99) TITLS(LUN)

C   Check if this is a DOSE, INTDF, or EXTDF call,
C   store title for reports--
    IF (LUN .EQ. 11) THEN
        TITLS(5) = TITLS(LUN)
    ELSEIF (LUN .EQ. 18) THEN
        TITLS(5) = TITLS(LUN)
    ELSEIF (LUN .EQ. 35) THEN
        TITLS(5) = TITLS(LUN)
```

GENERAL MODULES

```
ENDIF

ELSEIF (IMODE .EQ. 5) THEN
C   Open existing file for append--

    INQUIRE (FILE=FILN(LUN), EXIST=LEXIST)
    IF (LEXIST) THEN
        OPEN (LUN, FILE=FILN(LUN), STATUS='OLD', ACCESS='APPEND',
            IOSTAT=IOS)
    ELSE
        OPEN (LUN, FILE=FILN(LUN), STATUS='NEW', IOSTAT=IOS)
    ENDIF

ELSEIF (IMODE .EQ. 6) THEN
C   Open an existing unformatted file--

    OPEN (LUN, FILE=FILN(LUN), STATUS='OLD', FORM='UNFORMATTED',
        IOSTAT=IOS)

ELSEIF (IMODE .EQ. 7) THEN
C   Open an unformatted file, read and store title--

    OPEN (LUN, FILE=FILN(LUN), STATUS='OLD', FORM='UNFORMATTED',
        IOSTAT=IOS)
    READ (LUN) TITLS(LUN)

ELSEIF (IMODE .EQ. 8) THEN
C   Open a scratch unformatted file--

    OPEN (LUN, STATUS='SCRATCH', FORM='UNFORMATTED',
        IOSTAT=IOS)

ELSEIF (IMODE .EQ. 9) THEN
    IF (IHEAD .EQ. 9) WRITE (LUN, '(A)') FF
    CLOSE (LUN)
ELSE
    GO TO 92
ENDIF

IF (IOS .NE. 0) GOTO 97

IF (IMODE .EQ. 2) THEN
    IF (IHEAD .EQ. 1) THEN
        WRITE (LUN, '(A79)') TITLS(11)
        WRITE (LUN, '(5A)') 'Created on ', TODAY, ' at ', CLOCK
    ELSEIF (IHEAD .EQ. 2) THEN
        WRITE (LUN, '(A79)') TITLS(11)
        WRITE (LUN, '(5A)') 'Created on ', TODAY, ' at ', CLOCK
    ELSEIF (IHEAD .EQ. 3) THEN
```

GENERAL MODULES

```
      WRITE (LUN,'(A79)') TITLS(5)
      WRITE (LUN,'(5A)') 'Created on ',TODAY,' at ',CLOCK
    ELSEIF (IHEAD.EQ. 4) THEN
      TITLS(5) = TITLS(18)
    ENDIF
  ENDIF
```

```
  RETURN
```

C---- Format Statements -----

```
1000 FORMAT (10X,A30)
```

C---- Error Messages -----

```
91 WRITE (*,*) 'OPNFIL: Invalid value for LUN: ',LUN
   CALL EXIT (1)
```

```
92 WRITE (*,*) 'OPNFIL: Invalid value for IMODE: ', IMODE
   CALL EXIT (1)
```

```
97 WRITE (*,*) 'IOS:',IOS
   CALL FILERR (1, LUN, 'In OPNFIL      ')
98 CALL FILERR (2, LUN, 'In OPNFIL      ')
99 CALL FILERR (3, LUN, 'Title OPNFIL   ')
```

C-----
 END

GENERAL MODULES

```
C-----C
C      SUBROUTINE RLIBIN
C
C      RLBIN reads the master radionuclide library with chain decay data
C
C      General Module of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Version of 5-Apr-88  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----C
C
C      A      - Mass number (with optional metastable specification)
C              of input radionuclide
C      BON     - Bone Dosimetry classification of the input radionuclide
C      E       - Element symbol of input radionuclide
C      ELN     - Full element name of input radionuclide
C      FR()    - Decay fraction for first and second precursor of current
C              radionuclide
C      IM      - Chain position of the current radionuclide
C      IMO     - Control integer used to check order of chains
C      IMODIN  - Input model index
C      IT()    - Input index of first and second precursor of current
C              radionuclide
C      T       - Half life of the current radionuclide
C      TLC     - Translocation classification of the current radionuclide
C      ATNOIN  - Input atomic number for the current radionuclide
C      NDIN    - Input number of implicit daughters for the current
C              radionuclide
C      RFL     - Special flag input field, used to select radionuclides
C              for research applications, input as a character field
C              to set logical flag
C-----C
C
C      INCLUDE 'RMD.CMN'
C      INCLUDE 'RMD2.CMN'
C
C      INTEGER IT(2), IM, IMODIN, ATNOIN, NDIN
C      REAL FR(2), T
C      CHARACTER E*2, A*6, BON*1, TLC*1, RFL*1
C
C      DATA IMO /0/
C      NCH = 0
C      NUCS = 1
C      NIDRMD = 0
```

GENERAL MODULES

```
C      Open file and read title--
      LUN = 2
      CALL OPNFIL (4,0,LUN)

C      Read and count nuclide ID and decay data--
1 READ(LUN,100,END=99) E,A,T,IM,IT(1),FR(1),IT(2),FR(2),ATNOIN,RFL,
      .
      IMODIN,BON,TLC, NDIN

C      Test for end of library--
      IF(IM.GT.0) GO TO 2
      NUCS=NUCS+1
      IF(NUCS .LT. 1 .OR. NUCS .GT. 300) GO TO 98
      CLOSE (LUN)
      RETURN

C      Test for new chain, IM=1--
2      IF ( IM .LE. 1) THEN

C          First member of new chain--
          NCH=NCH+1
          NOFNUC(NCH)=1
          IMO=1
          NCHST(NCH)=NUCS

      ELSE

C          Daughter radionuclides; test order and store values--
          IF (IM-IMO.NE.1) GO TO 97
          IMO=IM
          NOFNUC(NCH)=NOFNUC(NCH)+1
          IFR(1,NUCS)=IT(1)
          IFR(2,NUCS)=IT(2)
          DKF(1,NUCS)=FR(1)
          DKF(2,NUCS)=FR(2)

      ENDIF

C      Set data for current radionuclide--
      ELTM(NUCS) = E
      AWM(NUCS) = A
      TR(NUCS) = T
      ATNO(NUCS) = ATNOIN
      IMODM(NUCS) = IMODIN
      BONED(NUCS) = BON
      TCLASS(NUCS) = TLC
      NDAU(NUCS) = NDIN
      NCHN(NUCS) = NCH
```

GENERAL MODULES

```
      IF (RFL .EQ. 'T') THEN
        RFLAG(NUCS) = .TRUE.
      ELSE
        RFLAG(NUCS) = .FALSE.
      ENDIF

C      Store implicit daughter information--
      IF (NDIN .GT. 0) THEN
        NI = NIDRMD + 1
        NK = NIDRMD + NDIN
        BACKSPACE (LUN)
        READ (LUN,102) (ELT2M(I), AW2M(I), BRANCH(I), I = NI, NK)
        DO 3 I = NI, NK
          IPNDX(I) = NUCS
        3  CONTINUE
        NIDRMD = NIDRMD + NDIN
      ENDIF

      NUCS = NUCS+1
      GO TO 1

C---- Print error messages and stop -----

      97 WRITE (*,901) NCH,IM,ELTM(NUCS),AWM(NUCS)
      901 FORMAT(' RLIBIN: Decay chain',I4,' has improper order. Current',
        .      ' member is',I4/,'          After ',A2,A6)
      CALL EXIT (1)

      98 WRITE (*,902) NUCS
      902 FORMAT(' RLIBIN: Improper number of nuclides in library: ',I4)
      CALL EXIT (1)

      99 CALL FILERR (3, LUN, 'In RLIBIN')

C---- Input data formats -----

      100 FORMAT(A2,A6,E10.2,I2,2(I2,F7.4),I4,1X,A1,1X,I1,1X,2A1,I2)
      101 FORMAT (' ',A2,A6,E10.2,2X,I4)
      102 FORMAT (52X,8(A2,A6,F5.3,1X))
      200 FORMAT(20A4)

C-----
      END
```


GENERAL MODULES

```
C-----
C
C      SUBROUTINE SIGMA (X, STAB, SIGMAZ, SIGMAY)
C
C      SIGMA computations are made given the atmospheric stability,
C      distance from the source, and mixing layer thickness. The curves
C      are based on the parameterizations of Martin and Tikvart (1968)
C      and Tadmor and Gur (1969). The parameterizations are used in
C      the NRC PAVAN and XOQDOQ codes.
C
C      Written by Athey, G.F., J.V. Ramsdell, C.S. Glantz (Created: June
C      1983 for MESOI; revised: September 1986 for GENII)
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 8-Jan-87  RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      X      - Distance
C      STAB    - Stability class
C      LAYER    - Mixing layer thickness
C      SIGMAZ   - Calculated vertical diffusion coefficient  ==> SIGMAZ
C      SIGMAY   - Horizontal diffusion coefficient
C-----
C
C      REAL AY(7), AZ(7,3), BZ(7,3), CZ(7,3)
C      INTEGER STAB
C
C      DATA AY/ 0.3658, 0.2751, 0.2089, 0.1471, 0.1046, 0.0722, 0.0481/
C      DATA AZ/ 0.192, 0.156, 0.116, 0.079, 0.063, 0.053, 0.032,
C      +         0.00066, 0.0382, 0.113, 0.222, 0.211, 0.086, 0.052,
C      +         0.00024, 0.055, 0.113, 1.26, 6.73, 18.05, 10.83 /
C      DATA BZ/ 0.936, 0.922, 0.905, 0.881, 0.871, 0.814, 0.814,
C      +         1.941, 1.149, 0.911, 0.725, 0.678, 0.74, 0.74,
C      +         2.094, 1.098, 0.911, 0.516, 0.305, 0.18, 0.18 /
C      DATA CZ/ 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
C      +         9.27, 3.3, 0.0, -1.7, -1.3, -0.35, -0.21,
C      +         -9.6, 2.0, 0.0, -13., -34.0, -48.6, -29.2 /
C
C      Compute SIGMAY--
C      SIGMAY = AY(STAB) * X ** 0.9031
C
C      Compute SIGMAZ--
C
C      IF( X .LE. 100.0 ) THEN
C      SIGMAZ = AZ(STAB,1) * X ** BZ(STAB,1)
```

GENERAL MODULES

```
ELSE IF ( X .LE. 1000.0 ) THEN
  SIGMAZ = AZ(STAB,2) * X ** BZ(STAB,2) + CZ(STAB,2)
ELSE
  SIGMAZ = AZ(STAB,3) * X ** BZ(STAB,3) + CZ(STAB,3)
ENDIF

IF(SIGMAZ .GT. 10000.0) SIGMAZ = 10000.

RETURN
```

```
C-----
  END
```

GENERAL MODULES

```
C-----
C
C      SUBROUTINE XQIN (INOPT)
C
C      This module reads population, food production, and chi/Q input
C      files.
C
C      Module of Program ENVIN of the GENII Software Package
C      Pacific Northwest Laboratory Environmental Dosimetry System
C
C      Last Modification: 11-Feb-88 RAP
C      Reviewed and Approved: 12-Sept-88  BA Napier
C-----
C
C      RTEMP() - Temporary input and calculation array
C      INOPT   - Input options:
C                1- read chi/Q file,
C                2- read population,
C                3- read food production grid
C                4- select MI location; read population file and set
C                   all locations with population equal to 1
C-----
C
C      INCLUDE 'OPT.CMN'
C      INCLUDE 'AFPPAR.CMN'
C      INCLUDE 'AIRPAR.CMN'
C      INCLUDE 'FODPAR.CMN'
C      INCLUDE 'ANMPAR.CMN'
C
C      CHARACTER DUM*8
C      REAL RTEMP(9)
C
C---- Read chi/Q input file -----
C
C      IF (INOPT .EQ. 1) THEN
C
C          LUN = 24
C          CALL OPNFIL (4,0,LUN)
C          READ (LUN,111,ERR=98,END=99) DUM, DUM, DUM
C
C      READ XQO data set for first eight directions, followed by 9-16--
C      IEND = (NDIR + 1) / 2
C
C      Read average wind speed--
C      READ (LUN,5) (AVEU(ID), ID=1,IEND)
C
C      Read distance, XQO--
```

GENERAL MODULES

```
DO 610 IX = 1,NDIST
  READ (LUN,*) RTEMP(1), (XOQ(IX,ID), ID = 1,IEND)
610  CONTINUE

C    Repeat--
  READ (LUN,11) DUM, DUM
  READ (LUN,5) (AVEU(ID), ID=IEND+1,NDIR)
  DO 620 IX = 1,NDIST
    READ (LUN,*) RTEMP(1), (XOQ(IX,ID),ID = IEND+1,NDIR)
620  CONTINUE

C    If finite plume, read dose factors by energy group--
  IF (FINITE) THEN
    DO 632 IE = 1, 6

      READ (LUN,11,ERR=98,END=99) DUM, DUM
      DO 634 IX = 1,NDIST
        READ (LUN,*) RTEMP(1), (DRFOQ(ID,IX,IE), ID = 1,IEND)
634      CONTINUE

      READ (LUN,11) DUM, DUM
      DO 636 IX = 1,NDIST
        READ (LUN,*) RTEMP(1), (DRFOQ(ID,IX,IE),ID = IEND+1,NDIR)
636      CONTINUE

632    CONTINUE

  ENDIF

C---- Read population input file, and total population for air paths -----
  ELSEIF (INOPT .EQ. 2) THEN

    POPT = 0.0

    LUN = 27
    CALL OPNFIL (4,0,LUN)
    READ (LUN,11) DUM, DUM

    DO 400 ID = 1, NDIR

      READ (LUN,*,ERR=98,END=99) (POP(I,ID), I=1,NDIST)
      DO 401 I = 1, NDIST
        POPT = POPT + POP(I,ID)
401      CONTINUE
400    CONTINUE
```

GENERAL MODULES

C---- Read food production file and accumulate total production -----

```
ELSEIF (INOPT .EQ. 3) THEN

  LUN = 29
  CALL OPNFIL (4,0,LUN)
  READ (LUN,11,ERR=98,END=99) DUM, DUM

  DO 411 ITF = 1, NTF
    IF (TFD(ITF)) THEN
      EFPOP(ITF) = 0.0
      TPRODT(ITF) = 0.0
      DO 148 ID = 1, NDIR
        READ (LUN,10,ERR=98,END=99) (FPRD(I,ID,ITF), I=1,NDIST)
        DO 602 IX = 1, NDIST
          EFPOP(ITF) = EFPOP(ITF) + FPRD(IX,ID,ITF) / CONS(ITF)
          TPRODT(ITF) = TPRODT(ITF) + FPRD(IX,ID,ITF)
602      CONTINUE
148    CONTINUE
      ENDIF
411  CONTINUE

  DO 413 IAN = 1, NAN
    IF (ANF(IAN)) THEN
      EFPOPA(IAN) = 0.0
      TPRODA(IAN) = 0.0
      DO 149 ID = 1, NDIR
        READ (LUN,10,ERR=98,END=99) (FPRDA(I,ID,IAN), I=1,NDIST)
        DO 604 IX = 1, NDIST
          TPRODA(IAN) = TPRODA(IAN) + FPRDA(IX,ID,IAN)
          EFPOPA(IAN) = EFPOPA(IAN) + FPRDA(I,ID,IAN)/CONS2(IAN)
604      CONTINUE
149    CONTINUE
      ENDIF
413  CONTINUE
```

C---- Read population input file, set population to 1 or 0 -----

```
ELSEIF (INOPT .EQ. 4) THEN

  POPT = 1.0

  LUN = 27
  CALL OPNFIL (4,0,LUN)
  READ (LUN,11) DUM, DUM

  DO 410 ID = 1, NDIR

    READ (LUN,*,ERR=98,END=99) (POP(I,ID), I=1,NDIST)
```

GENERAL MODULES

```
      DO 412 I = 1, NDIST
        IF (POP(I,ID) .GT. 0.0) POP(I,ID) = 1.0
412   CONTINUE
410   CONTINUE
```

```
      ELSE
        WRITE (*,*) 'Invalid INOPT in XQIN'
      ENDIF
```

```
      CLOSE (LUN)
      RETURN
```

C---- Error Messages -----

```
      98 CALL FILERR (3, LUN, 'In XQIN      ')
      99 CALL FILERR (2, LUN, 'In XQIN      ')
```

C---- Format Statements -----

```
      1 FORMAT (A8)
     11 FORMAT (A10/A10)
    111 FORMAT (A10/A10/A10)

      2 FORMAT (/6X,10(5X,I2,2X))
      5 FORMAT (8X,10(F8.0,1X))
     10 FORMAT (10E8.0)
```

C-----
 END

COMMON BLOCKS

C-----

C Air-weighted, Food-weighted & Population Parameters Common Block
C Module of GENII Version of 12-Nov-87 RAP

```
COMMON /AFPPAR/ EFPOP(4), EFPOPA(4),  
  .             AVEU(16), POP(10,16), XOQ(10,16), XOQI,  
  .             FPRD(10,16,4), FPRDA(10,16,4), DRFOQ(16,10,6)  
  
REAL EFPOP, EFPOPA, XOQI, AVEU, POP, XOQ, FPRD, FPRDA, DRFOQ
```

C-----

C NORMALIZED AIR CONCENTRATION FACTORS
C Module of GENII

```
COMMON /AIRCON/ EOQ(10,16)
```

C-----

C Air Pathway Parameters Common Block
C Module of GENII Version of 5-Jul-88 RAP

```
COMMON /AIRPAR/ ETEMP, HEIGHT,  
  .             MIDIST, MIDIR, MISTAB, MIUBAR, MINDIS,  
  .             NDIR, NDIST, NSEAS, NSPD, NSTAB, NTOD,  
  .             SFLOW, SHITE, SIGMAY, SIGMAZ, SRAD,  
  .             STACK, EFFSTK, JFIN,  
  .             X(10), IDIR(16), TTAIR(10), PWT(10),  
  .             TPOPS, TTAIRI,  
  .             PWTX(10,6), DRFSAV(6), PMX(6), EDIS(6,9), FC(6),  
  .             IRELES, BUILDX, BUILDH  
LOGICAL STACK, EFFSTK, JFIN  
INTEGER MISTAB, NDIR, NDIST, NSEAS, NSPD, NSTAB, NTOD, IDIR,  
  .             MIDIR, IRELES  
REAL ETEMP, HEIGHT, MIDIST, MINDIS,  
  .             MIUBAR, SFLOW, SHITE, SIGMAY, SIGMAZ, X, TTAIR, PWT,  
  .             TPOPS, TTAIRI, PWTX, DRFSAV, PMX, EDIS, FC, BUILDX, BUILDH
```

COMMON BLOCKS

```
C      Animal Products Parameters Common Block
C      Module of GENII                               Version of 12-Aug-88 RAP
```

```
COMMON /ANMPAR/ TRANSA(6), YELDA(6), GRWPA(6),
. STORTM(6), DIETFR(6), FMI(6,9),
. DWFACA(4), HLDUPA(4),
. CONS2(4), HARVA(9,6,2), ADJET2(4),
. CONSUM(6), DWATER(4),
. IRRSA(6), IRTIMA(6), RIRRA(6),
. TPRODA(4), FRACUT(4), ANMFED,
. BIOMA2(6), DRYFA2(6)
```

```
REAL RIRRA, TRANSA, YELDA, GRWPA, STORMT, DIETFR, FMI,  
    DWFACA, HLDUPA, CONS2, CONSUM, DWATER, IRTIMA, ADJET2,  
    FRACUT, BIOMA2, DRYFA2  
LOGICAL ANMFED  
INTEGER IRRSA
```

C Aquatic Foods/ Drinking Water Parameters Common Block
C Module of GENII Version of 14-Jan-87 RAP

```
COMMON /AQUAPAR/ BIOACF(4,9),
. HLDUP2(4),
. USAG(4), TPRODQ(4), ADJETQ(4), AQUPOP,
. DWUSAG, DWSRC, DWTRET, DWCLEN(9), DWPOP, HOLDDW
```

```
REAL BIOACF, HLDUP2, USAG, DWUSAG, DWCLN, DWPOP, TPRODQ, HOLDDW,  
    ADJETQ, AQUPOP  
LOGICAL DWTRET  
INTEGER DWSRC
```

C BIOACCUMULATION FACTORS FOR AQUATIC PATHWAYS
C Module of GENII

COMMON /BIODAT/ BIOACF(4,100), DWCF(100), ISALT, IOSALT

COMMON BLOCKS

C-----

C Concentration Common Block

C Module of GENII

Version of 22-Dec-87 RAP

```
COMMON /CONC/ SOLCON(9,4), SL2CON(9,6), NONAGS(9), RESSOL(9),  
  .          DSCON(9,4), DS2CON(9,6), NONAGD(9), DSRES(9),  
  .          GWCON(9), SWCON(9), SWIRR(9),  
  .          AIRCON(9), ARPCON(9), ARFCON(9,4), ARF2CN(9,6),  
  .          AQUCON(9,4), SEDCON(9),  
  .          PLTCON(9,4), ANMCON(9,4), DWCON(9),  
  .          QAIR(9), QSW(9), QWAS(9),  
  .          EXPOS(9,24), PAKADD(9),  
  .          ARPXCN(9), PWTAIR(9), PWTXAR(9),  
  .          CTOAIR(9), SWACUT(9)
```

```
REAL DSCON, DS2CON, GWCON, SWCON, AIRCON,  
  .   SOLCON, SL2CON, AQUCON, SEDCON, ARFCON, ARF2CN, ARPCON,  
  .   QAIR, QSW, QWAS, NONAGS, NONAGD, RESSOL, DSRES,  
  .   PLTCON, ANMCON, DWCON, EXPOS, PAKADD,  
  .   ARPXCN, PWTAIR, PWTXAR, CTOAIR, SWACUT
```

C-----

C DATE OF THE CURRENT RUN AND HEADING INFO

C Module of GENII

COMMON /DAY/ CHIA, CHIPAT

CHARACTER*7 CHIA

CHARACTER*30 CHIPAT

C-----

C SYSTEM DATE FOR THE IBM PC IN INTEGER FORMAT

C Module of GENII

```
INTEGER*2 MONTH, DAY, YEAR, IHO, MINT, ISEC, IFRAC  
COMMON /DAYPC/ MONTH, DAY, YEAR, IHO, MINT, ISEC, IFRAC
```

C

CHARACTER*10 TODAY, CLOCK

COMMON /DACPC/ TODAY, CLOCK

COMMON BLOCKS

C-----
C Radionuclide Decay Parameters Common Block
C Module of GENII Version of 1-Jun-87 RAP

C
COMMON /DECAY/ NUC, IFRM(2,9), DK(2,9), AL(9), ALDAY(9)

INTEGER IFRM, NUC
REAL DK, AL
REAL*8 ALDAY

C-----
C Dose Rate / Exposure Rate Parameters Common Block
C Module of GENII Version of 8-Jan-88 RAP

COMMON /DFPAR/ DFH(70,25), DFG(70,25),
 DBIT(100), DSIT(100), DAIT(100), DDIT(100,3),
 Q(70,24), IOR(25)

REAL DFH, DFG, DBIT, DSIT, DAIT, DDIT, Q
LOGICAL IOR

COMMON /DFPARC/ DATINT(100), TIMINT(100)
CHARACTER*10 DATINT, TIMINT

C-----
C ATMOSPHERIC DISPERSION DATA AND PARAMETERS
C Module of GENII

COMMON /DISPSN/ NDIST, DIST(10), NUBAR, UBAR(8), NMET, MET(7),
 F(8,7,16), HS

C-----
C RADIONUCLIDE DECAY INFORMATION FOR MASTER LIST
C Module of GENII

C
COMMON /DKAY/ INUC, ICHN, NOFN(100), IFR2(2,100), DK2(2,100),
 AR(100)

COMMON BLOCKS

C-----

C Dose and Report Arrays
C Module of GENII

Version of 7-Jun-88 RAP

```
COMMON /DOSALL/ DOSR(25,100),   DOSV(25,24),  
  .      DOSCDR(25,100),   DOSCDV(25,24),  
  .      DOSO1(25), DOSO2(25), DOSO3(25),  
  .      DEX1R(100), DEX1V(24),  
  .      DOSRE(100), DOSVE(24), EXTDOS(70), EXTD,  
  .      CDE(11), ICDE(11), WDE(11), EDE, AEDEQ,  
  .      ANNULD(70), MAXD, MAXYR, RADEDE(100),  
  .      CUMIOR(25,70), CUMIYR(70), CUMID, CUMD,  
  .      NORGS, ICLN(25), SAVORG(25,3,3), SAVINC(3,3),  
  .      DOSRP(25,100,2), CDEINH(25), CDEING(25),  
  .      EDEINH, EDEING, EDERH(100), EDERG(100),  
  .      RMAX, PMAX, OMAX, MAXR, MAXP, MAXO
```

```
REAL DOSR, DOSV, DOSCDR, DOSCDV,  
  .      DOSO1, DOSO2, DOSO3,  
  .      DEX1R, DEX1V,  
  .      DOSRE, DOSVE, RADEDE, EXTDOS, EXTD,  
  .      CDE, WDE, EDE, AEDEQ, ANNULD, MAXD,  
  .      CUMIOR, SAVORG, CUMIYR, CUMID, CUMD, SAVINC,  
  .      DOSRP, CDEINH, CDEING, EDEINH, EDEING, EDERH, EDERG,  
  .      RMAX, PMAX, OMAX
```

```
INTEGER ICDE, MAXYR, NORGS, ICLN, MAXR, MAXP, MAXO
```

C-----

C Doses Common Block
C Module of GENII

Version of 4-Sep-86 RAP

```
COMMON /DOSES/ CDEINH(25,70),  
  .      CDEING(25,70)
```

```
REAL CDEINH, CDEING
```

C-----

C DOSE COMMITMENT FACTORS
C Module of GENII

Version of 27-Apr-87 RAP

```
COMMON /DOSFAC/ DFH(2,25,100), DFG(2,25,100)
```

COMMON BLOCKS

C-----
C RADIONUCLIDE CONCENTRATIONS IN VARIOUS MEDIA
C Module of GENII

COMMON /EDCN/ WATCON(100), SCONW(100), SEDCON(100), EDBCW(7,100),
 AQUATC(5,100), AIRCON(100), SLCON(100),
 EDBCON(7,100)

C-----
C Environmental Parameters Common Block
C Module of GENII Version of 21-Dec-87 RAP

COMMON /ENVPAR/ DPVLT(100),
 BVIT(4,100),
 FMIT(6,100),
 BIOACT(4,100),
 DWCLET(100),
 LEACT(100),
 GAMMAT(6,100)

REAL DPVLT, BVIT, FMIT, BIOACT, DWCLET, LEACT, GAMMAT

C-----
C Exposure Rates Common Block
C Module of GENII Version of 2-Sep-87 RAP

COMMON /EXPALL/ EXPOST(70,9,24)

REAL EXPOST

C-----
C External Exposure / Inhalation Parameters Common Block
C Module of GENII Version of 5-Jul-88 RAP

COMMON /EXTPAR/ HRPLUM, HRGRD, HRSWIM, HRBOAT, HRSHOR,
 SHRTYP, SHORWI(4), INGWAT, FRCLD,
 HRINH, RINH, RINHA, RESFAC, AVALSL, XMLF, FRISZ

REAL HRPLUM, HRGRD, HRSWIM, HRBOAT, HRSHOR,
 SHORWI, INGWAT, FRCLD, HRINH, RINH, RINHA,
 RESFAC, AVALSL, XMLF, FRISZ
INTEGER SHRTYP

COMMON BLOCKS

C-----

C File Names Common Block
C Module of GENII Version of 29-Jan-88 RAP

COMMON /FILES/ FILN(50), INFILN

CHARACTER*30 FILN, INFILN

C-----

C RADIONUCLIDE SELECTION CONTROL FLAGS
C Module of GENII

COMMON /FLAGS/ INFLG(100), IOFLG(100)

LOGICAL IOFLG

C-----

C DATA FOR TERRESTRIAL FOOD PATHWAYS
C Module of GENII

COMMON /FODATA/ DVEL(100), CRATIO(6,100), AB(100)

C-----

C Terrestrial Foods Parameters Common Block
C Module of GENII Version of 12-Aug-88 RAP

COMMON /FODPAR/ DPVL(9),
RIRR(4), IRRST(4), IRTIMT(4),
TRANS(4),
YELD(4),
BVI(4,9), LEAFRS,
GRWP(4),
HLDUP(4), HARVT(9,4,2),
CONS(4), TPRODT(4),
FOQ,
ADJEAT(4), BIOMAS(4), DRYFAC(4)

REAL DPVL, RIRR, TRANS, YELD, BVI, GRWP, HLDUP, CONS, FOQ, ADJEAT,
IRTIMT, LEAFRS, TPRODT, BIOMAS, DRYFAC

INTEGER IRRST

COMMON BLOCKS

```
C-----
C      EXTERNAL DOSE CONVERSION FACTORS
C      Module of GENII

      COMMON /GRDDAT/ EDS(100), EDW(100), EDA(100)

C-----
C      Internal Dose Factors Common Block
C      Module of GENII                               Version of 23-Jun-87 RAP

      COMMON /INTDFS/ NEQ, YWORK(9,45), RTOL, ATOL, ASSA, NSC,
      .               ISTAT(6,2)

      INTEGER NEQ, NSC, ISTAT
      REAL*8 YWORK, YLUNG(9,12), YGUT(9,4), YBLOOD(9), YBONE(9,4),
      .       YOTHR(9,3), YORG(9,10), RTOL, ATOL, ASSA

      EQUIVALENCE (YWORK(1,1), YLUNG(1,1)),
      .           (YWORK(1,13), YGUT(1,1)),
      .           (YWORK(1,17), YBLOOD(1)),
      .           (YWORK(1,29), YBONE(1,1)),
      .           (YWORK(1,33), YOTHR(1,1)),
      .           (YWORK(1,36), YORG(1,1))

C      YWORK(1,1)  YLUNG(1,1)  - Quantity in each of 12 lung compartments
C      YWORK(1,13) YGUT(1,1)   - Quantity in each of 4 gut compartments
C      YWORK(1,17) YBLOOD(1)   - Quantity in the transfer compartment
C      YWORK(1,18)          - Integrated retention in lung
C      YWORK(1,19)          - Integrated retention in lymph
C      YWORK(1,20)          - Integrated retention in stomach
C      YWORK(1,21)          - Integrated retention in SI
C      YWORK(1,22)          - Integrated retention in ULI
C      YWORK(1,23)          - Integrated retention in LLI
C      YWORK(1,24)          - Integrated retention in bone
C      YWORK(1,25)          - Integrated retention in OTHER tissues/organs
C      YWORK(1,26)          - Integrated retention specified organ no. 1
C      YWORK(1,27)          - Integrated retention specified organ no. 2
C      YWORK(1,28)          - Integrated retention specified organ no. 3
C      YWORK(1,29) YBONE(1,1) - Quantity in each of 4 bone compartments
C      YWORK(1,33) YOTHR(1,1) - Quantity in each of 3 OTHER compartments
C      YWORK(1,36) YORG(1,1)  - Quantity in each of 9 specified organ
C                               compartments
```

COMMON BLOCKS

C-----

C Source Term Common Block
C Module of GENII Version of 13-Aug-87 RAP

COMMON /INVIN/ NIN, CONCIN(9,100), QIN(3,100), NFLAG2(100)

INTEGER NIN, NFLAG2
REAL CONCIN, QIN

COMMON /INVINC/ ELTI(100), AWI(100)
CHARACTER ELTI*2, AWI*6

C-----

C ISOSHL D Common Blocks
C Module of GENII Version of 25-Jun-87 RAP

COMMON /IS01/ ML(250), LA(250),
. NCD, ENERGY(25), RANGE(26),
. SOURCE(3,25), MU(6,25), MUE(6,25),
. NDT, DATA2(5,450), SSV1, SSV2, SLTH, TOTAL(4), T(6),
. NSHLD, X, Y, ANG1, ANG2, ANG3, JBUF, IGEOM,
. JPH, BUF(4,2), BLIB(16,3,8), PI, NSHLDA, TTMFS,
. B1MFS, SECANT, BUIF, B1, CASER(10), FMWD, TET,
. TLN(5), TLH(5), NTHETA, NPSI, DELR, VOLUME,
. MODE, MODSAV, NZABS
REAL MU, MUE

COMMON /IS02/ BETENS(2,4000), IBESUB(250), NB(250),
. PHOTON(2,4000), IPHSUB(250), NP(250), TDOSE(250),
. BRGAM(25), BUPLWE(7,5,7), BETAPR(200), BETAEP(200),
. ZABS(20), FRACT(20), YIELD(25), ABAN, KOUNT

COMMON /IS03/ BREMI(5,6,25),
. BRME10(5,6,25),
. BRME30(5,6,25),
. BRME50(5,6,25),
. BRME70(5,6,25),
. BRME90(5,6,25)

COMMON /IS04/ DATA1(10,450), FEED3(450), FEED4(450), FEED5(450),
. FEED6(450), FEED7(450)

COMMON /IS05/ IPRNT, CASE, JSAVE, TSUM1, TSUM2, NPHEN, DOSE

COMMON /ISOC/ TITLE1(2)

COMMON BLOCKS

C-----

C Labels Common Block
C Module of GENII

Version of 18-Nov-87 RAP

COMMON /LABELS/ EXPLAB(24), SEALAB(4)

CHARACTER EXPLAB*8, ANMLAB(4)*8, AQFLAB(4)*8, AQRLAB(3)*8,
PLTLAB(4)*8, SEALAB*6

EQUIVALENCE (EXPLAB(4), PLTLAB(1)),
 (EXPLAB(8), ANMLAB(1)),
 (EXPLAB(18), AQFLAB(1)),
 (EXPLAB(14), AQRLAB(1))

C-----

C Metabolic Data Common Block
C Module of GENII

Version of 11-Feb-88 RAP

COMMON /MTBPAR/ F1, FG2TC, FG2SI, DIAM,
RTLUNG(12), RTGUT(4), RTSIBL,
TCBLOOD, RTBLOOD,
TCBONE(4), RTBONE(4),
TCOTHR(4), RTOTHR(4),
TCORG(10), RTORG(10),
ORGUEX(10), ORGFEX(10),
UEXTC, FEXTC,
DEPOSIT(9), UPTGUT,
ADJ(9,3), XDIV(3), ZNP, ZTB, ZP, H2,
IODI, TEI, FETAGE, RA226, FETDOS, CARBON, TRITUM

REAL F1, RTLUNG, RTGUT, RTSIBL, TCBLOOD, RTBLOOD, TCBONE, RTBONE,
TCOTHR, RTOTHR, TCOGR, RTORG, ORGUEx, ORGFEX, UEXTC, FEXTC,
FG2TC, FG2SI, ADJ, XDIV, ZNP, ZTB, ZP, DEPOSIT, UPTGUT,
FETAGE, DIAM

REAL*8 H2
INTEGER IODI
LOGICAL RA226, FETDOS, TEI, CARBON, TRITUM

COMMON /MTBC/ ELNAME(9)
CHARACTER*14 ELNAME

COMMON BLOCKS

C-----

C DATA FILE INPUT RADIONUCLIDE NAMES

C Module of GENII

COMMON /NAMES/ ELT(300), AW(300)

CHARACTER AW*6, ELT*2

C-----

C INPUT PARAMETERS FOR POPULATION DEFINITION

C Module of GENII

COMMON /NAMLST/ IEQ, IPA, IPOPL, IPL, NSECT, PMA, PPL, NTA,
NTL, T(20), TL(20), PMI(20), POPT(20), PL1(20)

C-----

C RADIONUCLIDE NAMES IN MASTER LIST

C Module of GENII Last modification: 8-May-87

COMMON /NUCNAM/ NUCTOT, AW(100), ELT(100)

CHARACTER*2 ELT

CHARACTER*6 AW

C-----

C Options / Flags / General Common Block

C Module of GENII Version of 7-Jan-88 RAP

COMMON /OPT/ ONEDOS, AEDE, MAXDOS, CUMDOS, DOSTYP,
ACUTE, OUTRAD, OUTPTH, OUTEDE, INHDF, NEAR, METHOD,
POPDOS, AIR, BURWAS, SWAT, RECRE, BIOT, HARVST,
FINITE, PATH(24), IDF(24), PRCNTI,
TFOOD, ANFOOD, AQFOOD,
IRES, IRR, NPATH, IUNIT, SOLUNT,
FOQOPT, XOQOPT, EXPORT, IMPORT, DEEP,
RELTRM, BASIC, DERIVE, AIRCN,
DERCRP, DERANM, DERAQU, DERDRK,
DOAIR, DOIRR, DOBIOT, DOWAST, NONAG,
NTF, NAN, NAQ, NRE, NMAX, NCHAIN,
NVU(5), SVU(3), SLDN, SSLDN,
DEPFR1, DEPFR2, DPVRES, WTIM,
RF1, RF2, POPOPT, POPIN, POPT,

COMMON BLOCKS

```
.      ISALT, DEBUG,
.      LUN, WT(11),
.      MOFIRR, ZERO, ONEYR, P, ALOG2, M3CM3, UNITCF,
.      YRDA, AYEAR, SECYR, HRYR, MOYR, SECDA, YRSEC, YRHR,
.      LM2IN, DUMMY(9), KGG, KGMG, DAYYR, M3L, MEVSV

INTEGER DOSTYP, METHOD, IRES, IRR, NPATH, FOQOPT, XOQOPT,
.      NTF, NAN, NAQ, NRE, LUN, MOFIRR, NMAX, IUNIT,
.      NCHAIN, IDF, POPOPT, SOLUNT, PRCNTI

LOGICAL ONEDOS, AEDE, MAXDOS, CUMDOS, ACUTE, OUTRAD, OUTPTH,
.      POPDOS, INHDF, NEAR, DEBUG, ISALT, EXPORT, IMPORT, DEEP,
.      AIR, SWAT, BIOT, FINITE, INHAL, AIREXT, SLING, HARVST,
.      GROUND, TFOOD, TFD(4), ANFOOD, ANF(4), DRINK, AQFOOD,
.      AQF(4), REC(3), RECRE, SWING, PATH, BURWAS,
.      RELTRM, BASIC, DERIVE, DOAIR, DOIRR, DOBIOT, DOWAST,
.      NONAG, AIRCN, OUTEDE,
.      DERCRP, DERANM, DERAQU, DERDRK

REAL NVU, SVU, SLDN, SSLDN, DEPFR1, DEPFR2, DPVRES,
.      WTIM, RF1, RF2, ONEYR, M3L, POPIN, POPT,
.      P, ALOG2, M3CM3, UNITCF, YRDA, AYEAR, SECYR, HRYR, MOYR,
.      SECDA, YRSEC, WT, LM2IN, DUMMY, YRHR, KGG, KGMG, DAYYR, MEVSV

REAL*B ZERO

EQUIVALENCE (PATH(1),AIREXT),
.      (PATH(2),INHAL),
.      (PATH(3),GROUND),
.      (PATH(4),TFD(1)),
.      (PATH(8),ANF(1)),
.      (PATH(12),SLING),
.      (PATH(13),SWING),
.      (PATH(14),REC(1)),
.      (PATH(17),DRINK),
.      (PATH(18),AQF(1))

COMMON /OPT2/ UNIT1(5), UNIT2(24), UNIT3(3), DASHES(10), DOSUNT
CHARACTER UNIT1*3, UNIT2*2, UNIT3*2, DASHES*8, DOSUNT*10
```

COMMON BLOCKS

C-----

C INPUT OPTION PARAMETERS

C Module of GENII Version of 11-Jan-88 RAP

COMMON /OPTION/ IPOP, IPATH, IAC, IWAT, IAIR, LUA, LUW, IGRNUC,
IGRPOP, IGRPM, IGRPL, IGRNU, ISPEC, IGRDOS,
LUN2, IREDE

C-----

C NUCDFL LIBRARY DATA

C Module of GENII Version of 14-May-87 RAP

COMMON /ORGID/ LORG, IORG(25)

C-----

C Master Organ List Common Block

C Module of GENII Version of 28-Dec-87 RAP

COMMON /ORGMAS/ MORG, SINDX(25), TINDX(25), MASMAS(25), SI2I
INTEGER MORG, SINDX, TINDX
REAL MASMAS, SI2I

COMMON /ORGMAC/ MASORG(25)
CHARACTER*8 MASORG

C-----

C Organ Data Common Block

C Module of GENII Version of 11-Nov-87 RAP

COMMON /ORGPARG/ NORG, NORGCM(5), NORGL, NOTHER, NBONE, NOCOMP,
IORG(25), NORGCR(4),
TARGET(25), IYX(25), ORGMLT(25), TCMULT(45),
TOTMAS, SPECOR(25), ORGING(25), ORGINH(25)

INTEGER NORG, NORGCM, NORGL, NOTHER, NBONE, NOCOMP, IORG, NORGCR,
IYX
LOGICAL TARGET, SPECOR
REAL ORGMLT, TOTMAS, TCMULT, ORGING, ORGINH

COMMON /ORGPARG/ ORGANS(25)
CHARACTER ORGANS*8

COMMON BLOCKS

```
C-----
C   ARRAY OF ORGAN DOSES AS A FUNCTION OF TIME, USED BY GRAPHING FOR
C   REPORT
C   Module of GENII                               Version of 8-May-87  RAP
C
C   COMMON / OUTORG / DTOTAL (144)
C
C-----
C   NAMELIST DATA FOR CALCULATION
C   Module of GENII
C
C   COMMON /PATHIN/ CONSUM(7), USAGE(7), EXTIM, SW, GRWP(7), YELD(7),
C   .               MOPYR, RECON, RM, CFLO, RIRR
C
C   REAL MOPYR
C
C-----
C   STORAGE ARRAYS FOR GRAPHING
C   Module of GENII
C
C   COMMON /PLOT/ ARRAY(40,73), LABELY(40), LABELX, TICKY(40),
C   .             TICKX(73), LEGEND(40)
C
C   CHARACTER*1 ARRAY, LABELY, TICKY, TICKX
C   CHARACTER*73 LABELX
C   CHARACTER*12 LEGEND
C
C-----
C   SPATIAL POPULATION DATA
C   Module of GENII
C
C   COMMON /POPU/ POP(10,16)
C
C   POP(10,16)  - POPULATION WITHIN EACH SPATIAL INTERVAL FOR 10
C               DISTANCES AND 16 DIRECTION SECTORS.
```

COMMON BLOCKS

C-----

C Radionuclide (Single Chain) Common Block
C Module of GENII Version of 18-Feb-88 RAP

COMMON /RAD/ NONUC, IMOD(9), ICL(9), HL(9), ATNUM(9), IRMD(9),
C14, H3
INTEGER NONUC, IMOD, ICL, ATNUM, IRMD
REAL HL
LOGICAL C14, H3

COMMON /RADC/ ELT(9), AW(9),
BONE(9),
CLASS(9)

CHARACTER ELT*2, AW*6, BONE*1, CLASS*1

C-----

C Total List of Radionuclides in this Case Common Block
C Module of GENII Version of 23-Dec-87 RAP

COMMON /RADIN/ NUCTOT, ICH,
IOFNUC(70), ICLASS(100),
IFRT(2,100), DKT(2,100),
HLT(100), ALT(100),
CASCON(9,100), CASQ(3,100), BAS(5)

INTEGER NUCTOT, ICH, IOFNUC, IFRT, ICLASS
REAL DKT, HLT, ALT, CASCON, CASQ
LOGICAL BAS

COMMON /RADINC/ ELTT(100), AWT(100),
BONET(100),
CLASST(100)

CHARACTER ELTT*2, AWT*6, BONET*1, CLASST*1

COMMON BLOCKS

C-----

C CALCULATED POPULATION DOSES

C Module of GENII

Version of 17-Aug-88 RAP

```
COMMON /RESULT/ DOSSUB(144), DOSEXT(144), DOSINT(25,144),  
  . AEDE2(144), DTOTAL(144),  
  . POPINT(25,100), POPSUB(100), POPEXT(100),  
  . HICDE(11), ICDEH(11), HIWBE(11),  
  . HIAEDE, HIEXT, HISUB, HIEDE, MAXTIM,  
  . HIDOSR(25,100), HIDOSV(25,4),  
  . HISUBR(100), HIEXTR(100),  
  . NORGS, NORGW, ICLN(25)
```

```
REAL DOSSUB, DOSEXT, DOSINT, AEDE2, DTOTAL,  
  . POPINT, POPSUB, POPEXT, HICDE, HIWBE,  
  . HIAEDE, HIEXT, HISUB, HIEDE, HIDOSR, HIDOSV, HISUBR, HIEXTR
```

```
INTEGER ICDEH, MAXTIM, NORGS, ICLN
```

C-----

C Radionuclide Master Library Common Blocks

C Module of GENII

Version of 28-Mar-88 RAP

```
COMMON /RMD/ NUCS, NCH,  
  . NOFNUC(200), NCHST(200), NCHN(300),  
  . IFR(2,300), DKF(2,300),  
  . TR(300),  
  . NFLAG(300), NFLAGC(300), IMODM(300), RFLAG(300)
```

```
INTEGER IFR, NOFNUC, NCHST, NCHN, NFLAG, NFLAGC, NUCS, NCH, IMODM  
REAL TR, DKF  
LOGICAL RFLAG
```

```
COMMON /RMD/ ELTM(300), AWM(300), BONED(300), TCLASS(300)  
CHARACTER ELTM*2, AWM*6, BONED*1, TCLASS*1
```

COMMON BLOCKS

```

C-----
C      Radionuclide Master Library Auxilliary Common Block
C      Module of GENII                               Version of 28-Mar-88 RAP

COMMON /RMD2/ ATNO(300), NDAU(300), IPNDX(30), BRANCH(30), NIDRMD
INTEGER ATNO, NDAU, IPNDX, NIDRMD
REAL BRANCH

COMMON /RMD2C/ ELT2M(30), AW2M(30)
CHARACTER ELT2M*2, AW2M*6

```

```
C-----
C      Specific Effective Energies (SEE) Utility Parameters (SEE.CMN)
C      Module of GENII

COMMON/COMONE/  NSORS,NTARG,SORG(30,8),TORG(40,12)
COMMON/COMSEV/  AHO,ZHO,LEME(3),HLIFE,UNITS(2),EXCH
COMMON/COMNIN/  TEFE(30,40),DBLIN(30,40)
COMMON/PRNTRX/  NPRS,NPRT,IPRS(30),IPRT(40),IGBAR(5),IG,TODAY
COMMON/BONSEK/  BONES
COMMON/PAGE/    LPAGE,FF
COMMON/SYM/     SYMBOL(103)

CHARACTER*2 SORG,TORG,SYMBOL
CHARACTER*8 TODAY
CHARACTER*1 BONES,EXCH,FF
CHARACTER*4 LEME,LEME1(3),LEME2(3),UNITS1(2),UNITS2(2)
INTEGER SOPT,VOPT,LPAGE,RADNUM
REAL*8 DBLIN
```

```
C-----
C      Specific Effective Energies (SEE) Utility Parameters (SEE2.CMN)
C      Module of GENII
C
C      COMMON/SEE2/ GEFE(30,40),BEFE(30,40),AEFE(30,40),REFE(30,40),
1          SPEFE(5,30,40)
```

COMMON BLOCKS

C-----
C
C Sij Factors Common Block
C Module of GENII Version of 19-Jun-87 RAP

COMMON /SIJS/ SIJ(25,25,9), SIJOTH(9)
REAL SIJ, SIJOTH

C-----
C
C Soil Parameters/ Biotic Transport Common Block
C Module of GENII Version of 30-Apr-87 RAP

COMMON /SOLPAR/ LEACHR(9), BTSET, INDW, MANULR,
 . PACKHL, OVRBRD, BTPRE, BTNTK, TOTEXC(3),
 . EXCAV(6,3), EXCAMT,
 . YELDBT(3), AVGIRR, AVGYLD, AVGBVI(9),
 . WASDEP, SOLING, SURCM,
 . RESIRR, IRRSR, IRTIMR, RIRRR,
 . RTAVAL(9), RTENV(9), RTPACK(9)

REAL LEACHR, PACKHL, OVRBRD, EXCAV, EXCAMT, YELDBT, AVGIRR,
 . AVGYLD, AVGBVI, TOTEXC, MANULR, WASDEP, SOLING, SURCM,
 . IRTIMR, RIRRR, RTAVAL, RTENV, RTPACK
INTEGER BTSET, INDW, IRRSR
LOGICAL BTPRE, BTNTK, RESIRR

C-----
C
C INPUT PARAMETERS FOR RADIONUCLIDE MASTER LIST
C Module of GENII

COMMON /SOURCE/ NIN, E(100), A(100)

C
 CHARACTER*2 E
 CHARACTER*6 A

COMMON BLOCKS

C-----

C Surface Water Transport Data for a Usage Location
C Module of GENII Version of 11-Dec-86 RAP

COMMON /SWPAR/ MIXFLG, SWQB, SWDPH, SWDZ, SWIDTH, SWFLOW,
SWLSX, SWOSY, MIXR, TCWS
INTEGER MIXFLG
REAL SWQB, SWDPH, SWDZ, SWIDTH, SWFLOW, SWLSX, SWOSY, MIXR, TCWS

C-----

C Time Common Block
C Module of GENII Version of 1-Jul-87 RAP

COMMON /TIMES/ NTIME, ITIME, NBEFORE, ITIMT,
BEFORE, BEFAIR, BEFIRR, LOIC,
RELEND, NTKEND, DCEND,
AQUTT(4), RECTT, SWTT, HSTART

INTEGER NTIME, ITIME, BEFAIR, BEFIRR, LOIC, NBEFORE, ITIMT
REAL BEFORE, RELEND, NTKEND, DCEND, AQUTT, RECTT, SWTT
REAL*8 HSTART

C-----

C REFERENCE TIME PARAMETERS (DITTY)
C Module of GENII

COMMON /TIMES2/ TZ, TZR

C-----

C Descriptive Titles Common Block
C Module of GENII Version of 9-Nov-87 RAP

COMMON /TITL/ TITLS(50)
CHARACTER*80 TITLS

C-----

C CALCULATED POPULATION AND RELEASE DATA
C Module of GENII

COMMON /VARYBL/ PM(144), PL(144), ACTA(144,100), ACTW(144,100)

5.2 DATA FILE LISTINGS

Table 5.2 is a table of contents for the data files listed in this section. Data libraries and other text files are listed in the order assigned in the file named FILENAME.DAT.

TABLE 5.2. Data File Listings Table of Contents

RMDLIB.DAT	5.719
METADATA.DAT	5.725
RMDBYELE.DAT	5.766
FTRANS.DAT	5.767
BIDAC1.DAT	5.769
GRDF.DAT	5.771
DOSSUM.DAT	5.777
DEFAULT.IN	5.778
ENERGY.DAT	5.779
DSFCT30.DAT	5.868
ISOLIB.DAT	5.891
DOSINC.OUT	5.895
GAMEN.DAT	5.1031
SEE.IN	5.1036
PARAMS.DAT	5.1040
APPRENTICE.DAT	5.1065

RMDLIB - Radionuclide Master Library (29-Aug-88 RAP)

H 3	4.49E+3	1	0	0.0000	0	0.0000	1	ND
BE10	5.84E+0	1	0	0.0000	0	0.0000	4	YY
C 14	2.89E+6	1	0	0.0000	0	0.0000	8	ND
N 13	8.02E-3	1	0	0.0000	0	0.0000	7	ND
F 18	7.82E-2	1	0	0.0000	0	0.0000	9	SD
NA22	9.50E+2	1	0	0.0000	0	0.0000	11	VD
NA24	8.25E-1	1	0	0.0000	0	0.0000	11	VD
SI31	1.89E-1	1	0	0.0000	0	0.0000	14	NW
P 32	1.43E+1	1	0	0.0000	0	0.0000	15	SD
P 33	2.54E+1	1	0	0.0000	0	0.0000	15	VD
S 35	8.74E+1	1	0	0.0000	0	0.0000	18	NW
CL36	1.1E+0	1	0	0.0000	0	0.0000	17	ND
K 40	4.87E11	1	0	0.0000	0	0.0000	19	ND
AR39	9.83E+4	1	0	0.0000	0	0.0000	18	ND
AR41	7.81E-2	1	0	0.0000	0	0.0000	18	ND
CA41	3.87E+7	1	0	0.0000	0	0.0000	20	1 VV
CA45	1.63E+2	1	0	0.0000	0	0.0000	20	1 VV
SC48	8.38E+1	1	0	0.0000	0	0.0000	21	YY
CR51	2.77E+1	1	0	0.0000	0	0.0000	24	YY
MN54	3.13E+2	1	0	0.0000	0	0.0000	25	SW
MN58	1.87E-1	1	0	0.0000	0	0.0000	25	SW
FE56	9.88E+2	1	0	0.0000	0	0.0000	28	NW
FE59	4.48E+1	1	0	0.0000	0	0.0000	28	NW
CO57	2.71E+2	1	0	0.0000	0	0.0000	27	NY
CO58	7.88E+1	1	0	0.0000	0	0.0000	27	NY
CO60	1.92E+3	1	0	0.0000	0	0.0000	27	T NY
NI59	2.74E+7	1	0	0.0000	0	0.0000	28	NW
NI63	3.85E+4	1	0	0.0000	0	0.0000	28	NW
NI65	1.85E-1	1	0	0.0000	0	0.0000	28	NW
CU64	5.29E-1	1	0	0.0000	0	0.0000	29	ND
ZN65	2.44E+2	1	0	0.0000	0	0.0000	30	T VV
ZN69M	5.73E-1	1	0	0.0000	0	0.0000	30	SY
ZN69	3.88E-2	2	1	1.0000	0	0.0000	30	SY
GA72	5.87E-1	1	0	0.0000	0	0.0000	31	SW
AS76	1.10E+0	1	0	0.0000	0	0.0000	33	NW
SE76	1.2E+2	1	0	0.0000	0	0.0000	34	NW
SE79	2.37E+7	1	0	0.0000	0	0.0000	34	NW
BR82	1.47E+0	1	0	0.0000	0	0.0000	35	ND
BR83	9.98E-2	1	0	0.0000	0	0.0000	35	ND
KR83M	7.63E-2	2	1	1.0000	0	0.0000	36	ND
BR84	2.21E-2	1	0	0.0000	0	0.0000	35	ND
KR85M	1.87E-1	1	0	0.0000	0	0.0000	36	ND
KR86	3.91E+3	2	1	0.2110	0	0.0000	36	ND
KR87	5.38E-2	1	0	0.0000	0	0.0000	36	ND
RB87	1.73E13	2	1	1.0000	0	0.0000	37	VD
KR88	1.18E-1	1	0	0.0000	0	0.0000	36	ND
RB88	1.24E-2	2	1	1.0000	0	0.0000	37	VD

RMDLIB.DAT

KR89	2.20E-3	1	0	0.0000	0	0.0000	38	ND
RB89	1.07E-2	2	1	1.0000	0	0.0000	37	VD
SR89	5.00E+1	3	2	1.0000	0	0.0000	38	1 VD
SR87M	1.17E-1	1	0	0.0000	0	0.0000	38	1 SD
RB86	1.87E+1	1	0	0.0000	0	0.0000	37	VD
SR86	0.6E+1	1	0	0.0000	0	0.0000	38	1 VD
SR90	1.04E+4	1	0	0.0000	0	0.0000	38	T 1 VD
Y 90	2.67E+0	2	1	1.0000	0	0.0000	39	T SY
SR91	3.00E-1	1	0	0.0000	0	0.0000	38	1 SD
Y 91M	3.46E-2	2	1	0.5740	0	0.0000	39	SY
Y 91	5.85E+1	3	2	1.0000	1	0.4200	39	SY
SR92	1.13E-1	1	0	0.0000	0	0.0000	38	1 SD
Y 92	1.40E-1	2	1	1.0000	0	0.0000	39	SY
Y 93	4.21E-1	1	0	0.0000	0	0.0000	39	SY
W093	1.20E+0	2	0	0.0000	0	0.0000	42	SD
ZR93	5.50E+0	3	1	1.0000	0	0.0000	40	SW
NB93M	5.33E+3	4	3	1.0000	2	1.0000	41	VY
ZR95	0.40E+1	1	0	0.0000	0	0.0000	40	SW
NB95M	3.01E+0	2	1	0.0000	0	0.0000	41	SY
NB95	3.51E-1	3	2	0.9450	1	0.9922	41	SY
ZR97	7.04E-1	1	0	0.0000	0	0.0000	40	SW
NB97M	0.94E+4	2	1	0.9470	0	0.0000	41	SY
NB97	5.01E-2	3	2	1.0000	1	0.0530	41	SY
NB94	7.41E+0	1	0	0.0000	0	0.0000	41	VY
W099	2.75E+0	1	0	0.0000	0	0.0000	42	SD
TC99M	2.51E-1	2	1	0.8800	0	0.0000	43	NW
TC99	7.77E+7	3	2	1.0000	1	0.1140	43	T NW
TC101	9.88E-3	1	0	0.0000	0	0.0000	43	NW
RJ103	3.94E+1	1	0	0.0000	0	0.0000	44	NY
PD103	1.70E+1	2	0	0.0000	0	0.0000	46	VY
RH103M	3.90E-2	3	1	0.9974	2	0.9997	45	NY
RJ105	1.85E-1	1	0	0.0000	0	0.0000	44	NY 1 RH105M 1.000
RH105	1.47E+0	2	1	1.0000	0	0.0000	45	NY
RJ108	3.08E+2	1	0	0.0000	0	0.0000	44	T NY 1 RH108 1.000
PD107	2.37E+9	1	0	0.0000	0	0.0000	46	VY
PD109	5.61E-1	1	0	0.0000	0	0.0000	48	VY 1 AG109M 1.000
AG110M	2.50E+2	1	0	0.0000	0	0.0000	47	ND 1 AG110 0.985
AG111	7.40E+0	1	0	0.0000	0	0.0000	47	ND
CD109	4.64E+2	1	0	0.0000	0	0.0000	48	ND
CD113M	5.00E+3	1	0	0.0000	0	0.0000	48	ND
CD115M	4.46E+1	1	0	0.0000	0	0.0000	48	ND
CD115	2.23E+0	2	0	0.0000	0	0.0000	48	ND
IN115M	1.82E-1	3	2	1.0000	0	0.0000	49	VD
IN111	2.0E+0	1	0	0.0000	0	0.0000	49	VD
IN114M	5.00E+1	1	0	0.0000	0	0.0000	49	VD 1 IN114 0.967
SN113	1.15E+2	1	0	0.0000	0	0.0000	50	VW
IN113M	0.91E-2	2	1	1.0000	0	0.0000	49	VD

SM117M	1.40E+1	1	0	0.0000	0	0.0000	50	SV
SM119M	2.93E+2	1	0	0.0000	0	0.0000	50	VF
SM121M	2.01E+4	1	0	0.0000	0	0.0000	50	VF
SM121	1.13E+0	2	1	0.770	0	0.0000	50	VF
SM123	1.20E+2	1	0	0.0000	0	0.0000	50	VF
I 125	0.01E+1	1	0	0.0000	0	0.0000	53	2 ND
SM125	0.84E+0	1	0	0.0000	0	0.0000	50	SV
SB125	1.01E+3	2	1	1.0000	0	0.0000	51	SV
TE125M	5.80E+1	3	2	0.2310	0	0.0000	62	SV
SM126	9.65E+7	1	0	0.0000	0	0.0000	50	VF
SB126M	1.32E-2	2	1	1.0000	0	0.0000	51	SV
SB126	1.24E+1	3	2	0.1400	0	0.0000	51	SV
SB122	2.70E+0	1	0	0.0000	0	0.0000	51	SV
SB124	0.02E+1	1	0	0.0000	0	0.0000	51	SV
SB127	3.86E+0	1	0	0.0000	0	0.0000	51	SV
TE127M	1.00E+2	2	1	0.1000	0	0.0000	52	SV
TE127	3.90E-1	3	2	0.9820	1	0.8310	52	SV
TE123M	1.20E+2	1	0	0.0000	0	0.0000	52	SV
TE129M	3.36E+1	1	0	0.0000	0	0.0000	52	SV
TE129	4.83E-2	2	1	0.8290	0	0.0000	52	SV
I 129	5.73E+9	3	2	1.0000	1	0.3710	53	T 2 ND
TE131M	1.25E+0	1	0	0.0000	0	0.0000	52	SV
TE131	1.74E-2	2	1	0.2220	0	0.0000	52	T SV
I 131	0.04E+0	3	2	1.0000	1	0.7780	53	T 2 ND
XE131M	1.18E+1	4	3	0.0100	0	0.0000	54	ND
TE132	9.28E+0	1	0	0.0000	0	0.0000	52	SV
I 132	0.58E-2	2	1	1.0000	0	0.0000	53	2 ND
TE133M	3.05E-2	1	0	0.0000	0	0.0000	52	SV
TE133	8.65E-3	2	1	0.1300	0	0.0000	52	SV
I 133	8.67E-1	3	2	1.0000	1	0.0700	53	2 ND
XE133M	2.19E+0	4	3	0.0200	0	0.0000	54	ND
XE133	5.25E+0	5	4	1.0000	3	0.9712	54	ND
TE134	2.90E-2	1	0	0.0000	0	0.0000	52	SV
I 134	3.85E-2	2	1	1.0000	0	0.0000	53	2 ND
CS134M	1.21E-1	1	0	0.0000	0	0.0000	55	ND
CS134	7.53E+2	1	1	1.0000	0	0.0000	55	ND
I 130	5.16E-1	1	0	0.0000	0	0.0000	53	2 ND
I 135	2.76E-1	1	0	0.0000	0	0.0000	53	2 ND
XE135M	1.07E-2	2	1	0.1850	0	0.0000	54	ND
XE135	3.80E-1	3	2	1.0000	1	0.8350	54	ND
CS135	8.40E+0	4	3	1.0000	0	0.0000	55	ND
XE137	2.60E-3	1	0	0.0000	0	0.0000	54	ND
CS137	1.10E+4	2	1	1.0000	0	0.0000	55	T ND 1 BA137M 0.940
XE130	0.81E-3	1	0	0.0000	0	0.0000	54	ND
CS138	2.24E-2	2	1	1.0000	0	0.0000	55	ND
CS139	0.53E-3	1	0	0.0000	0	0.0000	55	ND
BA139	5.77E-2	2	1	1.0000	0	0.0000	50	1 SD

BA140	1.28E+1	1	0	0.0000	0	0.0000	56	T	1	SD
LA140	1.68E+0	2	1	1.0000	0	0.0000	57	T		SD
CS130	1.32E+1	1	0	0.0000	0	0.0000	55			ND
BA141	1.27E-2	1	0	0.0000	0	0.0000	58		1	SD
LA141	1.64E-1	2	1	1.0000	0	0.0000	57			SD
CE141	3.25E+1	3	2	1.0000	0	0.0000	58			SY
BA142	7.43E-3	1	0	0.0000	0	0.0000	58		1	SD
LA142	6.63E-2	2	1	1.0000	0	0.0000	57			SD
CE143	1.30E+0	1	0	0.0000	0	0.0000	58			SY
PR143	1.30E+1	2	1	1.0000	0	0.0000	59			SY
CE144	2.84E+2	1	0	0.0000	0	0.0000	58	T		SY
PR144M	6.00E-3	2	1	0.0143	0	0.0000	59			SY
PR144	1.20E-2	3	2	1.0000	1	0.0057	59	T		SY
PR142	7.97E-1	1	0	0.0000	0	0.0000	59			SY
ND147	1.10E+1	1	0	0.0000	0	0.0000	60			SY
PM147	9.58E+2	2	1	1.0000	0	0.0000	61			SY
SM147	3.87E13	3	2	1.0000	0	0.0000	62			SW
PM148M	4.13E+1	1	0	0.0000	0	0.0000	61			SY
PM148	6.87E+0	2	1	0.0420	0	0.0000	61			SY
PM149	2.21E+0	1	0	0.0000	0	0.0000	61			SY
PM151	1.18E+0	1	0	0.0000	0	0.0000	61			SY
SM151	3.29E+4	2	1	1.0000	0	0.0000	62			SW
SM153	1.95E+0	1	0	0.0000	0	0.0000	62			SW
EU152M	3.68E-1	1	0	0.0000	0	0.0000	63			SW
EU152	4.90E+3	1	0	0.0000	0	0.0000	63			SW
EU154	3.21E+3	1	0	0.0000	0	0.0000	63			SW
EU155	1.81E+3	1	0	0.0000	0	0.0000	63			SW
EU158	1.62E+1	1	0	0.0000	0	0.0000	63			SW
GD153	2.42E+2	1	0	0.0000	0	0.0000	64			SD
GD159	7.73E-1	1	0	0.0000	0	0.0000	64			SD
TB160	7.23E+1	1	0	0.0000	0	0.0000	65			SW
TB161	6.91E+0	1	0	0.0000	0	0.0000	65			SW
DY165	9.73E-2	1	0	0.0000	0	0.0000	66			SW
HO166M	4.38E+5	1	0	0.0000	0	0.0000	67			SW
HO168	1.12E+0	1	0	0.0000	0	0.0000	67			SW
ER169	9.40E+0	1	0	0.0000	0	0.0000	68			SW
ER171	3.13E-1	1	0	0.0000	0	0.0000	68			SW
TA182	1.16E+2	1	0	0.0000	0	0.0000	73			YY
W 181	1.21E+2	1	0	0.0000	0	0.0000	74			VD
W 185	7.51E+1	1	0	0.0000	0	0.0000	74			VD
W 187	9.93E-1	1	0	0.0000	0	0.0000	74			SD
RE187	1.72E13	2	1	1.0000	0	0.0000	75			NW
OS185	9.36E+1	1	0	0.0000	0	0.0000	76			ND
OS191	1.5E+1	1	0	0.0000	0	0.0000	76			ND
IR192	7.40E+1	1	0	0.0000	0	0.0000	77			NY
HQ203	4.66E+1	1	0	0.0000	0	0.0000	80			ND
TH230	2.81E+7	1	0	0.0000	0	0.0000	90			SY

RA226	5.84E+5	2 1 1.0000	0 0.0000	88 T 1	VV												
RN222	3.82E+0	3 2 1.0000	0 0.0000	88 T	ND 4	P0216	1.000	P8214	1.000	BI214	1.000	P0214	1.000				
P8210	8.12E+3	4 3 1.0000	0 0.0000	82 T	VD												
BI210	5.01E+0	5 4 1.0000	0 0.0000	83 T	NV												
P0210	1.38E+2	6 5 1.0000	0 0.0000	84 T	NV												
U 232	2.38E+4	1 0 0.0000	0 0.0000	92	VY												
TH232	5.13E12	2 0 0.0000	0 0.0000	90	SY												
RA228	2.10E+3	3 2 1.0000	0 0.0000	88	1 VV												
AC228	2.55E-1	4 3 1.0000	0 0.0000	89	SY												
TH228	6.98E+2	5 4 1.0000	1 1.0000	90	SY												
RA224	3.82E+0	6 5 1.0000	0 0.0000	88	1 SW 2	RN220	1.000	P0216	1.000								
P8212	4.43E-1	7 6 1.0000	0 0.0000	82	SD												
BI212	4.20E-2	8 7 1.0000	0 0.0000	83	NV 2	P0212	.6407	TL200	.3593								
U 234	8.29E+7	1 0 0.0000	0 0.0000	92	VY												
U 236	8.55E+9	1 0 0.0000	0 0.0000	92	VY												
U 235	2.57E11	1 0 0.0000	0 0.0000	92	VY												
TH231	1.00E+0	2 1 1.0000	0 0.0000	90	SY												
PA231	1.30E+7	3 2 1.0000	0 0.0000	91	SY												
AC227	7.95E+3	4 3 1.0000	0 0.0000	89	SY												
TH227	1.87E+1	5 4 0.9852	0 0.0000	90	SY												
FR223	1.51E-2	6 4 0.0138	0 0.0000	87	ND												
RA223	1.14E+1	7 5 1.0000	0 1.0000	88	1 SW 5	RN219	1.000	P0215	1.000	P8211	1.000	BI211	1.000	TL207	1.000		
U 237	8.76E+0	1 0 0.0000	0 0.0000	92	SY												
NP237	7.81E+6	2 1 1.0000	0 0.0000	93	SW												
PA233	2.70E+1	3 2 1.0000	0 0.0000	91	SY												
U 233	5.58E+7	4 3 1.0000	0 0.0000	92	VY												
TH229	2.60E+6	5 4 1.0000	0 0.0000	90	SY												
RA225	1.48E+1	6 5 1.0000	0 0.0000	88	1 SW												
AC225	1.00E+1	7 6 1.0000	0 0.0000	89	SY 8	FR221	1.000	AT217	1.000	BI213	1.000	P0213	.9784	TL209	.0216	P8209	1.000
U 238	1.83E12	1 0 0.0000	0 0.0000	92	VY												
TH234	2.41E+1	2 1 1.0000	0 0.0000	90	SY 1	PA234M	0.998										
PA234	2.79E-1	3 2 0.0016	0 0.0000	91	SY												
PU236	1.04E+3	1 0 0.0000	0 0.0000	94	SY												
PU237	4.53E+1	1 0 0.0000	0 0.0000	94	SY												
AM242M	5.55E+4	1 0 0.0000	0 0.0000	95	SW												
AM242	6.88E-1	2 1 1.0000	0 0.0000	95	SW												
CM242	1.83E+2	3 2 0.8270	0 0.0000	98	SW												
PU242	1.37E+8	4 2 0.1730	0 0.0000	94	SY												
NP238	2.12E+0	5 6 0.0000	0 0.0000	93	SW												
PU238	3.20E+4	6 5 1.0000	3 1.0000	94	SY												
CM244	8.81E+3	1 0 0.0000	0 0.0000	96	SW												
PU244	3.01E10	2 0 0.0000	0 0.0000	94	SY												
U 240	6.80E-1	3 2 0.9980	0 0.0000	92	SY 1	NP240M	1.000										
PU240	2.40E+0	4 3 1.0000	1 1.0000	94	SY												
CM245	3.10E+6	1 0 0.0000	0 0.0000	98	SW												
PU241	5.26E+3	2 1 1.0000	0 0.0000	94	SY												
AM241	1.58E+5	3 2 1.0000	0 0.0000	95 T	SW												

RMDLIB.DAT

CM246	1.73E+6	1	0	0.0000	0	0.0000	98	SW
CM247	6.69E+9	1	0	0.0000	0	0.0000	98	SW
CM243	1.04E+4	2	0	0.0000	0	0.0000	98	SW
PU243	1.92E-1	3	1	1.0000	0	0.0000	94	SY
AM243	2.69E+6	4	3	1.0000	2	0.0024	95	SW
NP239	2.36E+6	5	4	1.0000	0	0.0000	93	SW
PU239	8.81E+6	6	5	1.0000	2	0.9976	94	T SY
CM248	1.24E+8	1	0	0.0000	0	0.0000	98	SW
CF252	9.63E+2	1	0	0.0000	0	0.0000	98	SW
				0.0000	0	0.0000		

RMDLIB.DAT

METADATA.DAT

Metabolic Data Library (J.R. Johnson) 28-Aug-88 RAP

6
CARBON Adult 2.77 0.0 0.0 (as organic)
1.0 0.0 0.0
Other 1.0 40.0 0. 0.0
End

1
HYDROGEN Adult 2.77 0.0 0.0 (H3 as HTO)
1.0 0.0 0.0
Other 1.0 10.0 0. 0.
End

53
IODINE Adult 1.92 1.00 0.00
1.0 0.0 0.0
End

9
FLUORINE Adult 34.6 0.95 0.05
1.0 1.0 1.0
Bone 1.0 100.0 0.95 0.05

End
11
SODIUM Adult 2.77 0.75 0.02
1. 0.0 0.0
Bone 0.3 10. 0.75 0.02
0.003 500. 0.75 0.02

Other 0.7 15. 0.75 0.02
End

4
BERYLLIUM Adult 2.77 1.00 0.00
0.0 .005 .005
Bone 0.40 1500. 1.0 0.0

Other 0.16 15. 1.0 0.0
0.04 1500. 1. .0
End

15
PHOSPHORUS Adult 1.39 0.8 0.2
0.8 0.8 0.0
Bone 0.3 1500. 0.8 0.2

METADATA.DAT

Other	0.15	2.	0.8	0.2
	0.40	19.	0.8	0.2
End				
21				
SCANDIUM		Adult	2.77	1.0 0.
	0.0	0.0	.0001	
Bone	0.04	5.	0.1	0.9
	0.36	1500.	0.1	0.9
Liver	0.03	5.	0.1	0.9
	0.27	1500.	0.1	0.9
Spleen	.01	5.	0.1	0.9
	.09	1500.	0.1	0.9
Other	0.02	5.	0.1	0.9
	0.18	1500.	0.1	0.9
End				
16				
SULFUR		Adult	2.77	0.80 0.14
	0.8	0.8	0.0	
Other	0.15	20.	0.80	0.14
	0.05	2000.	0.80	0.14
End				
33				
ARSENIC		Adult	2.77	0.05 0.8
	0.0	0.5	0.0	
Liver	0.028	1.	.05	0.8
	0.042	10.	.05	0.8
Kidneys	0.006	1.	.05	0.8
	0.009	10.	.05	0.8
Spleen	0.002	1.	.05	0.8
	0.003	10.	.05	0.8
Other	.22	1.	.05	0.8
	.34	10.	.05	0.8
End				
17				
CHLORINE		Adult	2.77	0.95 0.03

METADATA.DAT

	1.0	1.0	0.0	
Other	1.0	10.	0.95	0.03
End				
19				
POTASSIUM		Adult	20.	0.85 0.11
	1.0	0.0	0.0	
Other	1.0	30.	0.85	.11
End				
20				
CALCIUM		Adult	.919	.68 .32
	0.0	0.3	0.0	
Bone Can	.426	.00112		
	.000605	.000852		
Bone Cor	.543	.00439		
	.00366	.000189		
Bone Sur	10.5	.883		
Other	11.1	1.54		
End				
24				
CHROMIUM		Adult	1.39	0.5 0.5
	0.1	0.1	0.1	
Bone	0.05	1000.	0.5	0.5
Other	0.4	6.	0.5	0.5
	0.25	80.	0.5	0.5
End				
25				
MANGANESE		Adult	2.77	0.08 .92
	0.1	0.1	0.0	
Bone	0.35	40.	0.08	0.92
Liver	0.1	4.	0.08	0.92
	0.15	40.	0.08	0.92
Other	0.2	4.	0.08	0.92
	0.2	40.	0.08	0.92

METADATA.DAT

End 26					
IRON		Adult	2.77	0.16	0.84
	0.1	0.1		0.0	
Liver	0.08	2000.		0.16	0.84
Spleen	0.013	2000.		0.16	0.84
Other	0.907	2000.		0.16	0.84
End 27					
COBALT		Adult	1.39	0.83	0.08
	0.8	0.05		0.05	
Liver	0.03	6.		0.83	0.08
	0.01	60.		0.83	0.08
	0.01	800.		0.83	0.08
Other	0.27	6.0		0.83	0.08
	0.09	60.		0.83	0.08
	0.09	800.		0.83	0.08
End 28					
NICKEL		Adult	2.77	0.50	0.0
	0.05	0.05		0.0	
Kidneys	0.02	.2		0.50	
Other	0.30	1200.		0.50	
End 29					
COPPER		Adult	2.77	0.03	0.97
	0.5	0.5		0.5	
Liver	0.1	40.		0.03	.97
Brain	0.1	40.		0.03	.97
Pancreas	0.006	40.		0.03	.97

METADATA.DAT

Other	0.797	40.	0.03	.97
End				
30				
ZINC		Adult	2.77	0.077 0.7
	0.5	0.5	0.5	
Bone	0.2	400.	0.077	0.7

Other	0.24	20.	0.077	0.7
	0.56	400.	0.077	0.7
End				
31				
GALLIUM		Adult	2.77	0.1 0.1
	0.001	0.001	0.0	
Bone	0.09	1.0	0.1	0.1
	0.21	50.	0.1	0.1

Liver	0.027	1.	0.1	0.1
	0.063	50.	0.1	0.1

Spleen	0.003	1.0	0.1	0.1
	0.007	50.	0.1	0.1

Other	0.18	1.	0.1	0.1
	0.42	50.	0.1	0.1

End				
32				
GERMANIUM		Adult	2.77	1.0 0.0
	1.00	1.00	0.0	
Kidneys	.5	.02	1.	

Other	0.5	1.	1.0
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End			
34			
SELENIUM		Adult	2.77 0.35 0.14
	0.8	0.8	0.0
Liver	.015	3.	.35 .14
	.060	30.	.35 .14
	.075	150.	.35 .14
Kidneys	.005	3.	.35 .14

METADATA.DAT

	.02	30.	.35	.14
	.025	150.	.35	.14
Spleen	.001	3.	.35	.14
	.004	30.	.35	.14
	.005	150.	.35	.14
Other	.079	3.	.35	.14
	.31	30.	.35	.14
	.39	150.	.35	.14
End				
35				
BROMINE	Adult	2.77	0.93	.009
	1.0	1.0	0.0	
Other	1.	10.	0.93	0.009
End				
37				
RUBIDIUM	Adult	2.77	0.86	0.14
	1.0	0.0	0.0	
Bone	0.25	44.	0.86	0.14
Other	0.75	44.	0.86	0.14
End				
38				
STRONTIUM	Adult	3.44	.800	.20
	0.3	0.0	0.01	
Bone Can	.378	.00479		
	.00725	.00105		
Bone Cor	.516	.00214		
	.00136	.000149		
Bone Sur	2.66	.403		
Other	17.6	1.29		
End				
39				
YTTRIUM	Adult	2.77	1.0	0.
	0.0	.0001	.0001	
Bone	0.5	8000.	0.1	0.9

METADATA.DAT

Liver	0.15	8000.	0.1	0.9
Other	0.10	8000.	0.1	0.9
End				
40				
ZIRCONIUM	Adult	2.77	1.	0.
	0.002	0.002	0.002	
Bone	0.5	8000.	1.	
Other	0.5	7.	1.	
End				
41				
NIOBIUM	Adult	2.77	1.0	0.0
	0.5	0.01	0.01	
Bone	0.35	6.0	1.0	
	0.35	200.	1.0	
Kidneys	0.009	6.0	1.0	
	0.009	200.	1.0	
Spleen	0.005	6.0	1.0	
	0.005	200.	1.0	
Other	0.13	6.0	1.0	
	0.13	200.	1.0	
End				
73				
TANTALUM	Adult	2.77	1.0	0.0
	0.5	0.001	0.001	
Bone	0.3	100.	1.0	
Kidneys	0.03	4.0	1.0	
	0.03	100.	1.0	
Other	0.32	4.0	1.0	
	0.32	100.	1.0	
End				

METADATA.DAT

```

42
MOLYBDENUM      Adult      2.77 0.63 0.1
      0.8      0.0      0.05
Bone      0.015      1.      0.63      0.1
      0.14      50.      0.63      0.1

Liver      0.03      1.      0.63      0.1
      0.27      50.      0.63      0.1

Kidneys      0.005      1.      0.63      0.1
      0.045      50.      0.63      0.1

Other      0.05      1.      0.63      0.1
      0.45      50.      0.63      0.1
End
43
TECHNETIUM      Adult      35.0 0.67 0.33
      0.8      0.8      0.0
S Wall      0.075      1.6      0.67      0.33
      0.02      3.7      0.67      0.33
      0.005      22.      0.67      0.33

Kidneys      0.05      1.6      0.67 0      0.33
      0.02      3.7      0.67      0.33
      0.005      22.      0.67      0.33

Thyroid      0.04      0.5      0.67      0.33
      0.0007      100.      0.67      0.33

Other      0.64      1.6      0.67      0.33
      0.17      3.7      0.67      0.33
      0.04      22.      0.67      0.33
End
44
RUTHENIUM      Adult      2.31 0.5 0.5
      0.05      0.05      0.05
Other      0.35      8.0      0.5      0.5
      0.30      35.      0.5      0.5
      0.2      1000.      0.5      0.5
End
45
RHODIUM      Adult      2.31 0.5 0.5
      0.05      0.05      0.05
Other      0.35      8.0      0.5      0.5

```

METADATA.DAT

	0.30	35.	0.5	0.5
	0.2	1000.	0.5	0.5
End 46				
PALLADIUM	Adult	2.77	0.5	0.5
	0.005	0.005	0.005	
Liver	0.45	15.	0.5	0.5
Kidneys	0.15	15.	0.5	0.5
Bone	0.07	15.	0.5	0.5
Other	0.03	15.	0.5	0.5
End 47				
SILVER	Adult	2.77	0.1	0.8
	0.05	0.05	0.05	
Liver	0.08	3.5	0.1	0.8
	0.72	50.	0.1	0.8
Other	0.02	3.5	0.1	0.8
	0.18	50.	0.1	0.8
End 48				
CADMIUM	Adult	2.77	0.8	0.2
	0.05	0.05	0.05	
Liver	0.3	9000.	0.8	0.2
Kidneys	0.3	9000.	0.8	0.2
Other	0.4	9000.	0.8	0.2
End 49				
INDIUM	Adult	2.77	0.1	0.1
	0.02	0.02	0.0	
R Marrow	0.3	8000.	0.1	0.1

METADATA.DAT

Liver	0.2	8000.	0.1	0.1
Kidneys	0.07	8000.	0.1	0.1
Spleen	0.01	8000.	0.1	0.1
End				
50				
TIN	Adult	2.77	0.10	0.
	0.02	0.02	0.0	
Bone	.07	4.	.1	
	.07	25.	.1	
	.21	400.	.1	
Other	.03	4.	.1	
	.03	25.	.1	
	.09	400.	.1	
End				
51				
ANTIMONY	Adult	16.64	1.0	0.
	0.1	0.01	0.0	
Bone	0.19	5.	1.	
	0.01	100.	1.	
Liver	0.095	5.	1.	
	0.005	100.	1.	
Other	0.475	5.	1.	
	0.025	100.	1.	
End				
52				
TELLURIUM	Adult	0.87	1.	0.
	0.2	0.2	0.0	
Bone	0.25	5000.	1.	0.
Other	0.25	20.	1.	0.
End				
55				
CESIUM	Adult	2.77	0.9	0.05

METADATA.DAT

	1.0	0.0	0.0	
Other	0.1	2.0	0.9	0.05
	0.9	110.	0.9	0.05
End				
56				
BARIUM		Adult	30.9	.1 .9
	0.1	0.0	0.0	
Bone Can	.776	.00109		
	.000396	.000863		
Bone Cor	1.21	.00483		
	.00318	.000219		
Bone Sur	2.95	.265		
Other	18.4	.927		
End				
57				
LANTHANUM		Adult	2.77	1.0 0.
	.001	.001	.001	
Bone	0.2	3500.	0.1	0.9
Liver	0.6	3500.	0.1	0.9
Other	0.20	3500.	0.1	0.9
End				
58				
CERIUM		Adult	2.77	1.0 0.0
	0.0	.0003	0.0003	
Bone	0.2	3500.	0.1	0.9
Liver	0.6	3500.	0.1	0.9
Spleen	0.05	3500.	0.1	0.9

METADATA.DAT

Other	0.15	3500.	0.1	0.9
End				
59				
PRASEODYMIUM	Adult	2.77	1.0	0.0
	0.0	0.0003	0.0003	
Bone	0.25	3500.	0.1	0.9
Liver	0.6	3500.	0.1	0.9
Kidneys	0.05	10.00	0.1	0.9
End				
60				
NEODYMIUM	Adult	2.77	0.5	0.5
	0.0	0.0003	0.0003	
Bone	0.45	3500.	0.5	0.5
Liver	0.45	3500.	0.5	0.5
End				
61				
PROMETHIUM	Adult	2.77	0.5	0.5
	0.0	0.0003	0.0003	
Bone	0.45	3500.	0.5	0.5
Liver	0.45	3500.	0.5	0.5
End				
62				
SAMARIUM	Adult	2.77	0.5	0.5
	0.0003	0.0003	0.0003	
Bone	0.45	3500.	0.5	0.5
Liver	0.45	3500.	0.5	0.5
End				
64				
GADOLINIUM	Adult	2.77	0.5	0.5
	0.0003	0.0003	0.0	
Bone	0.45	3500.	0.5	0.5

METADATA.DAT

Kidneys	0.03	10.	.5	.5
Liver	0.3	3500.	0.5	0.5
End				
63				
EUROPIUM	Adult	2.77	0.5	0.5
	0.0	0.001	0.001	
Bone	0.4	3500.	0.5	0.5
Kidneys	.06	10.	.5	.5
Liver	0.4	3500.	0.5	0.5
End				
65				
TERBIUM	Adult	2.77	0.5	0.5
	0.0003	0.0003	0.0003	
Bone	0.5	3500.	0.5	0.5
Kidneys	0.05	10.	.5	.5
Liver	0.25	3500.	0.5	0.5
End				
70				
YTTERBIUM	Adult	2.77	0.5	0.5
	0.0	0.0003	0.0003	
Bone	0.50	3500.	0.5	0.5
Kidneys	0.02	10.	.5	.5
Spleen	0.005	3500.	.5	.5

METADATA.DAT

Liver	0.03	3500.	0.5	0.5
End				
72				
HAFNIUM	Adult	2.77	1.0	0.0
	.002	.002	.002	
Bone	.5	8000.	1.0	0.0
Other	.5	7.	1.	0.0
End				
67				
HOLMIUM	Adult	2.77	0.1	0.9
	0.0	3.0E-4	0.0	
Bone	0.4	3500.0	0.1	0.9
Liver	0.4	3500.0	0.1	0.9
Pancreas	0.05	3500.0	0.1	0.9
End				
80				
MERCURY-0	Adult	2.77	1.0	0.0
	1.	0.0	0.0	
Brain	.19	80.	1.0	
	.01	10000.	1.0	
Kidneys	0.076	80.	1.0	
	0.004	10000.	1.0	
Other	0.68	80.	1.0	
	0.036	10000.	1.0	
End				
80				
MERCURY-I	Adult	2.77	1.0	0.0
	.02	0.02	0.0	
Kidneys	0.076	40.	1.0	
	0.004	10000.	1.0	

METADATA.DAT

Other	0.87	40.	1.0	
	0.046	10000.	1.0	
End				
79				
GOLD		Adult	2.77	1. 0.0
	0.1	0.1	0.1	
Other	1.	3.	1.	
End				
81				
THALLIUM		Adult	2.77	0.67 0.33
	1.0	0.0	0.0	
Kidneys	0.03	10.	0.67	.33
Other	0.97	10.	0.67	.33
End				
74				
TUNGSTEN		Adult	2.77	0.6 0.1
	0.3	0.0	0.05	
Bone	0.005	5.	.6	.1
	0.0025	100.	.6	.1
	0.018	1000.	.6	.1
Kidneys	0.007	5.	.6	.1
	0.003	100.	.6	.1
Liver	0.007	5.	.6	.1
	0.003	100.	.6	.1
Spleen	0.0035	5.	.6	.1
	0.0015	100.	.6	.1
End				
75				
RHENIUM		Adult	34.6	0.67 0.33
	0.8	0.8	0.0	
Thyroid	0.04	0.5	0.67	0.33
S Wall	0.075	1.6	0.67	0.33
	0.02	3.7	0.67	0.33
	0.005	22.0	0.67	0.33
Liver	0.0225	1.6	0.67	0.33

METADATA.DAT

	0.006	3.7	0.67	0.33
	0.0015	22.0	0.67	0.33
Other	0.62	1.6	0.67	0.33
	0.17	3.7	0.67	0.33
	0.04	22.0	0.67	0.33
End				
77				
IRIDIUM	Adult	2.77	0.5	0.5
	0.01	0.01	0.01	
Liver	0.04	8.0	0.5	0.5
	0.16	200.	0.5	0.5
Kidneys	0.0075	8.0	0.5	0.5
	0.033	200.	0.5	0.5
Spleen	0.004	8.0	0.5	0.5
	0.016	200.	0.5	0.5
Other	0.1	8.0	0.5	0.5
	0.44	200.	0.5	0.5
End				
76				
OSMIUM	Adult	2.77	0.5	0.5
	0.01	0.01	0.01	
Liver	0.04	8.0	0.5	0.5
	0.16	200.	0.5	0.5
Kidneys	0.0075	8.0	0.5	0.5
	0.033	200.	0.5	0.5
Spleen	0.004	8.0	0.5	0.5
	0.016	200.	0.5	0.5
Other	0.1	8.0	0.5	0.5
	0.44	200.	0.5	0.5
End				
82				
LEAD	Adult	2.77	0.1	0.67
	0.2	0.0	0.0	
Bone	0.33	12.	0.1	0.67

METADATA.DAT

	0.11	180.	0.1	0.67
	0.11	10000.	0.1	0.67
Liver	0.2	12.	0.1	0.67
	0.045	180.	0.1	0.67
	0.005	10000.	0.1	0.67
Kidneys	0.016	12.	0.1	0.67
	0.0036	180.	0.1	0.67
	0.0004	10000.	0.1	0.67
Other	0.14	12.	0.1	0.67
	0.032	180.	0.1	0.67
	0.0036	12000.	0.1	0.67
End				
83				
BISMUTH	Adult	69.3	0.9	0.1
	0.05	0.05	0.0	
Kidneys	0.24	0.6	0.9	0.1
	0.16	5.0	0.9	0.1
Other	0.18	0.6	0.9	0.1
	0.12	5.0	0.9	0.1
End				
84				
POLONIUM	Adult	2.77	0.05	0.95
	0.1	0.1	0.0	
Liver	0.1	50.	0.05	0.95
Kidneys	0.1	50.	0.05	0.95
Spleen	0.1	50.	0.05	0.95
Other	0.7	50.	0.05	0.95
End				
87				
FRANCIUM	Adult	2.77	0.9	0.05
	1.0	0.0	0.0	
Other	0.1	2.0	0.9	0.05
	0.9	110.	0.9	0.05
End				

METADATA.DAT

88					
RADIUM	Adult	26.9	.027	.973	
	0.0	0.2	0.0		
Bone Can	.241	.000462			
	.0000900	.000251			
Bone Cor	.430	.00188			
	.000991	.000121			
Bone Sur	7.83	.221			
Other	16.2	1.08			
End					
89					
ACTINIUM	Adult	2.77	1.0	0.0	
	0.001	.001	0.001		
Bone	0.45	36500.	0.1		0.9
Liver	0.45	15000.	0.1		0.9
Testes	.00035	36500.	.1		.9
End					
90					
THORIUM	Adult	1.39	0.8	0.2	
	0.0002	.0002	.0002		
Bone	0.7	8000.	0.8		0.2
Liver	0.04	700.	0.8		0.2
Other	0.16	700.	0.8		0.2
End					
91					
PROTACTINIUM	Adult	2.77	0.5	0.5	
	0.0	0.001	0.001		
Bone	0.4	36500.	0.5		0.5

METADATA.DAT

Liver	0.11	10.	.5	.5
	0.05	60.	.5	.5
Kidneys	0.004	10.	.5	.5
	0.016	60.	.5	.5
End				
92				
URANIUM	Adult	2.77	1.0	0.0
	0.05	0.05	0.002	
Bone	0.2	20.	1.0	
	0.023	5000.	1.0	
Kidneys	0.12	6.	1.0	
	0.00052	1500.	1.0	
Other	0.12	6.	1.0	
	0.00052	1500.	1.0	
End				
93				
NEPTUNIUM	Adult	2.77	0.5	0.5
	0.001	0.001	0.001	
Bone	0.75	36500.	0.5	0.5
Liver	0.15	15000.	0.5	0.5
Testes	0.00035	36500.	0.5	0.5
End				
94				
PLUTONIUM	Adult	2.77	0.5	0.5
	0.001	.001	.0001	
Bone	0.45	18250.	0.5	0.5
Liver	0.45	7300.	0.5	0.5
Testes	0.00035	36500.	0.5	.05

METADATA.DAT

End 95					
AMERICIUM	Adult	2.77	0.5	0.5	
	0.0	0.001	0.0		
Bone	0.45	18250.	0.5		0.5
Liver	0.45	7300.	0.5		0.5
Testes	0.00035	36500.	0.5		0.5
End 96					
CURIUM	Adult	2.77	0.5	0.5	
	0.0	.001	0.0		
Bone	0.45	18250.	0.5		0.5
Liver	0.45	7300.	0.5		0.5
Testes	0.00035	36500.	0.5		0.5
End 98					
CALIFORNIUM	Adult	2.77	0.5	0.5	
	0.0	0.001	0.001		
Bone	0.65	18250.	0.5		0.5
Liver	0.25	7300.	0.5		0.5
Testes	0.00035	36500.	0.5		0.5
End 14					
SILICON	Adult	2.77	1.00	0.00	
	0.0	.01	0.0		
Other	0.4	5.0	1.0		0.0
	0.6	100.	1.		.0
End 31 66					

METADATA.DAT

DYPROSIUM		Adult	2.77	1.00	0.00
	0.0		.0003	0.0	
Bone	0.6		3500.	1.0	0.0
Liver	0.1		3500.0	1.0	0.0
Kidneys	0.02		10.	1.0	0.0
End					
68					
ERBIUM		Adult	2.77	1.00	0.00
	0.0		.0003	0.0	
Bone	0.6		3500.	1.0	0.0
Liver	0.05		3500.0	1.0	0.0
Other	0.1		3500.0	1.0	0.0
End					
65					
TANTALUM		Adult	2.77	1.00	0.00
	0.0		.00	0.001	
Bone	0.3		100.	1.0	0.0
Kidneys	0.03		4.0	1.0	0.0
	0.03		100.		
Other	0.32		4.0	1.0	0.0
	0.32		100.		
End					
1					
HYDROGEN-HTO		Infant	.167	0.47	0.00
	0.0		0.0	0.0	
WATER	0.		0.	0.	0.

METADATA.DAT

BT1	0.	0.	0.	0.
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BT2	0.	0.	0.	0.
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Other	0.00011	0.002	0.	0.
	0.0011	0.02	0.	0.

End

1

HYDROGEN-HT	Infant	.167	0.47	0.00
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	0.0	0.0	0.0	
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HT/BLOOD	60.0	13.01	0.	0.
	1.851			

B WATER	7611.	0.0	0.	0.
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BT	0.	0.	0.	0.
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Other	0.00011	0.002	0.	0.
	0.0011	0.02	0.	0.

End

53

IODINE	Infant	1.92	1.00	0.00
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	1.0	0.0	0.0	
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End

11

SODIUM	Infant	5.0	0.75	0.02
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	1.	0.0	0.0	
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Bone	0.3	5.0	0.75	0.02
	0.003	250.	0.75	0.02

Other	0.7	5.0	0.75	0.02
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End

4

METADATA.DAT

BERYLLIUM		Infant	5.0	1.0	0.0
	0.0		.005	0.005	
Bone	.4		750.	1.	0.0
Other	.16		7.	1.	0.0
	.04		750.	1.	
End					
15					
PHOSPHORUS		Infant	3.0	0.8	0.2
	0.8		0.8	0.0	
Bone	0.3		700.	0.8	0.2
Other	0.15		1.	0.8	0.2
	0.40		9.	0.8	0.2
End					
21					
SCANDIUM		Infant	5.0	1.0	0.0
	0.0		0.0	0.0001	
Bone	0.04		5.	0.1	0.9
	0.34		750.	.1	.9
Liver	0.03		5.	0.1	0.9
	0.27		750.	.1	.9
Spleen	0.01		5.	.1	.9
	0.09		750.	.1	.9
Other	0.02		5.	0.1	0.9
	0.18		750.	0.1	0.9
End					
16					
SULFUR		Infant	5.0	0.8	0.14
	.8		.8	0.0	
Other	0.15		10.	0.8	0.14
	0.05		1000.	0.8	0.14
End					
33					
ARSENIC		Infant	5.0	0.05	0.8
	0.0		0.5	0.0	
Liver	0.028		1.	.05	.8
	0.042		5.	.05	.8
Kidneys	0.006		1.	.05	.8

METADATA.DAT

	0.009	5.	.05	.8
Spleen	0.002	1.	.05	.8
	0.003	5.	.05	.8
Other	0.22	1.	.05	.8
	0.34	5.	.05	.8
End				
17				
CHLORINE		Infant	5.0	0.95 0.03
	1.	1.		0.0
Other	1.0	5.	0.95	0.03
End				
19				
POTASSIUM		Infant	20.	0.85 0.11
	1.	0.0		0.0
Other	1.0	15.	0.85	.11
End				
20				
CALCIUM		Infant	.919	.68 .32
	0.0	0.3		0.0
Bone Can	3.41	.00995		
	.000605	.00968		
Bone Cor	3.52	.0132		
	.00366	.00902		
Bone Sur	10.5	.883		
Other	11.1	1.54		
End				
24				
CHROMIUM		Infant	3.0	0.5 0.5
	0.1	0.1		0.1
Bone	0.5	500.	0.5	0.5
Other	0.4	3.	0.5	0.5
	0.25	40.	0.5	0.5
End				
25				

METADATA.DAT

MANGANESE		Infant	5.0	0.08	.92
	0.1	0.1		0.0	
Bone	0.35	20.		0.08	0.92
Liver	0.1	2.		0.08	0.92
	0.15	20.		0.08	0.92
Other	0.2	2.		0.08	0.92
	0.2	20.		0.08	0.92
End					
26					
IRON		Infant	5.0	0.16	0.84
	0.1	0.1		0.0	
Liver	0.08	500.		0.16	0.84
Spleen	0.013	1000.		0.16	0.84
Other	0.907	1000.		0.16	0.84
End					
27					
COBALT		Infant	2.0	0.83	0.08
	0.8	0.05		0.05	
Liver	0.03	3.		0.83	0.08
	0.01	30.		0.83	0.08
	0.01	400.		0.83	0.08
Other	0.27	3.		0.83	0.08
	0.09	30.		0.83	0.08
	0.09	400.		0.83	0.08
End					
28					
NICKEL		Infant	5.0	0.5	0.0
	0.05	0.05		0.0	
Kidneys	0.02	0.2		0.50	
Other	0.30	600.		0.50	
End					
29					
COPPER		Infant	2.77	0.03	0.97

METADATA.DAT

Brain	0.5 0.1	0.5 20.	0.5 0.03	.97
Liver	0.1	20.	0.03	.97
Pancreas	0.003	20.	0.03	.97
Other	0.797	20.	0.03	.97
End 30				
ZINC		Infant 5.00	.077	0.7
	0.5	0.5	0.5	
Bone	0.2	200.	0.077	0.7
Other	0.24	10.	0.077	0.7
	0.56	200.	0.077	0.7
End 31				
GALLIUM		Infant 5.0	0.1	0.1
	0.001	0.001	0.0	
Bone	0.09	1.	0.1	0.1
	0.21	25.	.1	.9
Liver	0.027	1.	0.1	0.1
	0.063	25.	.1	.1
Spleen	0.018	1.	0.1	0.1
	0.009	25.	.1	.1
Other	0.18	1.	0.1	0.1
	0.42	25.	0.1	0.1
End 32				
GERMANIUM		Infant 5.0	1.0	0.
	1.00	1.00	0.0	
Kidneys	0.5	.02	1.	

METADATA.DAT

Other	0.5	1.	1.		
End					
34					
SELENIUM		Infant	5.0	0.35	0.14
	0.8	0.8		0.0	
Liver	0.015	2.		1.	
	0.06	15.		1.	
	0.075	75.		1.	
Kidneys	0.005	2.		1.	
	0.02	15.		1.	
	0.025	75.		1.	
Spleen	0.001	2.		1.	
	0.004	15.		1.	
	0.005	75.		1.	
Other	0.079	2.		1.	
	0.31	15.		1.	
	0.39	75.		1.	
End					
35					
BROMINE		Infant	5.	0.93	.009
	1.0	1.0		0.0	
Other	1.	2.		0.93	0.009
End					
37					
RUBIDIUM		Infant	5.	0.86	0.14
	1.	0.0		0.0	
Bone	0.25	20.		0.86	0.14
Other	0.75	20.		0.86	0.14
End					
38					
STRONTIUM		Infant	3.44	.800	.20
	0.3	0.0		0.01	
Bone Can	2.67	.0101			
	.00725	.00635			
Bone Cor	2.30	.00744			
	.00136	.00545			

METADATA.DAT

Bone Sur 2.66		.403			
Other	17.6	1.29			
End					
39					
YTTRIUM	Infant	5.0	1.0	0.	
	0.0	.0001	.0001		
Bone	0.5	4000.	0.1		0.9
Liver	0.15	4000.	0.1		0.9
Other	0.10	4000.	0.1		0.9
End					
40					
ZIRCONIUM	Infant	5.	1.	0.	
	0.002	0.002	0.002		
Bone	0.5	3000.	1.		
Other	0.5	3.	1.		
End					
41					
NIOBIUM	Infant	5.0	1.0	0.0	
	0.5	0.01	0.01		
Bone	0.35	3.0	1.0		
	0.35	100.	1.0		
Kidneys	0.009	3.0	1.0		
	0.009	100.	1.0		
Spleen	0.005	3.0	1.0		
	0.005	100.	1.0		
Other	0.13	3.0	1.0		
	0.13	100.	1.0		
End					
73					
TANTALUM	Infant	5.0	1.0	0.0	

METADATA.DAT

Bone	0.5 0.3	0.001 50.	0.001 1.0	
Kidneys	0.03 0.03	2.0 50.	1.0 1.0	
Other	0.32 0.32	2.0 50.	1.0 1.0	
End				
42				
MOLYBDENUM	Infant	5.0	0.63	0.1
	0.8	0.0	0.05	
Bone	0.015 0.14	1. 25.	0.63 0.63	0.1 0.1
Liver	0.03 0.27	1. 25.	0.63 0.63	0.1 0.1
Kidneys	0.005 0.045	1. 25.	0.63 0.63	0.1 0.1
Other	0.05 0.45	1. 25.	0.63 0.63	0.1 0.1
End				
43				
TECHNETIUM	Infant	35.0	0.67	0.33
	0.8	0.8	0.0	
S Wall	0.075 0.02 0.005	1. 2. 10.	0.67 0.67 0.67	0.33 0.33 0.33
Kidneys	0.05 0.02 0.005	1. 2. 10.	0.67 0.67 0.67	0.33 0.33 0.33
Thyroid	0.04 0.0007	1. 50.	0.67 0.67	0.33 0.33
Other	0.64 0.17 0.04	1. 2. 10.	0.67 0.67 0.67	0.33 0.33 0.33

METADATA.DAT

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End
44
RUTHENIUM      Infant      5.0  0.5  0.5
                0.05      0.05      0.05
Other          0.35      2.      0.5      0.5
                0.30      10.      0.5      0.5
                0.2       500.      0.5      0.5

End
45
RHODIUM        Infant      5.   0.5  0.5
                0.05      0.05      0.05
Other          0.35      2.      0.5      0.5
                0.30      10.      0.5      0.5
                0.2       500.      0.5      0.5

End
46
PALLADIUM      Infant      5.   0.5  0.5
                0.005     0.005     0.005
Liver         0.45      7.      0.5      0.5

Kidneys       0.15      7.      0.5      0.5

Spleen        0.07      7.      0.5      0.5

Other         0.03      7.      0.5      0.5
End
47
SILVER         Infant      5.0  .1  0.0
                0.05      0.05      0.05
Liver         0.08      1.      0.1      0.8
                0.72      20.      0.1      0.8

Other         0.02      1.      0.1      0.8
                0.18      20.      0.1      0.8
End
48
CADMIUM        Infant      5.   0.8  0.2
                0.05      0.05      0.05
Liver         0.3       4000.     0.8      0.2

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METADATA.DAT

Kidneys	0.3	4000.	0.8	0.2
Other	0.4	4000.	0.8	0.2
End				
49				
INDIUM		Infant	0.0	0.1 0.1
	0.02	0.02	0.0	
R Marrow	0.3	3000.	0.1	0.1
Liver	0.2	3000.	0.1	0.1
Kidneys	0.07	3000.	0.1	0.1
Spleen	0.01	3000.	0.1	0.1
End				
50				
TIN		Infant	5.0	0.10 0.0
	0.02	0.02	0.0	
Bone	0.07	2.	.1	
	0.07	15.	.1	
	0.21	200.	.1	
Other	0.03	2.	.1	
	0.03	15.	.1	
	0.09	200.	.1	
End				
51				
ANTIMONY		Infant	30.	1.0 0.
	0.1	0.01	0.0	
Bone	0.19	2.	1.	
	0.01	50.	1.	
Liver	0.095	2.	1.	
	0.005	50.	1.	
Other	0.475	2.	1.	
	0.025	50.	1.	

METADATA.DAT

End					
52					
TELLURIUM		Infant	2.	1.	0.
	0.2	0.2		0.0	
Bone	0.25	2000.	1.		0.
Other	0.25	10.	1.		0.
End					
55					
CESIUM		Infant	5.0	0.9	0.05
	1.0	0.0		0.0	
Other	0.1	1.		0.9	0.05
	0.9	20.		0.9	0.05
End					
56					
BARIUM		Infant	30.9	.1	.9
	0.1	0.0		0.0	
Bone Can	2.33	.00568			
	.000396	.00545			
Bone Cor	2.76	.00942			
	.00318	.00481			
Bone Sur	2.95	.265			
Other	18.4	.927			
End					
57					
LANTHANUM		Infant	5.	1.0	0.
	.001	.001		.001	
Bone	0.2	1500.	0.1		0.9
Liver	0.6	1500.	.1		.9
Other	0.2	1500.	0.1		0.9
End					
58					
CERIUM		Infant	5.	1.0	0.0

METADATA.DAT

Bone	0.0 0.2	.0003 1500.	0.0003 0.1	0.9
Liver	0.6	1500.	0.1	0.9
Spleen	0.05	1500.	0.1	0.9
Other	0.15	1500.	0.1	0.9
End				
59				
PRASEODYMIUM	Infant	5.0	1.0	0.0
	0.	0.0003	0.0003	
Bone	0.25	1500.	0.1	0.9
Liver	0.6	1500.	0.1	0.9
Kidneys	0.05	10.	.1	.9
End				
60				
NEODYMIUM	Infant	5.	0.5	0.5
	0.0	0.0003	0.0003	
Bone	0.45	1500.	0.5	0.5
Liver	0.45	1500.	0.5	0.5
End				
61				
PROMETHIUM	Infant	5.	0.5	0.5
	0.0	0.0003	0.0003	
Bone	0.45	1500.	0.5	0.5
Liver	0.45	1500.	0.5	0.5
End				
62				
SAMARIUM	Infant	5.	0.5	0.5

METADATA.DAT

Bone	0.0003 0.45	0.0003 1500.	0.0003 0.5	0.5
Liver End 64	0.45	1500.	0.5	0.5
GADOLINIUM	Infant	5.	0.5	0.5
	0.0003	0.0003	0.0	
Bone	0.45	1500.	0.5	0.5
Kidneys	0.06	10.	.5	.5
Liver End 63	0.30	1500.	0.5	0.5
EUROPIUM	Infant	5.	0.5	0.5
	0.0	0.001	0.001	
Bone	0.4	1500.	0.5	0.5
Kidneys	0.06	10.	.5	.5
Liver End 65	0.4	1500.	0.5	0.5
TERBIUM	Infant	5.	0.5	0.5
	0.0003	0.0003	0.0003	
Bone	0.5	1500.	0.5	0.5
Kidneys	0.06	10.	.5	.5
Liver End 72	0.25	1500.	0.5	0.5
HAFNIUM	Infant	5.	1.	0.0

METADATA.DAT

Bone	.002 .5	.002 4000.	.002 1.	0.
Other	.5	4.	1.	0.
End				
70				
YTTERBIUM	Infant	5.	0.5	0.5
	0.0	0.0003	0.0003	
Bone	0.5	1500.	0.5	0.5
Kidneys	0.02	10.	.5	.5
Spleen	0.005	1500.	.5	.5
Liver	0.03	1500.	0.5	0.5
End				
80				
MERCURY-I	Infant	5.	1.0	0.0
	0.02	0.02	0.0	
Kidneys	0.076	10.	1.0	
	0.004	2000.	1.0	
Other	0.87	10.	1.0	
	0.046	2000.	1.0	
End				
80				
MERCURY-0	Infant	2.77	1.0	0.0
	1.	0.0	0.0	
Brain	.19	40.	1.	
	.01	2000.	1.	
Kidneys	0.076	40.	1.0	
	0.004	2000.	1.0	
Other	0.68	40.	1.0	
	0.036	2000.	1.0	
End				

METADATA.DAT

79					
GOLD		Infant	5.	1.	0.
	0.1	0.1		0.1	
Other	1.	2.		1.	
End					
81					
THALLIUM		Infant	5.	0.67	0.33
	1.0	0.0		0.0	
Kidneys	0.03	5.		0.67	.33
Other	0.97	5.		0.67	.33
End					
74					
TUNGSTEN		Infant	5.	0.6	0.1
	0.3	0.0		0.05	
Bone	0.005	2.		.6	.1
	0.0025	50.		.6	.1
	0.018	500.		.6	.1
Kidneys	0.007	2.		.6	.1
	0.003	50.		.6	.1
Liver	0.007	2.		.6	.1
	0.003	50.		.6	.1
Spleen	0.0035	2.		.6	.1
	0.0015	50.		.6	.1
End					
77					
IRIDIUM		Infant	5.	0.5	0.5
	0.01	0.01		0.01	
Liver	0.04	2.		0.5	0.5
	0.16	50.		0.5	0.5
Kidneys	0.0075	2.		0.5	0.5
	0.033	50.		0.5	0.5
Spleen	0.004	2.		0.5	0.5
	0.016	50.		0.5	0.5
Other	0.1	2.		0.5	0.5

METADATA.DAT

	0.44	50.	0.5	0.5
End 76				
OSMIUM		Infant	5.	0.5 0.5
	0.01	0.01	0.01	
Liver	0.04	2.	0.5	0.5
	0.16	50.	0.5	0.5
Kidneys	0.0075	2.	0.5	0.5
	0.033	50.	0.5	0.5
Spleen	0.004	2.	0.5	0.5
	0.016	50.	0.5	0.5
Other	0.1	2.	0.5	0.5
	0.44	50.	0.5	0.5
End 82				
LEAD		Infant	5.	0.1 0.67
	0.2	0.0	0.0	
Bone	0.33	6.	0.1	0.67
	0.11	60.	0.1	0.67
	0.11	4000.	0.1	0.67
Liver	0.02	6.	0.1	0.67
	0.045	60.	0.1	0.67
	0.005	4000.	0.1	0.67
Kidneys	0.016	6.	0.1	0.67
	0.0036	60.	0.1	0.67
	0.0004	4000.	0.1	0.67
Other	0.14	6.	0.1	0.67
	0.032	60.	0.1	0.67
	0.0036	4000.	0.1	0.67
End 83				
BISMUTH		Infant	69.3	0.9 0.1
	0.05	0.05	0.0	
Kidneys	0.24	0.6	0.9	0.1
	0.16	2.	0.9	0.1
Other	0.18	0.6	0.9	0.1
	0.12	2.	0.9	0.1

METADATA.DAT

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End
84
POLONIUM      Infant  5.  0.05 0.95
0.1           0.1    0.0
Liver         0.1    10.    0.05  0.95

Kidneys 0.1      10.    0.05  0.95

Spleen  0.1      10.    0.05  0.95

Other      0.7      10.    0.05  0.95
End
88
RADIUM      Infant 26.9 .027 .973
0.0         0.2    0.0
Bone Can 1.76     .00505
          .0000900 .00484

Bone Cor 1.98     .00647
          .000991 .00471

Bone Sur 7.83     .221

Other      16.2     1.08
End
89
ACTINIUM    Infant  5.  1.0 0.0
0.001       .001   0.001
Bone        0.45   36500. 0.1  0.9

Liver       0.45   15000. 0.1  0.9

Testes     0.00035 36500. .1   .9
End

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METADATA.DAT

90					
THORIUM	Infant	3.	0.8	0.2	
	0.0002	.0002	.0002		
Bone	0.7	2000.	0.8		0.2
Liver	0.04	200.	0.8		0.2
Other	0.16	200.	0.8		0.2
End					
91					
PROTACTINIUM	Infant	2.77	0.5	0.5	
	0.0	0.001	0.001		
Bone	0.4	36500.	0.5		0.5
Liver	0.11	5.	0.5		0.5
	0.05	30.	.5		.5
Kidneys	0.004	5.	.5		.5
	0.016	30.	.5		.5
End					
92					
URANIUM	Infant	5.	1.0	0.0	
	0.05	0.05	0.002		
Bone	0.2	10.	1.0		
	0.023	1000.	1.0		
Kidneys	0.12	2.	1.0		
	0.00052	400.	1.0		
Other	0.12	2.	1.0		
	0.00052	400.	1.0		
End					
93					
NEPTUNIUM	Infant	2.77	0.5	0.5	
	0.001	0.001	0.001		
Bone	0.75	36500.	0.5		0.5

METADATA.DAT

Liver	0.15	15000.	0.5	0.5
Testes	0.00035	36500.	0.5	0.5
End				
94				
PLUTONIUM		Infant 2.77	0.5	0.5
	0.001	.001	.0001	
Bone	0.45	18250.	0.5	0.5
Liver	0.45	7300.	0.5	0.5
Testes	0.00035	36500.	0.5	0.5
End				
95				
AMERICIUM		Infant 2.77	0.5	0.5
	0.0	.001	0.0	
Bone	0.45	18250.	0.5	0.5
Liver	0.45	15000.	0.5	0.5
Testes	0.00035	36500.	0.5	0.5
End				
96				
CURIUM		Infant 2.77	0.5	0.5
	0.0	.001	0.0	
Bone	0.45	18250.	0.5	0.5
Liver	0.45	7300.	0.5	0.5
Testes	0.00035	36500.	0.5	0.5
End				
98				
CALIFORNIUM		Infant 2.77	0.5	0.5
	0.0	.001	.001	

METADATA.DAT

Bone	0.45	18250.	0.5	0.5
Liver	0.45	7300.	0.5	0.5
Testes End	0.00035	36500.	0.5	0.5

RMDBYELE.DAT

RMDBYELE: Radionuclide Master List Sorted by Element/Isotope (26-Aug-88 RAP)

H 3	RB87	SN117M	BA139	PB210	AM242
BE10	RB88	SN119M	BA140	PB212	AM243
C 14	RB89	SN121M	BA141	BI210	CM242
N 13	SR87M	SN121	BA142	BI212	CM243
F 18	SR89	SN123	LA140	PO210	CM244
NA22	SR85	SN125	LA141	RN222	CM245
NA24	SR90	SN126	LA142	FR223	CM246
SI31	SR91	SB122	CE141	RA223	CM247
P 32	SR92	SB125	CE143	RA224	CM248
P 33	Y 90	SB126M	CE144	RA225	CF252
S 35	Y 91M	SB126	PR142	RA226	
CL36	Y 91	SB124	PR143	RA228	
K 40	Y 92	SB127	PR144M	AC225	
AR39	Y 93	TE123M	PR144	AC227	
AR41	ZR93	TE125M	ND147	AC228	
CA41	ZR95	TE127M	PM147	TH227	
CA45	ZR97	TE127	PM148M	TH228	
SC46	NB93M	TE129M	PM148	TH229	
CR51	NB94	TE129	PM149	TH230	
MN54	NB95M	TE131M	PM151	TH231	
MN56	NB95	TE131	SM147	TH232	
FE55	NB97M	TE132	SM151	TH234	
FE59	NB97	TE133M	SM153	PA231	
CO57	MO93	TE133	EU152M	PA233	
CO58	MO99	TE134	EU152	PA234	
CO60	TC99M	I 125	EU154	U 232	
NI59	TC99	I 129	EU155	U 233	
NI63	TC101	I 130	EU156	U 234	
NI65	RU103	I 131	GD152	U 235	
CU64	RU105	I 132	GD153	U 236	
ZN65	RU106	I 133	GD159	U 237	
ZN69M	RH103M	I 134	TB160	U 238	
ZN69	RH105	I 135	TB161	U 240	
GA72	PD103	XE131M	DY165	NP237	
AS76	PD107	XE133M	HO166M	NP238	
SE75	PD109	XE133	HO166	NP239	
SE79	AG110M	XE135M	ER169	PU236	
BR82	AG111	XE135	ER171	PU237	
BR83	CD109	XE137	TA182	PU238	
BR84	CD113M	XE138	W 181	PU239	
KR83M	CD115M	CS134M	W 185	PU240	
KR85M	CD115	CS134	W 187	PU241	
KR85	IN115M	CS135	RE187	PU242	
KR87	IN111	CS136	OS185	PU243	
KR88	IN113M	CS137	OS191	PU244	
KR89	IN114M	CS138	IR192	AM241	
RB86	SN113	CS139	HG203	AM242M	

FTRANS.DAT

Food Element	Transfer Factor Dep Vel m/sec	Library - (RAP Leafy Veg 1.0E-2	Library - (RAP Root Veg 1.0E-2	Library - (RAP Fruit -- 3.0E-3	Library - (RAP Grain -- 3.0E-4	Library - (RAP Beef day/kg 4.0E-4	Library - (RAP Poultry day/kg 4.0E-3	Library - (RAP Milk day/L 2.0E-5	Library - (RAP Egg day/kg 2.0E-3	Leaching Factor
AC	1.0E-3	1.0E-2	1.0E-2	3.0E-3	3.0E-4	4.0E-4	4.0E-3	2.0E-5	2.0E-3	1.3E-03
AM	1.0E-3	2.0E-3	2.0E-3	2.0E-3	2.0E-4	2.0E-5	2.0E-4	3.0E-7	9.0E-3	1.3E-03
SB	1.0E-3	5.0E-2	5.0E-2	5.0E-2	5.0E-2	1.0E-3	6.0E-3	7.5E-4	7.0E-2	4.2E-02
AR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
BA	1.0E-3	4.0E-2	4.0E-2	4.0E-2	4.0E-3	5.0E-4	8.1E-4	4.8E-4	1.5E+0	9.5E-05
BE	1.0E-3	8.0E-3	8.0E-3	8.0E-3	3.3E-3	8.0E-4	4.0E-1	2.0E-6	2.0E-2	1.9E-04
BI	1.0E-3	6.0E-1	6.0E-1	6.0E-1	6.0E-1	1.7E-2	9.9E-4	5.0E-4	9.9E-4	2.7E-05
CD	1.0E-3	2.0E+0	2.0E+0	2.0E+0	6.0E-1	4.0E-4	8.4E-1	1.2E-4	1.0E-1	6.3E-04
CA	1.0E-3	2.0E+0	2.0E+0	2.0E+0	2.0E+0	1.6E-3	4.4E-2	8.0E-3	4.4E-1	1.9E-04
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0E-01
CS	1.0E-3	2.0E-2	2.0E-2	2.0E-2	1.0E-2	3.0E-2	4.4E+0	7.0E-3	4.9E-1	1.1E-03
CE	1.0E-3	4.0E-2	4.0E-2	4.0E-2	4.0E-3	2.0E-3	1.0E-2	4.0E-5	5.0E-3	5.0E-04
CL	1.0E-3	5.0E+1	5.0E+1	5.0E+1	1.0E+0	3.0E-2	3.0E-2	2.0E-2	9.9E-4	8.0E-01
CR	1.0E-3	4.0E-2	4.0E-2	4.0E-2	4.0E-3	9.0E-3	9.9E-4	1.0E-5	9.9E-4	4.7E-03
CO	1.0E-3	1.0E-1	1.0E-1	1.0E-1	4.0E-3	2.0E-2	5.0E-1	1.0E-4	1.0E-1	3.0E-02
CU	1.0E-3	5.0E-1	5.0E-1	5.0E-1	5.0E-2	9.0E-3	5.1E-1	2.0E-3	4.9E-1	2.9E-03
CM	1.0E-3	2.0E-3	2.0E-3	2.0E-3	2.0E-4	5.0E-3	4.0E-3	3.0E-7	2.0E-3	1.3E-04
EU	1.0E-3	1.0E-2	1.0E-2	1.0E-2	2.0E-3	6.0E-3	4.0E-3	2.0E-5	7.0E-3	5.0E-04
GD	1.0E-3	5.0E-2	5.0E-2	5.0E-2	5.0E-3	2.0E-3	9.9E-4	6.0E-5	9.9E-4	4.1E-04
GA	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-3	3.0E-4	9.9E-4	1.0E-5	9.9E-4	1.8E-04
AU	1.0E-3	4.0E-1	4.0E-1	4.0E-1	4.0E-2	5.0E-3	9.9E-4	1.0E-5	9.9E-4	1.1E-02
HF	1.0E-3	1.0E-2	1.0E-2	1.0E-2	2.0E-3	4.0E-4	9.9E-4	2.0E-5	9.9E-4	1.8E-04
HO	1.0E-3	1.0E-2	2.0E-2	1.0E-2	2.7E-3	5.0E-3	4.0E-3	2.5E-6	7.0E-3	4.1E-04
IN	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-3	4.0E-3	9.9E-4	2.0E-4	9.9E-4	1.8E-04
I	1.0E-2	4.0E-1	4.0E-1	4.0E-1	4.0E-1	2.0E-3	1.8E-2	1.2E-2	2.8E+0	0.8
IR	1.0E-3	1.0E-1	1.0E-1	1.0E-1	4.0E-3	2.0E-3	9.9E-4	2.0E-6	9.9E-4	1.8E-03
FE	1.0E-3	2.0E-2	2.0E-2	2.0E-2	5.0E-3	2.0E-2	1.5E+0	5.0E-5	1.3E+0	1.8E-02
KR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
LA	1.0E-3	1.0E-2	1.0E-2	1.0E-2	3.0E-4	5.0E-3	1.0E-1	2.5E-6	9.0E-3	4.1E-04
PB	1.0E-3	1.0E-1	1.0E-1	1.0E-1	1.0E-2	4.0E-4	9.9E-4	3.0E-5	9.9E-4	4.5E-04
MN	1.0E-3	7.0E-1	7.0E-1	7.0E-1	2.0E-1	5.0E-4	5.0E-2	3.0E-4	6.5E-2	1.1E-02
HG	1.0E-3	1.0E+0	1.0E+0	1.0E+0	1.0E-1	1.0E-1	1.1E-2	4.0E-4	9.9E-4	4.6E-04
MO	1.0E-3	1.0E+0	1.0E+0	1.0E+0	1.0E-1	1.2E-3	1.9E-1	1.7E-3	7.8E-1	0.8
ND	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-3	5.0E-3	4.0E-3	2.0E-5	2.0E-4	4.1E-04
NP	1.0E-3	1.0E+0	1.0E+0	1.0E+0	1.0E-1	1.0E-3	4.0E-3	1.0E-5	2.0E-3	3.3E-03
NI	1.0E-3	1.0E-1	1.0E-1	1.0E-1	5.0E-2	2.0E-3	1.0E-3	1.0E-3	1.0E-1	4.6E-03
NB	1.0E-3	4.0E-2	4.0E-2	4.0E-2	8.0E-3	2.6E-7	3.1E-4	4.1E-7	1.3E-3	2.7E-03
PD	1.0E-3	3.0E-1	3.0E-1	3.0E-1	5.0E-2	1.0E-3	3.0E-4	5.0E-3	4.0E-3	4.6E-03
P	1.0E-3	4.0E+0	4.0E+0	4.0E+0	4.0E+0	5.0E-2	1.9E-1	1.5E-2	1.0E+1	0.8
PU	1.0E-3	4.0E-4	4.0E-4	4.0E-4	4.0E-5	2.0E-6	1.5E-4	1.0E-7	8.0E-3	1.3E-03
PO	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-3	4.5E-3	9.9E-4	1.2E-4	9.9E-4	2.7E-05
K	1.0E-3	3.0E+0	3.0E+0	3.0E+0	3.0E+0	1.8E-2	9.9E-4	7.0E-3	9.9E-4	0.5
PR	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-3	5.0E-3	3.0E-2	2.5E-6	5.0E-3	5.0E-04
PM	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-3	5.0E-3	2.0E-3	2.5E-6	2.0E-2	5.0E-04
PA	1.0E-3	5.0E-2	5.0E-2	5.0E-2	2.0E-2	5.0E-3	4.0E-3	2.5E-6	2.0E-3	1.3E-03

FTRANS.DAT

RA	1.0E-3	1.0E-1	1.0E-1	1.0E-1	1.0E-2	9.0E-4	9.9E-4	2.0E-4	2.0E-5	5.9E-04
RH	1.0E-3	5.0E+1	5.0E+1	5.0E+1	5.0E+0	1.0E-3	3.0E-4	5.0E-3	4.0E-3	4.4E-03
RB	1.0E-3	3.0E-1	3.0E-1	3.0E-1	3.0E-1	1.0E-2	2.0E+0	1.0E-2	3.0E+0	4.4E-03
RU	1.0E-3	2.0E-1	2.0E-1	2.0E-1	2.0E-1	2.0E-3	7.0E-3	6.0E-7	6.0E-3	7.6E-04
SM	1.0E-3	1.0E-2	1.0E-2	1.0E-2	2.0E-3	5.0E-3	4.0E-3	2.0E-5	7.0E-3	4.1E-04
SC	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-2	6.0E-3	4.0E-3	2.5E-6	9.9E-4	2.7E-04
AG	1.0E-3	6.0E-1	6.0E-1	6.0E-1	6.0E-2	2.0E-3	9.9E-4	2.5E-2	9.9E-4	2.7E-01
SE	1.0E-3	5.0E-1	5.0E-1	5.0E-1	5.0E-2	1.0E+0	8.5E+0	2.3E-2	9.3E+0	1.7E-02
NA	1.0E-3	1.0E+1	1.0E+1	1.0E+1	1.0E+1	8.0E-2	1.0E-2	2.0E-2	2.0E-1	0.5
SR	1.0E-3	2.0E+0	2.0E+0	2.0E+0	2.0E-1	8.0E-4	3.5E-2	1.3E-3	3.0E-1	2.7E-03
S	1.0E-3	2.0E+0	2.0E+0	2.0E+0	2.0E+0	2.0E-1	9.9E-4	1.5E-2	9.9E-4	3.4E-02
TC	1.0E-3	4.0E+1	4.0E+1	4.0E+1	4.0E+1	9.9E-4	3.0E-2	3.0E-4	3.0E+0	0.8
TE	1.0E-3	5.0E+0	5.0E+0	5.0E+0	5.0E-1	7.0E-3	8.5E-2	4.5E-4	5.2E+0	0.8
TH	1.0E-3	4.0E-3	4.0E-3	4.0E-3	4.0E-4	5.0E-3	4.0E-3	2.5E-6	2.0E-3	5.3E-04
SN	1.0E-3	1.0E-1	1.0E-1	1.0E-1	1.0E-2	1.0E-2	9.9E-4	1.0E-3	9.9E-4	2.7E-03
W	1.0E-3	3.0E+0	3.0E+0	3.0E+0	3.0E-1	3.7E-2	9.9E-4	3.0E-4	9.9E-4	1.8E-03
U	1.0E-3	4.0E-3	4.0E-3	4.0E-3	2.0E-4	2.0E-4	1.2E+0	6.0E-4	9.9E-1	1.3E-03
XE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Y	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-3	1.0E-3	1.0E-2	5.0E-6	2.0E-3	5.0E-04
ZN	1.0E-3	2.0E+0	2.0E+0	2.0E+0	2.0E+0	1.0E-1	6.5E+0	1.0E-2	2.6E+0	2.8E-04
ZR	1.0E-3	4.0E-2	4.0E-2	4.0E-2	4.0E-2	1.2E-6	6.4E-5	5.5E-7	1.9E-4	5.3E-04
H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0E-01
N	1.0E-3	7.5E+0	7.5E+0	7.5E+0	7.5E+0	9.9E-4	9.9E-4	1.1E-2	9.9E-4	0.8
F	1.0E-2	2.0E-2	2.0E-2	2.0E-2	2.0E-2	2.0E-2	9.9E-4	7.0E-3	9.9E-4	0.8
AS	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-2	1.5E-3	8.3E-1	8.0E-5	9.9E-4	1.3E-03
BR	1.0E-2	7.6E-1	7.6E-1	7.6E-1	7.6E-1	2.0E-2	4.0E-3	2.0E-2	1.6E+0	1.1E-01
TB	1.0E-3	2.6E-3	2.6E-3	2.6E-3	2.6E-3	5.0E-3	4.0E-3	2.5E-6	7.0E-3	4.1E-04
RN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
CF	1.0E-3	2.5E-3	2.5E-3	2.5E-3	2.5E-3	5.0E-3	4.0E-3	7.5E-7	2.0E-3	4.1E-04
DY	1.0E-3	9.9E-4	9.9E-4	9.9E-4	9.9E-4	5.3E-3	9.9E-4	5.0E-6	9.9E-4	4.1E-04
MG	1.0E-3	9.9E-4	9.9E-4	9.9E-4	9.9E-4	1.8E-2	9.9E-4	9.9E-4	1.6E+0	1.9E-04
RE	1.0E-3	9.9E-4	9.9E-4	9.9E-4	9.9E-4	9.9E-4	9.9E-4	1.0E-3	9.9E-4	3.3E-02
TA	1.0E-3	9.9E-4	9.9E-4	9.9E-4	9.9E-4	9.9E-4	9.9E-4	3.0E-6	9.9E-4	4.1E-04
TL	1.0E-3	9.9E-4	9.9E-4	9.9E-4	9.9E-4	9.9E-4	9.9E-4	2.0E-3	9.9E-4	0.5
SI	1.0E-3	3.5E-1	3.5E-1	3.5E-1	3.5E-1	4.0E-5	9.9E-4	2.0E-5	9.9E-4	8.8E-03
ER	1.0E-3	1.0E-2	1.0E-2	1.0E-2	1.0E-2	4.0E-3	9.9E-4	2.0E-5	9.9E-4	4.1E-04

BIOAC1.DAT

Bioaccumulation Factor Library - (30-Aug-88) RAP									
Salt:	Fish	Crustacea	Molluscs	Plants	Fr:Fish	Crustacea	Molluscs	Plants	Cleanup
AC	30.0	1000.0	1000.0	1000.0	330.0	1000.0	1000.0	10000.0	.7
AM	2500.0	360.0	290.0	2900.0	100.0	100.0	100.0	3000.0	.7
SB	1000.0	100.0	1200.0	100.0	200.0	100.0	100.0	1000.0	.8
BA	10.0	1.0	20.0	100.0	200.0	200.0	200.0	500.0	.4
BE	1000.0	10000.0	10000.0	10000.0	10.0	50.0	50.0	200.0	.2
BI	15.0	1000.0	1000.0	10000.0	15.0	100000.0	100000.0	1500.0	.9
BK	50.0	500.0	20000.0	1.0	50.0	500.0	20000.0	1.0	
BR	10.0	10.0	10.0	10.0	420.0	330.0	330.0	50.0	
CD	2000.0	5000.0	10000.0	1000.0	200.0	10000.0	10000.0	500.0	.6
CA	2.0	5.0	1.0	50.0	200.0	2000.0	2000.0	1000.0	.2
CF	50.0	500.0	2000.0	5000.0	25.0	1000.0	1000.0	5000.0	
C	20000.0	20000.0	20000.0	1800.0	9000.0	9000.0	9000.0	4500.0	1.0
CE	100.0	500.0	500.0	5000.0	500.0	1000.0	1000.0	4000.0	.2
CS	100.0	30.0	30.0	700.0	15000.0	500.0	500.0	1000.0	.9
CL	1.0	1.0	1.0	1.0	50.0	50.0	50.0	50.0	1.0
CR	600.0	500.0	1140.0	4000.0	20.0	2000.0	2000.0	4000.0	
CO	100.0	2000.0	3000.0	400.0	330.0	2000.0	2000.0	1000.0	.2
CU	1000.0	5000.0	5000.0	1000.0	2500.0	400.0	400.0	2000.0	
CM	2500.0	460.0	460.0	43000.0	30.0	1000.0	1000.0	10000.0	.7
DY	500.0	1000.0	5000.0	1.0	25.0	1000.0	5000.0	1.0	
EU	300.0	1000.0	7000.0	5000.0	300.0	3000.0	3000.0	5000.0	.2
GD	500.0	2000.0	5000.0	1.0	500.0	2000.0	5000.0	1.0	
HF	40.0	1000.0	3000.0	1.0	40.0	1000.0	3000.0	1.0	
HO	300.0	1000.0	1000.0	5000.0	300.0	3000.0	3000.0	5000.0	.2
H	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
IN	1000.0	10000.0	10000.0	1.0	1000.0	10000.0	10000.0	1.0	
I	10.0	50.0	50.0	1500.0	50.0	100.0	100.0	300.0	.8
IR	20.0	100.0	100.0	100.0	50.0	200.0	200.0	200.0	
FE	3000.0	5000.0	30000.0	50000.0	2000.0	100.0	100.0	1000.0	.2
KR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
PB	200.0	1000.0	1000.0	50000.0	2000.0	500.0	500.0	2000.0	.9
MN	400.0	800.0	6000.0	10000.0	400.0	100000.0	100000.0	10000.0	.5
HG	20000.0	20000.0	10000.0	34000.0	20000.0	20000.0	20000.0	34000.0	
MO	40.0	20.0	20.0	100.0	10.0	100.0	100.0	1000.0	.9
NP	2500.0	10.0	150.0	6.0	2500.0	30.0	30.0	300.0	.7
NI	100.0	500.0	500.0	3000.0	100.0	500.0	500.0	500.0	.2
NB	100.0	50.0	50.0	500.0	100.0	50.0	50.0	500.0	.7
PD	50.0	300.0	300.0	20000.0	50.0	2000.0	2000.0	2000.0	.5
P	28000.0	38000.0	45000.0	100000.0	66700.0	100000.0	100000.0	500000.0	.4
PU	1000.0	300.0	3000.0	3600.0	250.0	100.0	100.0	890.0	.7
PO	2000.0	50000.0	10000.0	1000.0	50.0	20000.0	20000.0	2000.0	.8
PR	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2
PM	500.0	1000.0	5000.0	3000.0	300.0	3000.0	3000.0	5000.0	.2
PA	300.0	10.0	10.0	50.0	30.0	30.0	30.0	300.0	.7
RA	950.0	100.0	100.0	1000.0	50.0	1000.0	1000.0	30000.0	.7
RB	500.0	200.0	200.0	1000.0	2000.0	1000.0	1000.0	1000.0	.9

BIOAC1.DAT

RU	10.0	100.0	2000.0	1000.0	100.0	300.0	300.0	2000.0	.5
SM	500.0	1000.0	5000.0	5000.0	300.0	3000.0	3000.0	5000.0	.2
SC	750.0	300.0	100000.0	1000.0	100.0	1000.0	1000.0	10000.0	.3
SE	6000.0	5000.0	6000.0	1000.0	1000.0	2000.0	2000.0	100.0	.8
AG	300.0	350.0	580.0	1000.0	100.0	200.0	200.0	1000.0	.7
NA	1.0	0.1	0.3	1.0	70.0	100.0	100.0	100.0	.9
SR	4.0	1.0	40.0	300.0	50.0	100.0	100.0	3000.0	.2
S	2.0	1.0	4.0	5.0	750.0	100.0	100.0	1.0	
TA	60.0	3000.0	3000.0	1.0	60.0	3000.0	3000.0	1.0	
TC	30.0	10.0	20.0	5000.0	15.0	100.0	100.0	5000.0	.7
TE	1000.0	1000.0	1000.0	400.0	400.0	6100.0	6100.0	100.0	.8
TB	60.0	1000.0	3000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2
TH	600.0	1000.0	1000.0	2000.0	100.0	100.0	100.0	3000.0	.7
TL	5000.0	1000.0	5000.0	1.0	5000.0	1000.0	5000.0	1.0	
TM	500.0	1000.0	5000.0	1.0	500.0	1000.0	5000.0	1.0	
SN	50000.0	50000.0	50000.0	50000.0	1000.0	10000.0	10000.0	50000.0	.7
W	10.0	10.0	100.0	100.0	1200.0	10.0	10.0	1200.0	
U	50.0	10.0	30.0	1000.0	50.0	100.0	100.0	900.0	.7
XE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Y	20.0	1000.0	1000.0	300.0	25.0	1000.0	1000.0	5000.0	.2
YB	200.0	1000.0	3000.0	1.0	200.0	1000.0	3000.0	1.0	
ZN	1000.0	50000.0	30000.0	50000.0	2500.0	10000.0	10000.0	20000.0	.4
ZR	50.0	50.0	50.0	5000.0	200.0	50.0	50.0	5000.0	.7
N	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F	4.0	4.0	4.0	1.0	10.0	100.0	100.0	2.0	.8
AR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.0
AS	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	.7
RH	10.0	100.0	100.0	100.0	10.0	300.0	300.0	200.0	.5
LA	30.0	100.0	100.0	300.0	25.0	1000.0	1000.0	5000.0	.2
ND	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2
RN	1.0	1.0	1.0	1.0	57.0	1.0	1.0	1.0	.0
SI	50000.0	50000.0	50000.0	50000.0	1000.0	10000.0	10000.0	50000.0	.7
GA	1000.0	10000.0	10000.0	1.0	1000.0	10000.0	10000.0	1.0	
ER	100.0	500.0	500.0	5000.0	500.0	1000.0	1000.0	4000.0	.2

GRDF.DAT

External Dose Factors for GENII in person Sv/yr per Bq/n (28-Aug-88 RAP)

	Air	Water	Soil	Buried	Buried	Buried
	Submersion	Surface	Surface	0.15 m	0.5 m	1.0m
n	m3	L	"m3"	m3	m3	m3
H 3	1.95E-16	2.86E-16	1.04E-20	0.00E+00	0.00E+00	0.00E+00
BE10	4.21E-10	5.88E-10	1.30E-13	1.66E-15	1.95E-18	5.66E-22
C 14	1.41E-11	2.02E-11	2.23E-15	8.89E-19	3.86E-24	3.56E-31
N 13	1.93E-06	2.66E-06	1.03E-09	9.53E-11	5.30E-13	3.72E-16
F 18	1.87E-06	2.58E-06	1.00E-09	9.23E-11	5.13E-13	3.60E-16
NA22	3.89E-06	4.99E-06	2.11E-09	2.77E-10	4.59E-12	2.07E-14
NA24	8.08E-06	1.00E-05	4.07E-09	1.07E-09	6.29E-11	1.54E-12
SI31	6.17E-09	8.26E-09	2.89E-12	2.32E-13	3.40E-15	1.51E-17
P 32	6.32E-09	8.71E-09	2.89E-12	1.56E-13	9.86E-16	2.03E-18
P 33	4.90E-11	6.96E-11	1.01E-14	2.12E-17	5.55E-22	3.34E-28
S 35	1.63E-11	2.34E-11	2.67E-15	1.31E-18	7.67E-24	1.82E-30
CL36	7.52E-10	1.05E-09	2.57E-13	5.16E-15	1.09E-17	4.80E-21
K 40	2.86E-07	3.87E-07	1.53E-10	2.87E-11	8.40E-13	6.53E-15
AR39	4.22E-10	5.89E-10	1.31E-13	1.71E-15	2.11E-18	6.34E-22
AR41	2.14E-06	2.58E-06	1.17E-09	1.90E-10	4.09E-12	2.03E-14
CA41	2.65E-10	3.89E-10	1.41E-14	0.00E+00	0.00E+00	0.00E+00
CA45	5.11E-11	7.26E-11	1.07E-14	2.40E-17	6.49E-22	5.39E-28
SC46	3.62E-06	4.42E-06	1.96E-09	2.83E-10	5.10E-12	2.22E-14
CR51	6.43E-08	8.84E-08	3.47E-11	2.43E-12	7.66E-15	2.43E-18
MN54	1.46E-06	1.82E-06	7.85E-10	9.20E-11	9.88E-13	1.78E-15
MN56	3.22E-06	3.93E-06	1.69E-09	3.27E-10	1.34E-11	2.36E-13
FE55	6.07E-10	8.90E-10	3.23E-14	0.00E+00	0.00E+00	0.00E+00
FE59	1.92E-06	2.32E-06	1.08E-09	1.73E-10	3.53E-12	1.62E-14
CO57	1.79E-07	2.45E-07	7.48E-11	7.80E-13	7.38E-16	6.00E-19
CO58	1.77E-06	2.25E-06	9.50E-10	1.08E-10	1.13E-12	2.47E-15
CO60	4.31E-06	5.19E-06	2.35E-09	3.83E-10	8.23E-12	4.08E-14
NI59	7.37E-10	1.08E-09	3.92E-14	0.00E+00	0.00E+00	0.00E+00
NI63	6.50E-13	9.47E-13	5.65E-17	6.96E-24	4.40E-34	0.00E+00
NI65	1.02E-06	1.32E-06	5.46E-10	9.62E-11	2.57E-12	1.84E-14
CU64	3.57E-07	4.91E-07	1.91E-10	1.80E-11	1.15E-13	1.67E-16
ZN65	1.12E-06	1.36E-06	6.12E-10	9.85E-11	2.10E-12	1.04E-14
ZN69M	9.18E-07	1.27E-06	4.91E-10	4.53E-11	2.52E-13	1.77E-16
ZN69	1.34E-09	1.86E-09	4.98E-13	1.45E-14	4.53E-17	2.56E-20
GA72	5.10E-06	6.31E-06	2.67E-09	5.28E-10	2.35E-11	4.72E-13
AS76	8.60E-07	1.21E-06	4.83E-10	5.68E-11	9.34E-13	8.54E-15
SE75	6.05E-07	8.29E-07	2.90E-10	1.17E-11	3.47E-14	2.17E-17
SE79	1.05E-11	1.50E-11	1.59E-15	5.17E-19	2.03E-24	1.33E-31
BR82	4.81E-06	6.39E-06	2.67E-09	3.36E-10	5.07E-12	2.30E-14
BR83	1.49E-08	2.06E-08	7.77E-12	6.85E-13	3.77E-15	2.64E-18
KRB3M	5.16E-10	7.57E-10	2.90E-14	8.11E-26	0.00E+00	0.00E+00
BR84	3.30E-06	3.97E-06	1.71E-09	4.29E-10	2.87E-11	1.01E-12
KR85M	2.30E-07	3.15E-07	1.08E-10	4.00E-12	1.10E-14	3.54E-18
KR85	4.84E-09	6.69E-09	2.46E-12	2.11E-13	1.16E-15	8.12E-19
KR87	1.66E-06	2.08E-06	8.53E-10	1.72E-10	8.65E-12	2.07E-13

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RB87	5.51E-11	7.81E-11	1.19E-14	3.08E-17	1.02E-21	5.93E-27
KR88	3.63E-06	4.43E-06	1.86E-09	4.44E-10	2.24E-11	4.21E-13
RB88	1.32E-06	1.61E-06	6.86E-10	1.57E-10	7.82E-12	1.60E-13
KR89	3.45E-06	4.34E-06	1.82E-09	3.89E-10	2.20E-11	7.06E-13
RB89	3.73E-06	4.53E-06	2.02E-09	4.04E-10	1.64E-11	3.14E-13
SR89	4.77E-09	6.55E-09	2.09E-12	1.14E-13	9.39E-16	2.67E-18
SR87M	5.34E-07	7.34E-07	2.90E-10	2.03E-11	6.41E-14	2.03E-17
R886	1.59E-07	1.93E-07	9.13E-11	1.41E-11	2.72E-13	1.15E-15
SR85	9.62E-07	1.33E-06	5.14E-10	4.74E-11	2.64E-13	1.85E-16
SR90	3.51E-10	4.90E-10	1.06E-13	1.28E-15	1.41E-18	3.85E-22
Y 90	1.27E-08	1.74E-08	5.92E-12	3.83E-13	3.52E-15	1.31E-17
SR91	1.17E-06	1.53E-06	6.67E-10	8.95E-11	1.48E-12	6.34E-15
Y 91M	1.10E-06	1.63E-06	6.29E-10	5.96E-11	3.79E-13	3.25E-16
Y 91	1.13E-08	1.45E-08	5.64E-12	6.76E-13	1.29E-14	6.21E-17
SR92	2.57E-06	3.45E-06	1.38E-09	2.55E-10	7.32E-12	5.62E-14
Y 92	5.09E-07	6.51E-07	2.83E-10	4.41E-11	9.95E-13	6.77E-15
Y 93	1.82E-07	2.33E-07	9.59E-11	1.62E-11	5.91E-13	8.29E-15
M093	1.42E-09	2.08E-09	7.54E-14	0.00E+00	0.00E+00	0.00E+00
ZR93	4.83E-13	7.06E-13	3.97E-17	1.35E-24	3.32E-35	0.00E+00
NB93M	2.94E-10	4.31E-10	1.56E-14	0.00E+00	0.00E+00	0.00E+00
ZR95	1.31E-06	1.76E-06	7.23E-10	7.83E-11	7.21E-13	1.14E-15
NB95M	1.01E-07	1.39E-07	4.91E-11	1.59E-12	9.96E-16	5.06E-20
NB95	1.46E-06	1.82E-06	7.84E-10	9.19E-11	9.86E-13	1.78E-15
ZR97	3.41E-07	4.42E-07	1.84E-10	2.64E-11	5.97E-13	4.79E-15
NB97M	1.13E-06	1.68E-06	6.48E-10	6.14E-11	3.90E-13	3.35E-16
NB97	1.17E-06	1.72E-06	6.69E-10	6.44E-11	4.45E-13	5.89E-16
NB94	2.62E-06	3.54E-06	1.45E-09	1.55E-10	1.39E-12	2.13E-15
M099	2.48E-07	3.49E-07	1.36E-10	1.29E-11	9.88E-14	1.27E-16
TC99M	1.63E-07	2.22E-07	6.81E-11	6.18E-13	2.28E-17	1.45E-23
TC99	6.61E-11	9.35E-11	1.50E-14	4.52E-17	2.44E-21	3.90E-26
TC101	6.97E-07	9.62E-07	3.78E-10	2.77E-11	1.06E-13	6.61E-17
RU103	9.40E-07	1.30E-06	5.05E-10	4.67E-11	2.63E-13	1.88E-16
PD103	1.12E-08	1.64E-08	9.37E-13	7.62E-15	2.40E-17	7.62E-21
RH103M	1.32E-09	1.93E-09	9.91E-14	1.13E-25	0.00E+00	0.00E+00
RU105	1.40E-06	2.00E-06	7.75E-10	7.20E-11	5.21E-13	8.48E-16
RH105	1.59E-07	2.19E-07	8.63E-11	6.03E-12	1.90E-14	6.01E-18
RU106	4.15E-07	5.77E-07	2.27E-10	2.36E-11	2.50E-13	1.05E-15
PD107	2.20E-14	3.23E-14	1.24E-18	0.00E+00	0.00E+00	0.00E+00
PD109	1.14E-08	1.64E-08	2.89E-12	8.98E-14	4.36E-16	3.00E-19
AG110M	4.91E-06	6.60E-06	2.71E-09	3.54E-10	6.00E-12	3.29E-14
AG111	5.07E-08	6.97E-08	2.70E-11	1.78E-12	5.55E-15	1.89E-18
CD109	1.04E-08	1.52E-08	7.81E-13	0.00E+00	0.00E+00	0.00E+00
CD113M	4.10E-10	5.72E-10	1.28E-13	1.76E-15	2.39E-18	7.80E-22
CD115M	4.47E-08	5.51E-08	2.47E-11	3.61E-12	6.96E-14	3.09E-16
CD115	3.78E-07	5.22E-07	2.01E-10	1.82E-11	1.00E-13	7.02E-17
IN115M	3.09E-07	4.25E-07	1.65E-10	1.16E-11	3.65E-14	1.16E-17
IN111	5.53E-07	7.57E-07	2.53E-10	6.56E-12	3.66E-15	1.16E-19
IN114M	2.07E-07	3.01E-07	1.10E-10	9.35E-12	6.46E-14	9.08E-17

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SN113	1.93E-08	2.75E-08	4.63E-12	1.23E-13	7.86E-17	5.71E-21
IN113M	4.25E-07	5.85E-07	2.29E-10	1.60E-11	5.06E-14	1.60E-17
SN117M	1.72E-07	2.36E-07	6.85E-11	6.14E-13	2.26E-17	1.44E-23
SN119M	7.15E-09	1.05E-08	5.36E-13	6.42E-19	4.76E-27	2.11E-38
SN121M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN121	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN123	1.48E-08	1.85E-08	7.98E-12	1.08E-12	2.00E-14	8.35E-17
I 125	2.78E-08	4.05E-08	2.84E-12	5.10E-23	0.00E+00	0.00E+00
SN125	5.49E-07	6.72E-07	3.05E-10	5.06E-11	1.40E-12	1.66E-14
SB125	8.41E-07	1.20E-06	4.60E-10	4.23E-11	2.51E-13	1.98E-16
TE125M	2.39E-08	3.46E-08	2.62E-12	1.96E-15	7.23E-20	4.61E-26
SN126	4.62E-08	6.54E-08	1.55E-11	3.53E-14	7.97E-20	1.31E-27
SB126M	2.90E-06	4.20E-06	1.63E-09	1.56E-10	1.06E-12	1.43E-15
SB126	4.88E-06	7.02E-06	2.75E-09	2.71E-10	2.06E-12	3.55E-15
SB122	8.97E-07	1.32E-06	5.12E-10	4.97E-11	3.62E-13	5.77E-16
S8124	3.58E-06	4.73E-06	1.92E-09	3.09E-10	8.87E-12	9.60E-14
SB127	1.20E-06	1.68E-06	6.62E-10	6.43E-11	4.80E-13	7.04E-16
TE127M	7.52E-09	1.09E-08	8.46E-13	7.22E-15	4.51E-17	3.86E-20
TE127	1.13E-08	1.56E-08	5.89E-12	5.10E-13	2.73E-15	1.88E-18
TE123M	1.63E-07	2.23E-07	6.52E-11	5.83E-13	2.15E-17	1.37E-23
TE129M	5.88E-08	8.69E-08	3.10E-11	2.84E-12	1.80E-14	1.57E-17
TE129	1.11E-07	1.52E-07	5.82E-11	5.62E-12	4.73E-14	1.16E-16
I 129	1.55E-08	2.25E-08	1.65E-12	5.72E-19	2.27E-24	1.51E-31
TE131M	2.61E-06	3.29E-06	1.41E-09	1.87E-10	3.61E-12	3.12E-14
TE131	7.33E-07	9.73E-07	3.87E-10	4.14E-11	5.92E-13	2.39E-15
I 131	6.68E-07	9.31E-07	3.64E-10	2.65E-11	1.02E-13	5.26E-17
XE131M	1.39E-08	1.99E-08	2.51E-12	1.36E-14	5.01E-19	3.19E-25
TE132	3.75E-07	5.15E-07	1.76E-10	5.58E-12	3.40E-15	1.09E-19
I 132	4.16E-06	5.59E-06	2.30E-09	2.82E-10	4.38E-12	2.98E-14
TE133M	4.08E-06	5.14E-06	2.27E-09	3.38E-10	7.71E-12	6.88E-14
TE133	1.79E-06	2.33E-06	9.74E-10	1.24E-10	2.48E-12	2.20E-14
I 133	1.09E-06	1.48E-06	5.88E-10	5.93E-11	5.07E-13	1.28E-15
XE133M	5.17E-08	7.17E-08	2.11E-11	6.50E-13	3.98E-16	1.27E-20
XE133	4.28E-08	6.06E-08	1.31E-11	2.84E-14	9.68E-20	4.29E-25
TE134	1.58E-06	2.16E-06	8.45E-10	7.85E-11	6.37E-13	1.05E-15
I 134	4.67E-06	5.91E-06	2.52E-09	3.41E-10	6.46E-12	5.18E-14
CS134M	3.37E-08	4.66E-08	1.14E-11	8.95E-14	3.30E-18	2.10E-24
CS134	2.93E-06	3.99E-06	1.62E-09	1.77E-10	1.76E-12	4.46E-15
I 130	3.74E-06	5.33E-06	2.09E-09	2.07E-10	1.69E-12	3.85E-15
I 135	2.89E-06	3.56E-06	1.55E-09	2.70E-10	7.49E-12	6.89E-14
XE135M	7.86E-07	1.09E-06	4.19E-10	3.87E-11	2.15E-13	1.51E-16
XE135	4.02E-07	5.55E-07	1.99E-10	7.86E-12	1.70E-14	1.15E-17
CS135	2.36E-11	3.36E-11	4.32E-15	4.52E-18	7.93E-23	4.31E-29
XE137	4.34E-07	5.87E-07	2.29E-10	2.64E-11	5.43E-13	1.17E-14
CS137	9.84E-07	1.46E-06	5.63E-10	5.33E-11	3.39E-13	2.91E-16
XE138	2.21E-06	2.73E-06	1.13E-09	2.30E-10	1.00E-11	1.66E-13
CS138	4.49E-06	5.78E-06	2.38E-09	4.65E-10	1.80E-11	3.03E-13
CS139	5.98E-07	7.48E-07	3.15E-10	6.25E-11	2.57E-12	5.04E-14

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BA139	5.45E-08	7.39E-08	2.42E-11	1.43E-12	2.96E-14	2.05E-16
BA140	3.45E-07	4.76E-07	1.82E-10	1.59E-11	8.55E-14	5.87E-17
LA140	4.05E-06	5.37E-06	2.17E-09	3.64E-10	1.02E-11	1.05E-13
CS136	3.72E-06	4.62E-06	2.05E-09	2.70E-10	4.30E-12	1.62E-14
BA141	1.55E-06	2.06E-06	8.26E-10	9.76E-11	1.97E-12	1.76E-14
LA141	9.77E-08	1.30E-07	5.10E-11	8.96E-12	2.62E-13	2.13E-15
CE141	9.44E-08	1.29E-07	3.80E-11	3.36E-13	1.31E-17	2.24E-22
BA142	1.58E-06	1.98E-06	8.65E-10	1.20E-10	2.23E-12	1.05E-14
LA142	5.20E-06	6.40E-06	2.69E-09	6.63E-10	4.06E-11	1.21E-12
CE143	4.05E-07	5.68E-07	2.04E-10	1.36E-11	8.07E-14	1.36E-16
PR143	1.34E-09	1.86E-09	5.01E-13	1.45E-14	4.48E-17	2.56E-20
CE144	2.42E-08	3.32E-08	9.24E-12	7.61E-14	2.77E-18	1.87E-24
PR144M	1.03E-08	1.46E-08	1.59E-12	1.70E-19	3.96E-30	0.00E+00
PR144	8.01E-08	1.06E-07	4.16E-11	6.99E-12	2.79E-13	4.73E-15
PR142	1.08E-07	1.47E-07	5.74E-11	1.02E-11	2.94E-13	2.27E-15
ND147	2.19E-07	3.04E-07	1.09E-10	8.51E-12	4.57E-14	3.19E-17
PM147	3.67E-11	5.19E-11	8.15E-15	2.83E-17	9.20E-22	5.75E-28
SM147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM148M	3.75E-06	5.35E-06	2.14E-09	2.24E-10	2.18E-12	5.76E-15
PM148	1.09E-06	1.48E-06	6.03E-10	9.44E-11	2.22E-12	1.53E-14
PM149	1.92E-08	2.65E-08	9.53E-12	5.01E-13	2.41E-15	2.91E-18
PM151	5.84E-07	8.07E-07	3.05E-10	2.31E-11	1.35E-13	1.72E-16
SM151	8.04E-12	1.18E-11	5.78E-16	1.25E-22	5.74E-31	0.00E+00
SM153	8.38E-08	1.16E-07	2.88E-11	3.35E-13	7.53E-16	5.21E-19
EU152M	5.53E-07	6.89E-07	3.01E-10	4.07E-11	6.76E-13	2.75E-15
EU152	2.07E-06	2.66E-06	1.12E-09	1.63E-10	3.47E-12	2.05E-14
EU154	2.12E-06	2.69E-06	1.16E-09	1.63E-10	3.00E-12	1.40E-14
EU155	7.19E-08	9.96E-08	2.68E-11	1.67E-13	5.34E-18	3.37E-24
EU156	2.48E-06	3.05E-06	1.33E-09	2.55E-10	9.49E-12	1.42E-13
GD153	1.22E-07	1.70E-07	3.82E-11	2.10E-13	6.15E-18	3.66E-24
GD159	6.62E-08	9.13E-08	3.32E-11	2.19E-12	6.89E-15	2.20E-18
TB160	1.84E-06	2.27E-06	1.01E-09	1.41E-10	2.55E-12	1.09E-14
TB161	2.01E-08	2.84E-08	4.43E-12	2.85E-15	7.97E-19	2.08E-22
DY165	4.08E-08	5.87E-08	2.06E-11	1.56E-12	8.87E-15	7.19E-18
HO166M	2.69E-06	3.62E-06	1.45E-09	1.45E-10	1.38E-12	3.01E-15
HO166	5.08E-08	6.85E-08	2.43E-11	3.73E-12	1.06E-13	8.42E-16
ER169	1.04E-10	1.47E-10	2.54E-14	1.15E-16	1.59E-20	4.17E-25
ER171	6.63E-07	9.08E-07	3.39E-10	2.08E-11	8.50E-14	1.19E-16
TA182	2.28E-06	2.78E-06	1.23E-09	1.90E-10	4.05E-12	2.01E-14
W 181	3.30E-08	4.61E-08	8.23E-12	1.51E-15	3.58E-20	2.28E-26
W 185	2.14E-10	3.00E-10	6.37E-14	4.86E-16	1.55E-19	2.25E-23
W 187	8.43E-07	1.20E-06	4.62E-10	4.30E-11	2.83E-13	2.79E-16
RE187	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OS185	1.20E-06	1.74E-06	6.69E-10	6.43E-11	4.56E-13	5.05E-16
OS191	7.98E-08	1.10E-07	2.94E-11	1.83E-13	6.62E-18	4.22E-24
IR192	1.60E-06	2.22E-06	8.60E-10	6.68E-11	3.05E-13	1.95E-16
HG203	3.19E-07	4.37E-07	1.54E-10	4.89E-12	2.99E-15	9.56E-20
TH230	5.11E-10	7.22E-10	1.22E-13	4.90E-16	1.76E-20	1.12E-26

GRDF.DAT

RA226	6.55E-09	8.94E-09	2.72E-12	2.50E-14	6.04E-18	1.65E-21
RN222	3.28E-06	4.23E-06	1.75E-09	2.83E-10	8.70E-12	1.11E-13
PB210	2.16E-09	3.08E-09	3.10E-13	1.31E-20	1.12E-35	0.00E+00
BI210	2.13E-09	2.95E-09	8.49E-13	3.15E-14	1.21E-16	9.31E-20
PO210	1.55E-11	1.93E-11	8.31E-15	9.75E-16	1.05E-17	1.89E-20
U 232	4.89E-10	6.96E-10	9.26E-14	5.06E-16	1.86E-20	1.19E-26
TH232	3.49E-10	4.97E-10	6.35E-14	2.92E-16	1.07E-20	6.84E-27
RA228	5.40E-14	7.92E-14	3.23E-18	9.00E-31	0.00E+00	0.00E+00
AC228	1.70E-06	2.13E-06	9.50E-10	1.40E-10	2.84E-12	1.58E-14
TH228	2.51E-09	3.49E-09	1.01E-12	1.77E-14	9.30E-18	2.96E-22
RA224	1.72E-08	2.36E-08	8.41E-12	3.05E-13	4.70E-16	2.48E-19
PB212	2.26E-07	3.10E-07	1.08E-10	3.68E-12	4.38E-15	8.97E-19
BI212	2.79E-06	3.48E-06	1.42E-09	3.39E-10	2.05E-11	5.35E-13
U 234	3.56E-10	5.11E-10	5.62E-14	2.78E-16	1.02E-20	6.52E-27
U 236	2.75E-10	3.99E-10	2.92E-14	3.56E-18	2.64E-26	1.24E-37
U 235	1.67E-07	2.28E-07	7.12E-11	8.96E-13	2.43E-16	7.19E-21
TH231	1.43E-08	2.02E-08	4.37E-12	1.82E-14	3.88E-19	2.61E-25
PA231	5.54E-08	7.63E-08	2.78E-11	1.68E-12	4.93E-15	1.54E-18
AC227	2.05E-10	2.82E-10	7.65E-14	6.81E-16	2.51E-20	1.60E-26
TH227	1.68E-07	2.30E-07	8.18E-11	3.42E-12	6.46E-15	1.76E-18
FR223	6.96E-08	9.55E-08	2.91E-11	1.40E-12	7.83E-15	9.46E-18
RA223	4.88E-07	6.65E-07	2.48E-10	1.66E-11	8.84E-14	9.54E-17
U 237	2.08E-07	2.85E-07	9.08E-11	2.09E-12	1.94E-15	3.57E-19
NP237	2.45E-08	3.44E-08	8.75E-12	5.14E-14	7.12E-18	1.99E-22
PA233	3.98E-07	5.47E-07	2.10E-10	1.37E-11	4.46E-14	1.58E-17
U 233	4.17E-10	5.77E-10	1.44E-13	1.26E-15	4.65E-20	2.96E-26
TH229	1.01E-07	1.39E-07	4.10E-11	4.33E-13	1.38E-16	4.22E-21
RA225	1.30E-08	1.83E-08	2.20E-12	8.50E-17	1.11E-20	3.08E-25
AC225	4.49E-07	6.15E-07	2.34E-10	2.27E-11	2.76E-13	1.48E-15
U 238	2.43E-10	3.53E-10	2.56E-14	3.11E-18	2.31E-26	1.04E-37
TH234	3.87E-08	5.01E-08	1.94E-11	2.05E-12	3.45E-14	1.39E-16
PA234	3.44E-06	4.45E-06	1.89E-09	2.46E-10	4.38E-12	2.53E-14
PU236	3.25E-10	4.74E-10	2.81E-14	2.64E-18	1.96E-26	8.65E-38
PU237	6.98E-08	9.55E-08	2.85E-11	2.33E-13	7.94E-18	4.95E-24
AM242M	1.03E-09	1.48E-09	1.74E-13	1.14E-15	4.21E-20	2.69E-26
AM242	2.03E-08	2.78E-08	8.18E-12	6.85E-14	5.63E-18	1.29E-21
CM242	2.67E-10	3.90E-10	1.76E-14	7.11E-20	1.87E-30	0.00E+00
PU242	2.18E-10	3.18E-10	1.55E-14	8.15E-20	2.14E-30	0.00E+00
NP238	9.55E-07	1.15E-06	5.52E-10	8.65E-11	1.67E-12	7.04E-15
PU238	2.72E-10	3.97E-10	1.87E-14	8.71E-20	2.29E-30	0.00E+00
CM244	2.35E-10	3.44E-10	1.51E-14	5.23E-20	1.38E-30	0.00E+00
PU244	1.82E-10	2.66E-10	1.10E-14	9.13E-23	0.00E+00	0.00E+00
U 240	6.45E-07	9.10E-07	3.62E-10	4.10E-11	5.41E-13	2.55E-15
PU240	2.62E-10	3.83E-10	1.86E-14	9.66E-20	2.54E-30	0.00E+00
CM245	9.58E-08	1.31E-07	3.95E-11	3.35E-13	1.17E-17	7.32E-24
PU241	6.50E-16	9.54E-16	3.46E-20	0.00E+00	0.00E+00	0.00E+00
AM241	1.87E-08	2.63E-08	4.24E-12	7.18E-17	4.44E-26	1.97E-37
CM246	2.09E-10	3.05E-10	1.24E-14	8.91E-23	0.00E+00	0.00E+00

GRDF.DAT

CM247	7.37E-07	1.02E-06	3.92E-10	3.52E-11	1.93E-13	1.35E-16
CM243	1.92E-07	2.62E-07	8.75E-11	2.07E-12	1.12E-15	3.55E-20
PU243	2.40E-08	3.36E-08	9.85E-12	1.92E-13	5.34E-16	1.69E-19
AM243	4.72E-08	6.55E-08	1.56E-11	1.82E-14	1.77E-19	1.11E-25
NP239	2.62E-07	3.58E-07	1.20E-10	3.17E-12	3.97E-15	9.31E-19
PU239	1.82E-10	2.58E-10	4.14E-14	3.30E-16	1.22E-20	7.75E-27
CM248	1.69E-10	2.47E-10	1.13E-14	4.83E-20	1.27E-30	0.00E+00
CF252	1.71E-10	2.50E-10	1.26E-14	8.61E-19	6.39E-27	2.83E-38

DOSSUM.DAT

GENII text file for report 29-Sep-87 RAP

	1	2	3	4	5	6	7	
	12345678901	23456789012	34567890123	45678901234	56789012345	67890123456	7890123456	
1	Dose Commitment Year							
2		1	2	3	...			
3								
4	Internal	:						
5	Intake	:						
6	Year:	3		$x.xE+xx$	...			
7				+				
8		2	$x.xE+xx$	$x.xE+xx$	...		Internal	
9			+	+			Effective	
10		1	$x.xE+xx$	+	$x.xE+xx$	+	$x.xE+xx$	Dose
11			=				Equivalent	
12								
13	Internal						Cumulative	
14	Annual		$x.xE+xx$	+	$x.xE+xx$	+	$x.xE+xx$	Internal
15	Dose		=				Dose	
16			+	+	+	+		
17	External							
18	Annual		$x.xE+xx$	$x.xE+xx$	$x.xE+xx$	...		
19	Dose							
20								
21	Annual						Cumulative	
22	Dose		$x.xE+xx$	+	$x.xE+xx$	+	$x.xE+xx$	Dose
23			=					
24							Maximum	
25						$x.xE+xx$	Annual	
26							Dose Occurred	
27							In Year	
28								
29								
	1	2	3	4	5	6	7	
	12345678901	23456789012	34567890123	45678901234	56789012345	67890123456	7890123456	

ENERGY.DAT

DLC-80/DRALIST (Kocher's Format) Decay Data (29-Aug-88 RAP)

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BE-10 1.6E6 Y 4.
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5.5580E-01 2.0250E-01 1.0000E+00
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C -14 5.73E3 Y 6.
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N -13 9.97 M 7.
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1.1985E+00 4.9180E-01 9.9804E-01
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2.6000E-04 1.8563E-03
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2.7700E-04 3.7200E-06 5.1100E-01 1.9961E+00
F -18 109.74 M 9.
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5.2000E-04 3.0691E-02
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5.2490E-04 1.7905E-04 5.1100E-01 1.9346E+00
NA-22 2.602 Y 11.
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5.4552E-01 2.1554E-01 8.9840E-01 2.8421E+00 8.3480E-01 6.0000E-04
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8.2000E-04 9.2004E-02
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ENERGY.DAT

8.4860E-04 1.2495E-03 1.2745E+00 9.9940E-01 5.1100E-01 1.7980E+00
NA-24 15.00 H 11.

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SI-31 157.3 M 14.

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P -33 25.4 D 15.

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S -35 87.44 D 16.

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2.3078E-03 6.8725E-04

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2.9577E-03 9.3760E-03 1.4608E+00 1.0670E-01
AR-39 269 Y 18.
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AR-41 1.827 H 18.
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8.1500E-01 2.9400E-01 5.2000E-04
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CA-41 1.03E5 Y 20.
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3.3138E-03 1.2332E-01
CA-45 162.7 D 20.
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SC-46 83.80 D 21.
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ENERGY.DAT

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5.4300E-03 2.6172E-02 3.2008E-01 9.8300E-02
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5.9500E-03 2.9445E-02 8.3483E-01 9.9976E-01
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9.8780E-01 3.7314E-01 1.1890E-03
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2.5229E+00 9.8870E-03 2.6575E+00 6.5254E-03 2.9598E+00 3.0650E-03
3.3696E+00 1.6808E-03 1.3514E+00 1.6263E-03
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6.4000E-04 4.1971E-03 5.8876E-03 8.2372E-02 5.8987E-03 1.6279E-01
6.4900E-03 3.2852E-02
FE-59 44.63 D 26.
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1.3079E-01 3.5700E-02 1.3700E-02 2.7344E-01 8.1000E-02 4.5200E-01
4.6578E-01 1.4920E-01 5.3100E-01 1.5650E+00 6.1450E-01 1.8000E-03
8.4100E-02 2.2200E-02 9.1000E-04
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ENERGY.DAT

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1.2122E-01 1.8299E-03 1.2936E-01 1.4208E-02 1.3563E-01 1.4739E-03
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7.0000E-04 7.7537E-03 6.3908E-03 1.6629E-01 6.4038E-03 3.2799E-01
7.0600E-03 6.6234E-02 1.4413E-02 9.5429E-02 1.2206E-01 8.5510E-01
1.3648E-01 1.0603E-01 6.9200E-01 1.5990E-03 5.3602E-01 2.8663E-04
CO-58 70.80 D 27.
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7.0000E-04 3.6223E-03 6.3908E-03 7.7827E-02 6.4038E-03 1.5350E-01
7.0600E-03 3.0998E-02 8.1076E-01 9.9430E-01 8.6394E-01 7.3578E-03
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CO-60 5.271 Y 27.
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2.1370E+00 8.7570E-01 6.0700E-01
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1.7249E+00 3.8775E-03 8.1483E-01 1.7009E-03
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8.4000E-04 5.9075E-01 6.5400E-03 2.3341E-01
6
8.5000E-04 2.2534E-03 7.4609E-03 4.8943E-02 7.4781E-03 9.6344E-02
8.2600E-03 1.9614E-02 1.3459E+00 4.8984E-03 5.1100E-01 3.5740E-01
ZN-65 244.4 D 30.
0
0
1
3.2990E-01 1.4300E-01 1.4150E-02
2
9.2000E-04 1.2673E+00 7.0300E-03 4.8288E-01
7
9.3000E-04 5.7287E-03 8.0278E-03 1.1506E-01 8.0478E-03 2.2606E-01
8.9100E-03 4.6052E-02 1.1155E+00 5.0750E-01 5.5775E-01 6.0000E-05
5.1100E-01 2.8300E-02
ZN-69M 13.76 H 30.
0
0
0
5
9.9000E-04 6.2752E-02 7.5300E-03 2.2864E-02 4.2898E-01 4.3886E-02
4.3744E-01 5.1383E-03 4.3850E-01 1.6994E-03
5
1.0100E-03 3.1534E-04 8.6158E-03 6.2554E-03 8.6389E-03 1.2265E-02
9.5700E-03 2.5003E-03 4.3863E-01 9.4889E-01
ZN-69 55.6 M 30.
0
2

ENERGY.DAT

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9.0450E-01 3.2090E-01 9.9999E-01 4.9060E-01 1.6091E-01 1.4500E-05
0
0
1
4.1390E-01 1.4500E-05
GA-72      14.1 H      31.
0
17
2.3420E-01 6.7000E-02 1.2400E-03 3.1345E-01 9.3200E-02 7.6900E-03
4.2549E-01 1.3240E-01 2.2200E-03 5.3627E-01 1.7330E-01 3.4100E-03
5.5230E-01 1.7930E-01 3.1700E-03 6.4985E-01 2.1700E-01 1.5000E-01
6.6657E-01 2.2350E-01 2.1520E-01 9.5605E-01 3.4180E-01 2.7900E-01
1.0481E+00 3.8080E-01 1.8600E-02 1.4768E+00 5.6890E-01 8.9400E-02
1.5277E+00 5.9180E-01 1.4000E-03 1.5893E+00 6.1960E-01 2.4200E-03
1.9267E+00 7.7400E-01 3.0300E-02 2.2633E+00 9.3060E-01 8.1000E-03
2.5276E+00 1.0549E+00 8.0000E-02 3.1576E+00 1.3543E+00 1.0600E-01
6.6630E-01 2.3448E-01 2.4820E-03
0
3
1.1900E-03 5.2761E-03 8.5600E-03 1.9378E-03 6.8010E-01 4.2127E-03
48
1.1900E-03 3.1848E-05 9.8553E-03 6.7101E-04 9.8864E-03 1.3106E-03
1.1000E-02 2.9327E-04 1.1252E-01 1.3582E-03 2.8950E-01 2.0087E-03
3.3660E-01 1.0713E-03 3.8120E-01 2.7643E-03 4.2840E-01 1.8365E-03
5.8740E-01 1.2435E-03 6.0085E-01 5.5860E-02 6.2986E-01 2.4391E-01
7.3560E-01 3.5964E-03 7.8643E-01 3.1660E-02 8.1024E-01 2.0087E-02
8.3400E-01 9.5650E-01 8.6111E-01 9.1154E-03 8.9422E-01 9.8520E-02
9.2410E-01 1.4252E-03 9.3935E-01 2.5921E-03 9.7054E-01 1.1048E-02
9.9986E-01 7.9581E-03 1.0508E+00 6.9251E-02 1.2151E+00 7.9676E-03
1.2309E+00 1.4443E-02 1.2601E+00 1.1478E-02 1.2768E+00 1.5591E-02
1.4640E+00 3.5582E-02 1.5682E+00 1.9895E-03 1.5717E+00 8.3502E-03
1.5967E+00 4.2373E-02 1.6808E+00 8.6755E-03 1.7109E+00 3.8260E-03
1.8378E+00 2.0278E-03 1.8611E+00 5.2321E-02 1.8780E+00 2.3147E-03
1.9202E+00 1.5878E-03 1.9911E+00 1.1191E-03 2.0291E+00 1.2435E-03
2.1095E+00 1.0340E-02 2.2017E+00 2.6112E-01 2.2141E+00 1.8556E-03
2.4910E+00 7.4798E-02 2.5078E+00 1.2817E-01 2.5154E+00 2.5252E-03
2.6215E+00 1.3104E-03 2.8441E+00 4.1034E-03 1.2747E+00 1.5545E-02
AS-76      26.32 H      33.
0
9 2 6 8
2.9880E-01 8.7800E-02 6.3000E-03 3.1310E-01 9.2600E-02 1.2000E-02
5.3980E-01 1.7370E-01 1.8800E-02 1.1809E+00 4.3620E-01 2.0800E-02
1.7525E+00 6.9150E-01 7.6000E-02 1.8462E+00 7.4910E-01 7.5000E-03
2.4095E+00 9.9630E-01 3.4700E-01 2.9686E+00 1.2669E+00 5.1000E-01
1.0043E+00 3.7381E-01 2.2100E-03
0
0
18

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ENERGY.DAT

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5.5910E-01 4.4700E-01 5.6323E-01 1.1711E-02 5.7130E-01 1.3857E-03
6.5703E-01 6.0792E-02 6.6531E-01 3.9336E-03 7.4012E-01 1.1622E-03
7.7176E-01 1.1622E-03 8.6763E-01 1.2516E-03 1.1299E+00 1.4304E-03
1.2127E+00 1.6271E-02 1.2160E+00 3.8442E-02 1.2285E+00 1.3857E-02
1.4391E+00 3.2631E-03 1.4536E+00 1.2963E-03 1.7877E+00 3.3078E-03
2.0963E+00 6.6156E-03 2.1108E+00 3.9336E-03 1.1520E+00 6.5307E-03
SE-75      119.78 D      34.
0
0
0
13
1.2400E-03 1.2950E+00 9.1100E-03 4.1833E-01 1.2533E-02 5.0232E-02
2.2874E-02 9.8072E-03 2.4196E-02 2.0930E-03 5.4183E-02 3.5995E-03
8.4866E-02 2.6451E-02 9.5206E-02 3.5449E-03 1.0925E-01 6.2455E-03
1.2413E-01 1.5570E-02 1.3447E-01 1.6103E-03 2.5278E-01 3.8093E-03
2.6766E-01 1.7917E-03
14
1.2800E-03 9.1288E-03 1.0508E-02 1.6109E-01 1.0544E-02 3.1401E-01
1.1700E-02 7.2690E-02 6.6050E-02 1.0226E-02 9.6733E-02 3.4086E-02
1.2112E-01 1.6744E-01 1.3600E-01 5.9202E-01 1.9860E-01 1.4472E-02
2.6465E-01 5.9800E-01 2.7953E-01 2.5236E-01 3.0391E-01 1.3216E-02
4.0065E-01 1.1422E-01 3.3265E-01 9.7156E-04
SE-79      6.5E4 Y      34.
0
1 1 1
1.4900E-01 5.2200E-02 1.0000E+00
0
0
0
BR-82      35.30 H      35.
0
3
2.6458E-01 7.6200E-02 1.3590E-02 4.4434E-01 1.3780E-01 9.7900E-01
5.3650E-01 1.7160E-01 9.0000E-04
0
0
20
9.2184E-02 7.1647E-03 1.3740E-01 1.4163E-03 2.2145E-01 2.2577E-02
2.7345E-01 7.9978E-03 5.5432E-01 7.0564E-01 6.0630E-01 1.1663E-02
6.1907E-01 4.3071E-01 6.9833E-01 2.8159E-01 7.7649E-01 8.3310E-01
8.2781E-01 2.4160E-01 9.5210E-01 3.6656E-03 1.0076E+00 1.2680E-02
1.0440E+00 2.7326E-01 1.0814E+00 6.2482E-03 1.3175E+00 2.6909E-01
1.4260E+00 1.0830E-03 1.4748E+00 1.6579E-01 1.6503E+00 7.4063E-03
1.7796E+00 1.1330E-03 7.4358E-01 7.5879E-03
BR-83      2.39 H      35.
0
3
3.8878E-01 1.1800E-01 1.3000E-02 9.1844E-01 3.2300E-01 9.8600E-01

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ENERGY.DAT

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3.7300E-01 1.1275E-01 9.9000E-04
0
0
2
5.2964E-01 1.3000E-02 5.3741E-01 1.0460E-03
KR-83M      1.83 H      36.
0
0
0
9
1.5000E-03 1.6517E+00 7.4690E-03 7.7700E-01 9.1020E-03 1.2700E-01
9.3660E-03 4.2000E-02 1.0800E-02 8.6022E-02 1.7834E-02 2.4300E-01
3.0239E-02 6.1700E-01 3.1872E-02 1.0400E-01 3.2136E-02 3.4400E-02
6
1.5900E-03 2.1755E-02 9.3900E-03 5.4100E-02 1.2598E-02 4.5745E-02
1.2649E-02 8.8654E-02 1.4100E-02 2.2579E-02 3.2160E-02 5.0700E-04
BR-84      31.80 M      35.
0
19 1 18
4.8390E-01 1.5200E-01 2.2000E-03 5.5650E-01 1.7900E-01 2.1000E-02
5.8880E-01 1.9100E-01 4.9000E-03 7.4580E-01 2.5300E-01 1.1700E-01
7.9430E-01 2.7200E-01 2.9000E-03 8.0270E-01 2.7600E-01 1.8000E-03
9.6730E-01 3.4300E-01 2.5000E-02 1.1975E+00 4.4200E-01 4.9000E-03
1.3073E+00 4.9000E-01 9.5000E-02 1.5908E+00 6.1600E-01 3.9000E-02
1.9141E+00 7.6300E-01 1.1300E-02 1.9731E+00 7.9000E-01 7.4000E-02
2.0502E+00 8.2600E-01 1.9000E-02 2.1838E+00 8.8800E-01 3.4000E-03
2.3276E+00 9.5500E-01 1.6000E-02 2.7759E+00 1.1660E+00 1.2100E-01
3.7915E+00 1.6500E+00 1.3700E-01 4.6730E+00 2.0720E+00 3.2000E-01
2.8360E+00 1.1940E+00 6.3000E-04
0
0
39
2.3020E-01 3.0806E-03 3.5470E-01 3.0806E-03 3.8200E-01 5.6970E-03
6.0480E-01 1.7724E-02 7.3650E-01 1.3082E-02 8.0220E-01 6.0768E-02
8.8150E-01 4.2200E-01 9.4750E-01 3.5870E-03 9.8730E-01 7.8070E-03
1.0057E+00 4.5998E-03 1.0159E+00 6.2456E-02 1.0826E+00 1.4348E-03
1.1191E+00 1.4348E-03 1.1850E+00 1.0972E-03 1.2133E+00 2.6164E-02
1.4638E+00 1.9834E-02 1.5347E+00 1.0128E-03 1.5781E+00 6.5832E-03
1.6076E+00 4.0090E-03 1.7412E+00 1.6458E-02 1.8187E+00 2.4476E-03
1.8775E+00 1.1394E-02 1.8973E+00 1.4939E-01 2.0296E+00 2.1100E-02
2.0942E+00 2.1522E-03 2.2007E+00 1.1816E-02 2.4841E+00 6.7520E-02
2.5937E+00 1.3926E-03 2.6229E+00 3.0384E-03 2.7587E+00 4.9374E-03
2.8241E+00 1.1394E-02 2.9887E+00 1.7724E-03 3.0454E+00 2.5320E-02
3.2021E+00 2.1100E-03 3.2353E+00 2.0678E-02 3.3658E+00 2.9118E-02
3.9275E+00 6.8786E-02 4.0846E+00 2.7852E-03 1.1229E+00 6.7490E-03
KR-85M      4.48 H      36.
0
3

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ENERGY.DAT

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7.1084E-01 2.3820E-01 2.9000E-03 8.4069E-01 2.9040E-01 7.8600E-01
2.6000E-01 7.4600E-02 2.1000E-04
0
10
1.5000E-03 7.6149E-02 1.0800E-02 2.0989E-02 2.9054E-01 5.9291E-02
3.0295E-01 8.9675E-03 3.0458E-01 2.9540E-03 1.6800E-03 3.8472E-02
1.1400E-02 1.0415E-02 1.3598E-01 3.1466E-02 1.4911E-01 3.5004E-03
1.5086E-01 1.1518E-03
12
1.5900E-03 1.0030E-03 1.2598E-02 1.1162E-02 1.2649E-02 2.1631E-02
1.4100E-02 5.5092E-03 3.0487E-01 1.3989E-01 1.6900E-03 5.8586E-04
1.3336E-02 6.1162E-03 1.3395E-02 1.1830E-02 1.5000E-02 3.1047E-03
1.2985E-01 3.0111E-03 1.5118E-01 7.5278E-01 5.8128E-01 2.1078E-04
KR-85      10.72 Y      36.
0
2      1      2
1.7301E-01 4.7500E-02 4.3700E-03 6.8700E-01 2.5140E-01 9.9563E-01
0
0
1
5.1399E-01 4.3400E-03
KR-87      76.3 M      36.
0
13      1      11
5.8048E-01 1.8780E-01 5.0000E-03 8.3366E-01 2.8750E-01 1.0800E-03
9.2840E-01 3.2640E-01 4.4000E-02 1.0778E+00 3.8930E-01 5.8000E-03
1.3342E+00 5.0040E-01 9.5000E-02 1.4746E+00 5.6260E-01 5.5100E-02
1.5106E+00 5.7870E-01 4.2000E-03 2.1485E+00 8.7000E-01 6.2000E-03
2.3110E+00 9.4560E-01 1.6000E-03 2.4991E+00 1.0337E+00 1.2400E-03
3.0436E+00 1.2942E+00 6.9000E-02 3.4864E+00 1.5020E+00 4.0700E-01
3.8890E+00 1.6948E+00 3.0400E-01
0
3
1.6800E-03 1.9394E-03 1.1400E-02 5.7673E-04 3.8738E-01 1.7424E-03
26
1.6900E-03 2.9534E-05 1.3336E-02 3.3867E-04 1.3395E-02 6.5507E-04
1.5000E-02 1.7192E-04 4.0258E-01 4.9500E-01 6.7387E-01 1.9058E-02
8.1425E-01 1.6830E-03 8.3637E-01 7.5240E-03 8.4543E-01 7.2765E-02
9.4664E-01 1.3860E-03 1.1754E+00 1.1237E-02 1.3380E+00 6.4845E-03
1.3825E+00 2.8710E-03 1.3899E+00 1.2375E-03 1.5312E+00 3.5640E-03
1.5780E+00 1.2870E-03 1.6112E+00 1.0395E-03 1.7405E+00 2.0493E-02
1.8426E+00 1.3860E-03 2.0119E+00 2.8957E-02 2.4085E+00 2.1285E-03
2.5548E+00 9.3060E-02 2.5581E+00 3.9105E-02 2.8114E+00 3.1680E-03
3.3085E+00 4.5045E-03 1.6201E+00 6.4993E-03
RB-87      4.73E10 Y      37.
0
1
2.7330E-01 7.8800E-02 1.0000E+00

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ENERGY.DAT

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0
0
0
KR-88      2.84 H      36.
0
16  2 13 15
1.4189E-01 3.8000E-02 3.5300E-03 3.6458E-01 1.0900E-01 2.6500E-02
5.2085E-01 1.6500E-01 6.7000E-01 6.8124E-01 2.2700E-01 9.1000E-02
8.2392E-01 2.8400E-01 1.4000E-03 9.9748E-01 3.5500E-01 2.0400E-03
1.1983E+00 4.4100E-01 1.9200E-02 1.2519E+00 4.6400E-01 2.3000E-03
1.4715E+00 5.6100E-01 2.2000E-03 1.7309E+00 6.7800E-01 9.0000E-03
1.7716E+00 6.9700E-01 1.0000E-03 2.0507E+00 8.2500E-01 1.3000E-02
2.5225E+00 1.0520E+00 2.6000E-03 2.7167E+00 1.1360E+00 1.8000E-02
2.9130E+00 1.2330E+00 1.4000E-01 6.8700E-01 2.3383E-01 1.0100E-03
0
9
1.6800E-03 1.4931E-01 1.1400E-02 4.0387E-02 1.2313E-02 1.0717E-01
1.3060E-02 1.3286E-03 2.5448E-02 1.2332E-02 2.7191E-02 2.7294E-03
1.5078E-01 2.0794E-03 1.8112E-01 1.1433E-02 1.9425E-01 1.3772E-03
55
1.6900E-03 2.2738E-03 1.3336E-02 2.3716E-02 1.3395E-02 4.5873E-02
1.5000E-02 1.2039E-02 2.7513E-02 2.0622E-02 1.2227E-01 1.9722E-03
1.6598E-01 3.1036E-02 1.9632E-01 2.5985E-01 2.4071E-01 2.5258E-03
3.1169E-01 1.0726E-03 3.3471E-01 1.4532E-03 3.6223E-01 2.2490E-02
3.9054E-01 6.4356E-03 4.2170E-01 1.2802E-03 4.7180E-01 7.2660E-03
6.7734E-01 2.3528E-03 7.8828E-01 5.3284E-03 7.9032E-01 1.2456E-03
8.3483E-01 1.2975E-01 8.5034E-01 1.7300E-03 8.6233E-01 6.7124E-03
9.4492E-01 2.9410E-03 9.8578E-01 1.3148E-02 9.9009E-01 1.4186E-03
1.0396E+00 4.8440E-03 1.0495E+00 1.4186E-03 1.1413E+00 1.2837E-02
1.1795E+00 9.9648E-03 1.1850E+00 6.8854E-03 1.2098E+00 1.4186E-03
1.2127E+00 1.3840E-03 1.2452E+00 3.6330E-03 1.2507E+00 1.1210E-02
1.3250E+00 1.5916E-03 1.3523E+00 1.5916E-03 1.3695E+00 1.4774E-02
1.4069E+00 2.1798E-03 1.4648E+00 1.1418E-03 1.5184E+00 2.1521E-02
1.5298E+00 1.0934E-01 1.6038E+00 4.5672E-03 1.6856E+00 6.6432E-03
1.8928E+00 1.3840E-03 1.9087E+00 1.0034E-03 2.0298E+00 4.5291E-02
2.0354E+00 3.7368E-02 2.1865E+00 2.8718E-03 2.1958E+00 1.3183E-01
2.2318E+00 3.3908E-02 2.3521E+00 7.3006E-03 2.3921E+00 3.4600E-01
2.4089E+00 1.0380E-03 2.5484E+00 6.2280E-03 2.7710E+00 1.4878E-03
1.0001E+00 1.8892E-02
RB-88      17.8 M      37.
0
10  1  9
4.6210E-01 1.4360E-01 6.6000E-03 4.6963E-01 1.4630E-01 3.6200E-03
5.7231E-01 1.8430E-01 1.4300E-03 8.0114E-01 2.7370E-01 2.1300E-02
9.0129E-01 3.1450E-01 2.1000E-03 2.0965E+00 8.4450E-01 9.8000E-03
2.5809E+00 1.0706E+00 1.3300E-01 3.4790E+00 1.4965E+00 4.1000E-02
5.3150E+00 2.3724E+00 7.8000E-01 1.3900E+00 5.2638E-01 6.2700E-04
0

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ENERGY.DAT

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0
15
8.9802E-01 1.4038E-01 1.3663E+00 1.0272E-03 1.3824E+00 7.4258E-03
1.7798E+00 2.1614E-03 1.8350E+00 2.1400E-01 2.1112E+00 1.1770E-03
2.1189E+00 4.2158E-03 2.5777E+00 1.7976E-03 2.6779E+00 1.9581E-02
2.7340E+00 1.0914E-03 3.0094E+00 2.4396E-03 3.2185E+00 2.1400E-03
3.4865E+00 1.3054E-03 4.7427E+00 1.4338E-03 1.4746E+00 3.3298E-03
KR-89      3.16 M      36.
0
48
3.3871E-01 1.0100E-01 5.7000E-03 4.8220E-01 1.5100E-01 3.6000E-03
4.9184E-01 1.5500E-01 3.2000E-03 5.6520E-01 1.8200E-01 1.7200E-03
6.0265E-01 1.9600E-01 5.9000E-03 6.2940E-01 2.0600E-01 2.1400E-03
6.3125E-01 2.0700E-01 1.5800E-03 6.6280E-01 2.1900E-01 1.4000E-03
7.3930E-01 2.4900E-01 2.0000E-03 7.5310E-01 2.5500E-01 1.8000E-03
8.2621E-01 2.8400E-01 5.8000E-03 8.8908E-01 3.1000E-01 6.8000E-03
9.2139E-01 3.2000E-01 4.9000E-03 9.9274E-01 3.5000E-01 4.5000E-03
1.0044E+00 3.6000E-01 2.0000E-03 1.0712E+00 3.9000E-01 1.7000E-03
1.2526E+00 4.6000E-01 2.3600E-02 1.2498E+00 4.6000E-01 3.3000E-03
1.4371E+00 5.5000E-01 1.4900E-02 1.5049E+00 5.8000E-01 3.1000E-03
1.6086E+00 6.2000E-01 1.5500E-02 1.5992E+00 6.2000E-01 2.0900E-02
1.6421E+00 6.4000E-01 2.0000E-02 1.7199E+00 6.7000E-01 2.7000E-03
1.9526E+00 7.8000E-01 8.5000E-03 2.1039E+00 8.5000E-01 4.0000E-02
2.1880E+00 8.9000E-01 1.5100E-02 2.1813E+00 8.9000E-01 2.8000E-03
2.3719E+00 9.7000E-01 1.4400E-01 2.5691E+00 1.0700E+00 5.7000E-02
2.5821E+00 1.0700E+00 3.1000E-03 2.6048E+00 1.0800E+00 1.9000E-03
2.7512E+00 1.1500E+00 2.2400E-03 2.8100E+00 1.1800E+00 3.0900E-02
2.9715E+00 1.2600E+00 2.5300E-02 3.1053E+00 1.3200E+00 4.7000E-03
3.1484E+00 1.3400E+00 1.7000E-03 3.2762E+00 1.4000E+00 1.0200E-01
3.4398E+00 1.4800E+00 2.9000E-02 3.6300E+00 1.5700E+00 6.2000E-03
3.6457E+00 1.5800E+00 3.6000E-02 3.9725E+00 1.7300E+00 1.3000E-02
4.0390E+00 1.7700E+00 4.4000E-03 4.3841E+00 1.9300E+00 2.3000E-02
4.3930E+00 1.9400E+00 4.4000E-02 4.4725E+00 1.9800E+00 1.2000E-02
4.9700E+00 2.2100E+00 2.3000E-01 1.2300E+00 4.7884E-01 2.8600E-03
0
3
1.6800E-03 6.9009E-03 1.1400E-02 2.0522E-03 2.0570E-01 6.2000E-03
145
1.6900E-03 1.0509E-04 1.3336E-02 1.2051E-03 1.3395E-02 2.3310E-03
1.5000E-02 6.1174E-04 1.9620E-01 2.2000E-03 1.9750E-01 1.8200E-02
2.0503E-01 1.2400E-03 2.2090E-01 2.0000E-01 2.6411E-01 6.6000E-03
3.3820E-01 3.4200E-03 3.4503E-01 1.1800E-02 3.5606E-01 4.1400E-02
3.6488E-01 9.0000E-03 3.6930E-01 1.3800E-02 4.0225E-01 3.1800E-03
4.1142E-01 2.5600E-02 4.3808E-01 9.6000E-03 4.6613E-01 8.0000E-03
4.9076E-01 3.2200E-03 4.9750E-01 6.6400E-02 4.9860E-01 1.1400E-02
5.5730E-01 1.6000E-03 5.7696E-01 5.6400E-02 5.8580E-01 1.6600E-01
6.2620E-01 6.0000E-03 6.2975E-01 3.4200E-03 6.6572E-01 1.1400E-03
6.7140E-01 1.0600E-03 6.7411E-01 2.3200E-03 6.9624E-01 1.7800E-02

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ENERGY.DAT

7.0701E-01	4.9800E-03	7.1005E-01	7.8000E-03	7.2963E-01	2.9600E-03
7.3839E-01	4.2000E-02	7.4740E-01	1.1400E-03	7.6290E-01	4.0000E-03
7.6290E-01	9.2000E-03	7.7649E-01	1.1200E-02	8.2675E-01	7.6000E-03
8.3553E-01	1.1000E-02	8.5737E-01	2.8600E-03	8.6708E-01	5.9200E-02
8.7042E-01	1.6000E-03	9.0427E-01	7.1800E-02	9.3095E-01	6.2000E-03
9.4419E-01	1.6400E-03	9.5318E-01	1.0600E-03	9.6042E-01	3.2200E-03
9.7439E-01	9.8000E-03	9.9737E-01	6.6000E-03	1.0108E+00	1.0800E-03
1.0444E+00	4.0800E-03	1.0765E+00	2.3600E-03	1.0881E+00	3.5800E-03
1.1032E+00	9.0000E-03	1.1078E+00	2.9200E-02	1.1166E+00	1.6600E-02
1.1315E+00	1.6000E-03	1.1625E+00	2.1400E-03	1.1723E+00	9.8000E-03
1.1824E+00	1.6600E-03	1.1865E+00	1.8400E-03	1.2288E+00	1.4400E-03
1.2356E+00	5.9400E-03	1.2737E+00	1.3600E-02	1.3027E+00	1.0000E-03
1.3243E+00	3.0600E-02	1.3354E+00	1.3200E-03	1.3406E+00	1.9400E-03
1.3675E+00	1.4800E-03	1.3722E+00	1.2600E-03	1.4126E+00	2.6400E-03
1.4216E+00	2.2400E-03	1.4613E+00	1.2200E-03	1.4642E+00	1.7800E-03
1.4685E+00	1.8800E-03	1.4728E+00	6.8800E-02	1.5010E+00	1.3200E-02
1.5062E+00	1.1200E-03	1.5300E+00	3.3200E-02	1.5337E+00	5.1200E-02
1.5553E+00	1.5200E-03	1.5738E+00	1.9000E-03	1.6341E+00	8.2000E-03
1.6438E+00	3.3800E-03	1.6675E+00	1.2800E-03	1.6769E+00	1.4000E-03
1.6838E+00	1.3200E-03	1.6920E+00	2.6000E-03	1.6937E+00	4.3800E-02
1.7213E+00	2.2400E-03	1.7776E+00	7.6000E-03	1.7882E+00	1.0600E-03
1.8107E+00	1.4000E-03	1.8375E+00	1.1800E-03	1.8397E+00	3.5000E-03
1.8685E+00	1.9600E-03	1.8798E+00	1.5800E-03	1.9034E+00	1.0400E-02
1.9391E+00	6.4000E-03	1.9666E+00	1.3200E-03	1.9986E+00	1.1800E-03
2.0122E+00	1.5600E-02	2.0210E+00	2.4400E-03	2.0465E+00	2.6200E-03
2.1006E+00	9.4000E-03	2.1600E+00	5.2800E-03	2.1958E+00	1.2800E-03
2.2802E+00	2.0400E-03	2.3774E+00	8.0000E-03	2.4010E+00	7.2000E-03
2.5979E+00	1.0800E-03	2.6453E+00	4.2000E-03	2.7509E+00	1.2400E-03
2.7821E+00	7.6000E-03	2.7938E+00	6.8000E-03	2.8196E+00	1.3200E-03
2.8533E+00	2.4000E-03	2.8662E+00	1.7400E-02	2.8787E+00	3.2400E-03
3.0179E+00	2.5400E-03	3.0292E+00	2.7000E-03	3.1073E+00	1.9400E-03
3.1403E+00	1.0400E-02	3.1721E+00	1.0000E-03	3.2198E+00	4.2800E-03
3.3617E+00	1.0400E-02	3.3711E+00	6.2000E-03	3.3999E+00	1.3600E-03
3.5329E+00	1.3400E-02	3.5839E+00	2.5800E-03	3.7178E+00	8.4000E-03
3.7325E+00	1.3800E-03	3.7814E+00	1.3200E-03	3.8274E+00	1.3800E-03
3.8427E+00	1.1000E-03	3.9018E+00	1.3400E-03	3.9230E+00	4.1400E-03
3.9655E+00	2.0800E-03	3.9775E+00	2.7000E-03	3.9960E+00	1.4200E-03
4.0480E+00	1.1600E-03	4.3411E+00	1.0400E-03	4.4892E+00	1.3400E-03
2.1811E+00	7.1180E-02				
RB-89	15.44 M	37.			
0					
11	1	9			
9.9434E-01	3.5320E-01	1.5200E-02	1.2751E+00	4.7360E-01	3.3000E-01
1.7958E+00	7.0640E-01	2.1900E-02	1.9329E+00	7.6910E-01	3.0000E-02
2.2229E+00	9.0310E-01	3.4000E-01	2.4456E+00	1.0071E+00	4.6000E-03
2.4954E+00	1.0304E+00	4.9000E-03	2.5628E+00	1.0620E+00	2.2000E-03
3.0296E+00	1.2848E+00	2.4000E-03	4.5030E+00	1.9874E+00	2.5000E-01
7.7600E-01	2.7239E-01	3.6900E-03			

ENERGY.DAT

```

0
0
22
2.7245E-01 1.4152E-02 2.8976E-01 5.3940E-03 6.5771E-01 9.9760E-02
7.6679E-01 1.6240E-03 9.4769E-01 9.2220E-02 1.0253E+00 2.2620E-03
1.0319E+00 5.8000E-01 1.2203E+00 2.2040E-03 1.2284E+00 1.2180E-03
1.2481E+00 4.2340E-01 1.4732E+00 3.5380E-03 1.5011E+00 1.9720E-03
1.5381E+00 2.5520E-02 1.9402E+00 3.3060E-03 2.0075E+00 2.3780E-02
2.0580E+00 2.3200E-03 2.1960E+00 1.3340E-01 2.2801E+00 1.7980E-03
2.5701E+00 9.8600E-02 2.7072E+00 2.0300E-02 3.5088E+00 1.1484E-02
1.9503E+00 1.1832E-02
SR-89      50.55 D      38. (No data for daughter, Y-89M)
0
2 1 1
1.4913E+00 5.8300E-01 9.9985E-01 5.8220E-01 1.8760E-01 1.5000E-04
0
0
1
9.0910E-01 1.5000E-04
SR-87M      2.805 H      38.
0
0
0
7
1.7900E-03 1.7855E-01 1.2100E-02 4.4979E-02 3.7230E-01 1.4556E-01
3.8618E-01 2.1336E-02 3.8804E-01 7.0388E-03 1.6800E-03 3.2002E-03
1.1400E-02 8.4157E-04
9
1.8100E-03 2.9033E-03 1.4098E-02 2.9161E-02 1.4165E-02 5.6296E-02
1.5800E-02 1.5126E-02 3.8840E-01 8.2253E-01 1.6900E-03 4.8734E-05
1.3336E-02 4.9419E-04 1.3395E-02 9.5588E-04 1.5000E-02 2.5086E-04
RB-86      18.66 D      37.
0
2 1 2
6.9764E-01 2.3250E-01 8.7800E-02 1.7744E+00 7.0930E-01 9.1220E-01
0
0
1
1.0766E+00 8.7795E-02
SR-85      64.84 D      38.
0
0
0
3
1.6800E-03 1.0815E+00 1.1400E-02 2.9067E-01 4.9879E-01 6.2540E-03
6
1.6900E-03 1.6470E-02 1.3336E-02 1.7069E-01 1.3395E-02 3.3015E-01
1.5000E-02 8.6645E-02 5.1399E-01 9.9270E-01 8.6850E-01 1.3898E-04

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ENERGY.DAT

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SR-90          28.6 Y      38.
0
1 1 1
5.4600E-01 1.9580E-01 1.0000E+00
0
0
0
Y -90          64.1 H      39.
0
2 2 1 2
2.2839E+00 9.3480E-01 9.9989E-01 5.2320E-01 1.8650E-01 1.1500E-04
0
0
0
SR-91          9.5 H      38.
0
12 1 11
4.0466E-01 1.2290E-01 2.3100E-03 4.7727E-01 1.4880E-01 1.4400E-02
6.1737E-01 2.0090E-01 2.0200E-02 7.0358E-01 2.3430E-01 3.6100E-03
1.1041E+00 3.9890E-01 3.3900E-01 1.1381E+00 4.1340E-01 1.7700E-02
1.2103E+00 4.4450E-01 1.8500E-03 1.3786E+00 5.1800E-01 2.4400E-01
1.4971E+00 5.7050E-01 6.4300E-03 2.0310E+00 8.1290E-01 3.3000E-02
2.6840E+00 1.1212E+00 3.0800E-01 3.5500E-01 1.1021E-01 1.2700E-03
0
0
23
2.6120E-01 4.3550E-03 2.7270E-01 2.5350E-03 2.7470E-01 1.0043E-02
3.7990E-01 1.4300E-03 6.2010E-01 1.7225E-02 6.3130E-01 5.3950E-03
6.5230E-01 2.8925E-02 6.5290E-01 7.8000E-02 6.5300E-01 4.5500E-03
7.4980E-01 2.2978E-01 7.6140E-01 5.5900E-03 8.2080E-01 1.5600E-03
8.7970E-01 1.8200E-03 9.2580E-01 3.7375E-02 1.0243E+00 3.2500E-01
1.0546E+00 2.1775E-03 1.1408E+00 1.2350E-03 1.2809E+00 9.0675E-03
1.4134E+00 9.5225E-03 1.4738E+00 1.6250E-03 1.6514E+00 2.8275E-03
1.7240E+00 1.5600E-03 7.7634E-01 1.1908E-02
Y -91M        49.71 M      39.
0
0
0
5
1.9100E-03 4.9532E-02 1.2700E-02 1.2051E-02 5.4053E-01 4.1700E-02
5.5520E-01 5.6100E-03 5.5718E-01 1.8500E-03
5
1.9200E-03 1.1142E-03 1.4883E-02 8.5776E-03 1.4958E-02 1.6527E-02
1.6700E-02 4.5440E-03 5.5757E-01 9.5080E-01
Y -91          58.51 D      39.
0
2 1 2
3.3810E-01 9.9900E-02 3.0000E-03 1.5430E+00 6.0380E-01 9.9700E-01

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ENERGY.DAT

0
0
1
1.2049E+00 3.0000E-03
SR-92 2.71 H 38.
0
4 1 4
5.4610E-01 1.7400E-01 9.6000E-01 9.7666E-01 3.4500E-01 3.0000E-03
1.0376E+00 3.7100E-01 2.1000E-03 1.9300E+00 7.7700E-01 4.0000E-02
0
0
8
2.4152E-01 2.9700E-02 4.3056E-01 3.3300E-02 4.9130E-01 2.6100E-03
6.5070E-01 3.6900E-03 9.5332E-01 3.6000E-02 1.1423E+00 2.8800E-02
1.3839E+00 9.0000E-01 6.6462E-01 1.7100E-03
Y -92 3.54 H 39.
0
9 3 5 6 8
8.1440E-01 2.7800E-01 1.0000E-03 1.2941E+00 4.8000E-01 6.5000E-02
1.5671E+00 6.0100E-01 2.4000E-03 1.7867E+00 7.0000E-01 4.3000E-03
2.1384E+00 8.6900E-01 1.1600E-02 2.2510E+00 9.2000E-01 2.3000E-02
2.6995E+00 1.1230E+00 3.4000E-02 3.6340E+00 1.5630E+00 8.5700E-01
5.5800E-01 1.8340E-01 3.7200E-04
0
0
10
4.4850E-01 2.3352E-02 4.9260E-01 4.8511E-03 5.6110E-01 2.4047E-02
8.4430E-01 1.2510E-02 9.1260E-01 6.2550E-03 9.3446E-01 1.3900E-01
1.1324E+00 2.4325E-03 1.4054E+00 4.7816E-02 1.8473E+00 3.6001E-03
1.6472E+00 1.5193E-03
Y -93 10.1 H 39.
0
9 1 8
4.3232E-01 1.3200E-01 1.8700E-03 7.0538E-01 2.3500E-01 1.6000E-02
1.4199E+00 5.3500E-01 1.4500E-03 1.4396E+00 5.4400E-01 3.7700E-03
1.4646E+00 5.5500E-01 2.6600E-03 1.9429E+00 7.7100E-01 2.5100E-02
2.6231E+00 1.0870E+00 4.6000E-02 2.8900E+00 1.2140E+00 9.0200E-01
8.9000E-01 3.1046E-01 1.1920E-03
0
3
2.0200E-03 1.5543E-03 1.3400E-02 4.0690E-04 2.4890E-01 1.5070E-03
14
2.0400E-03 4.3132E-05 1.5691E-02 3.1761E-04 1.5775E-02 6.1078E-04
1.7700E-02 1.7175E-04 2.6690E-01 6.8502E-02 6.8020E-01 6.0813E-03
9.4710E-01 1.9502E-02 1.2033E+00 1.0275E-03 1.4254E+00 2.3766E-03
1.4505E+00 3.3552E-03 1.9178E+00 1.4050E-02 2.1846E+00 1.5518E-03
2.1908E+00 1.7126E-03 1.4133E+00 3.2573E-03
MO-93 3.5E3 Y 42.

ENERGY.DAT

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0
0
0
2
2.1500E-03 9.8138E-01 1.4000E-02 2.1183E-01
4
2.1700E-03 3.0352E-02 1.6521E-02 1.8114E-01 1.6615E-02 3.4768E-01
1.8600E-02 9.9947E-02
ZR-93      1.53E6 Y      40.
0
1      1      1
6.1531E-02 1.9500E-02 1.0000E+00
0
0
0
NB-93M      14.6 Y      41.
0
0
0
6
2.1500E-03 7.9394E-01 1.1784E-02 1.5000E-01 1.4000E-02 3.7800E-02
2.8072E-02 6.6100E-01 3.0302E-02 1.4200E-01 3.0712E-02 4.6900E-02
4
2.1700E-03 2.4555E-02 1.6521E-02 3.2324E-02 1.6615E-02 6.2041E-02
1.8600E-02 1.7835E-02
ZR-95      64.02 D      40.
0
4      1      3
3.6638E-01 1.0930E-01 5.5400E-01 3.9891E-01 1.2040E-01 4.3700E-01
8.8741E-01 3.2700E-01 7.8000E-03 1.1231E+00 4.0540E-01 1.0000E-03
0
0
2
7.2418E-01 4.3656E-01 7.5671E-01 5.5345E-01
NB-95M      86.6 H      41.
0
3      1      2
9.5717E-01 3.3497E-01 1.3400E-03 1.1613E+00 4.3780E-01 5.4000E-02
3.7490E-01 1.1196E-01 3.9260E-05
0
5
2.1500E-03 6.6553E-01 1.4000E-02 1.3836E-01 2.1670E-01 5.4905E-01
2.3299E-01 1.0962E-01 2.3522E-01 3.6193E-02
7
2.1700E-03 2.0584E-02 1.6521E-02 1.1831E-01 1.6615E-02 2.2709E-01
1.8600E-02 6.5281E-02 2.3569E-01 2.5043E-01 2.0412E-01 1.2967E-03
6.2907E-01 3.9275E-05
NB-95      35.06 D      41.

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ENERGY.DAT

```

0
2
1.5977E-01 4.3350E-02 9.9970E-01 9.2560E-01 3.2195E-01 3.0000E-04
0
3
2.2700E-03 1.2632E-03 1.4800E-02 3.0150E-04 7.4579E-01 1.2775E-03
6
2.2900E-03 5.2635E-05 1.7374E-02 2.8060E-04 1.7479E-02 5.3754E-04
1.9600E-02 1.5790E-04 7.6579E-01 9.9808E-01 3.8917E-01 2.8944E-04
ZR-97      16.90 H      40.
0
10
4.0990E-01 1.2430E-01 4.9000E-03 5.5150E-01 1.7530E-01 5.5000E-02
8.9295E-01 3.0920E-01 1.8800E-02 9.0691E-01 3.1490E-01 5.0000E-03
1.0047E+00 3.5540E-01 1.8000E-03 1.1091E+00 3.9940E-01 3.8000E-03
1.1096E+00 3.9960E-01 6.5000E-03 1.3813E+00 5.1720E-01 2.1000E-03
1.4064E+00 5.2830E-01 4.4000E-02 1.9141E+00 7.5660E-01 8.6000E-01
0
0
26
2.0220E-01 1.0212E-03 2.1868E-01 2.3210E-03 2.5415E-01 1.2533E-02
2.7227E-01 2.5067E-03 3.3043E-01 1.1141E-03 3.5539E-01 2.2746E-02
4.0039E-01 3.2494E-03 5.0763E-01 5.2919E-02 5.1347E-01 5.1062E-03
6.0252E-01 1.3926E-02 6.9063E-01 2.5067E-03 6.9920E-01 1.2069E-03
7.0380E-01 9.2840E-03 7.9570E-01 1.2069E-03 8.0453E-01 6.4988E-03
8.2980E-01 2.2282E-03 8.5490E-01 3.3422E-03 9.7139E-01 2.8780E-03
1.0213E+00 1.2069E-02 1.1191E+00 1.1141E-03 1.1480E+00 2.6459E-02
1.2761E+00 9.7482E-03 1.3627E+00 1.3462E-02 1.7505E+00 1.3462E-02
1.8516E+00 3.5279E-03 3.4409E-01 2.1353E-03
NB-97M      60 S      41.
0
0
0
4
2.1500E-03 1.9904E-02 1.4000E-02 4.3848E-03 7.2437E-01 1.7400E-02
7.4066E-01 2.2500E-03
5
2.1700E-03 6.1560E-04 1.6521E-02 3.7495E-03 1.6615E-02 7.1968E-03
1.8600E-02 2.0689E-03 7.4336E-01 9.7960E-01
NB-97      72.1 M      41.
0
6
3.0381E-01 8.8200E-02 1.1800E-03 4.1734E-01 1.2660E-01 1.6700E-03
6.6426E-01 2.1760E-01 2.0600E-03 9.0840E-01 3.1490E-01 1.0800E-02
1.2749E+00 4.6980E-01 9.8300E-01 8.1590E-01 2.7730E-01 8.8000E-04
0
3
2.2700E-03 1.7458E-03 1.4800E-02 4.1669E-04 6.3790E-01 1.7656E-03

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ENERGY.DAT

```

10
2.2900E-03 7.2744E-05 1.7374E-02 3.8780E-04 1.7479E-02 7.4291E-04
1.9607E-02 2.1823E-04 4.8090E-01 1.4714E-03 6.5790E-01 9.8090E-01
1.0245E+00 1.0790E-02 1.2686E+00 1.5694E-03 1.5156E+00 1.1771E-03
7.9826E-01 4.9045E-03
NB-94      2.03E4 Y      41.
0
1
4.7147E-01 1.4580E-01 1.0000E+00
0
3
2.2700E-03 1.5920E-03 1.4800E-02 3.7996E-04 6.8263E-01 1.6100E-03
6
2.2900E-03 6.6332E-05 1.7374E-02 3.5362E-04 1.7479E-02 6.7743E-04
1.9600E-02 1.9899E-04 7.0263E-01 1.0000E+00 8.7110E-01 1.0000E+00
MO-99      66.02 H      42.
0
6
2.1459E-01 5.9800E-02 1.1300E-03 3.5265E-01 1.0420E-01 1.3600E-03
4.3604E-01 1.3300E-01 1.7300E-01 8.4760E-01 2.8960E-01 1.3600E-02
1.2140E+00 4.4270E-01 8.2700E-01 5.5930E-01 1.8089E-01 5.7800E-04
0
7
2.1700E-03 4.3503E-02 1.5500E-02 8.9457E-03 1.9540E-02 2.8881E-02
3.7542E-02 3.4975E-03 1.1946E-01 3.7433E-03 1.6002E-01 7.8543E-03
1.7802E-01 1.1719E-03
12
2.4200E-03 2.0499E-03 1.8251E-02 9.0462E-03 1.8367E-02 1.7297E-02
2.0600E-02 5.1896E-03 4.0584E-02 8.8320E-03 1.4051E-01 3.7888E-02
1.8106E-01 6.2336E-02 3.6643E-01 1.3696E-02 7.3958E-01 1.2800E-01
7.7800E-01 4.4800E-02 8.2290E-01 1.3312E-03 6.8013E-01 2.5837E-03
TC-99M      6.02 H      43.
0
0
0
9
1.6260E-03 7.4546E-01 2.1020E-03 2.4584E-01 2.1700E-03 1.0268E-01
1.5500E-02 2.0788E-02 1.1946E-01 8.7928E-02 1.2159E-01 6.1335E-03
1.3747E-01 1.0607E-02 1.3959E-01 1.9053E-03 1.3996E-01 2.2998E-03
6
2.4200E-03 4.8382E-03 1.8251E-02 2.1021E-02 1.8367E-02 4.0194E-02
2.0600E-02 1.2059E-02 1.4051E-01 8.9070E-01 1.4263E-01 2.1400E-04
TC-99      2.13E5 Y      43.
0
2
2.9360E-01 8.4600E-02 9.9999E-01 2.0420E-01 5.6500E-02 1.5000E-05
0
0

```

ENERGY.DAT

```

1
8.9360E-02 5.8000E-06
TC-101      14.2 M      43.
0
7
6.2350E-01 2.0100E-01 1.2000E-02 6.8658E-01 2.2500E-01 8.2000E-03
6.9603E-01 2.2900E-01 3.0900E-03 7.8217E-01 2.6300E-01 1.9400E-02
9.0500E-01 3.1200E-01 1.6000E-03 1.0799E+00 3.8500E-01 6.5000E-02
1.3182E+00 4.8700E-01 8.9000E-01
0
6
2.5300E-03 1.9192E-02 1.6200E-02 3.8912E-03 1.0512E-01 5.5772E-03
1.6199E-01 1.2119E-03 2.8469E-01 1.2009E-02 3.0359E-01 1.4040E-03
22
2.5600E-03 1.0101E-03 1.9150E-02 4.2730E-03 1.9279E-02 8.1390E-03
2.1700E-02 2.4948E-03 1.2724E-01 2.8168E-02 1.7957E-01 5.8278E-03
1.8411E-01 1.6159E-02 2.3371E-01 2.7461E-03 2.3826E-01 3.0728E-03
3.0681E-01 8.8300E-01 3.1150E-01 1.3951E-03 3.9333E-01 1.1214E-03
5.1595E-01 1.0861E-03 5.3149E-01 1.0243E-02 5.4514E-01 6.0044E-02
6.2705E-01 4.1501E-03 6.9470E-01 1.1479E-02 7.1552E-01 6.8874E-03
7.2000E-01 1.8543E-03 8.4279E-01 2.3046E-03 9.2871E-01 1.2715E-03
6.1783E-01 4.7797E-03
RU-103      39.35 D      44.
0
5
1.1282E-01 2.9800E-02 6.4000E-02 2.2607E-01 6.3200E-02 9.0000E-01
4.6792E-01 1.4380E-01 2.3800E-03 7.2315E-01 2.3920E-01 3.5000E-02
1.4090E-01 3.8725E-02 1.0230E-03
0
4
2.3900E-03 1.0117E-02 1.7000E-02 2.0974E-03 3.0055E-02 6.7955E-03
4.7386E-01 4.0716E-03
11
2.7000E-03 5.3249E-04 2.0074E-02 2.5107E-03 2.0216E-02 4.7732E-03
2.2700E-02 1.4859E-03 5.3275E-02 3.7338E-03 2.9498E-01 2.4892E-03
4.4380E-01 3.2004E-03 4.9708E-01 8.8900E-01 5.5704E-01 8.2677E-03
6.1033E-01 5.6007E-02 4.8693E-01 1.2487E-03
PD-103      16.961 D      46.
0
0
0
2
2.3900E-03 9.0771E-01 1.7000E-02 1.6576E-01
5
2.7000E-03 4.7774E-02 2.0074E-02 1.9843E-01 2.0216E-02 3.7724E-01
2.2700E-02 1.1744E-01 3.5961E-01 3.0837E-04
RH-103M     56.119 M      45.
0

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ENERGY.DAT

```

0
0
6
2.3900E-03 7.6598E-01 1.6528E-02 9.5200E-02 1.7000E-02 1.8374E-02
3.6336E-02 7.1300E-01 3.9121E-02 1.4400E-01 3.9667E-02 4.7500E-02
5
2.7000E-03 4.0315E-02 2.0074E-02 2.1995E-02 2.0216E-02 4.1815E-02
2.2700E-02 1.3017E-02 3.9748E-02 7.0400E-04
RU-105      4.44 H      44.      (Includes daughter, RH-105M)
0
14
2.2017E-01 6.1300E-02 1.0800E-03 4.3118E-01 1.3080E-01 3.4000E-03
4.7570E-01 1.4700E-01 2.0000E-03 5.4072E-01 1.7010E-01 1.3200E-02
5.7251E-01 1.8180E-01 4.4700E-02 5.9649E-01 1.9070E-01 5.0000E-03
7.0254E-01 2.3110E-01 1.1300E-03 9.4822E-01 3.2930E-01 5.2200E-02
1.1117E+00 3.9750E-01 2.0000E-01 1.1319E+00 4.0600E-01 1.8100E-01
1.1559E+00 4.1620E-01 2.9000E-03 1.1933E+00 4.3220E-01 4.9900E-01
1.5252E+00 5.7680E-01 5.0000E-03 4.4700E-01 1.4031E-01 1.6300E-03
0
11
2.3900E-03 6.6620E-03 1.7000E-02 1.3811E-03 6.2680E-02 3.5200E-03
1.2598E-01 2.0374E-03 2.3968E-01 1.5984E-03
2.3900E-03 6.9517E-01 1.7000E-02 9.8816E-02 1.0635E-01 5.1200E-01
1.2616E-01 2.3000E-01 1.2894E-01 4.4800E-02 1.2949E-01 7.7700E-02
47
2.7000E-03 3.5063E-04 2.0074E-02 1.6532E-03 2.0216E-02 3.1430E-03
2.2700E-02 9.7844E-04 8.5900E-02 3.2000E-03 1.4920E-01 1.6700E-02
1.6360E-01 1.4000E-03 1.8360E-01 1.0000E-03 2.2500E-01 1.5000E-03
2.6290E-01 7.2000E-02 3.1650E-01 1.1700E-01 3.2610E-01 1.1800E-02
3.3090E-01 7.9000E-03 3.5000E-01 3.0000E-03 3.5020E-01 1.1000E-02
3.9340E-01 4.2000E-02 4.0750E-01 1.8000E-03 4.1350E-01 2.4800E-02
4.6940E-01 1.7500E-01 4.7000E-01 1.3000E-02 4.8960E-01 5.9000E-03
4.9920E-01 2.4000E-02 5.0040E-01 3.0000E-03 5.1370E-01 3.6000E-03
5.3920E-01 1.3000E-03 5.7500E-01 1.3000E-03 5.7530E-01 1.0700E-02
6.3230E-01 2.3000E-03 6.3860E-01 2.8000E-03 6.5260E-01 3.5000E-03
6.5600E-01 2.0000E-03 6.5610E-01 2.4000E-02 6.7640E-01 1.6700E-01
7.2450E-01 4.9000E-01 8.2210E-01 1.9000E-03 8.4590E-01 7.3000E-03
8.7580E-01 3.4000E-02 9.0770E-01 5.9000E-03 9.6940E-01 2.3400E-02
1.0172E+00 3.4000E-03 1.3211E+00 2.3000E-03 7.0736E-01 1.2810E-02
2.7000E-03 3.6588E-02 2.0074E-02 1.1829E-01 2.0216E-02 2.2489E-01
2.2700E-02 7.0008E-02 1.2957E-01 2.0400E-01
RH-105      35.36 H      45.
0
4
2.4800E-01 6.9900E-02 1.9700E-01 2.6080E-01 7.3900E-02 5.2200E-02
5.6690E-01 1.7940E-01 7.5000E-01 1.2420E-01 3.3000E-02 4.0300E-04
0
4

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ENERGY.DAT

2.5000E-03 3.8419E-03 1.4420E-02 1.3594E-03 1.7700E-02 7.6732E-04
2.9455E-01 2.8800E-03
8
2.8400E-03 2.2791E-04 2.1020E-02 9.9195E-04 2.1177E-02 1.8823E-03
2.3800E-02 5.9783E-04 2.8010E-01 1.6704E-03 3.0610E-01 5.1264E-02
3.1890E-01 1.9200E-01 2.9492E-01 6.2976E-04
RU-106 368.2 D 44. (Includes daughter, RH-106)
0
8
3.9401E-02 1.0030E-02 1.0000E+00
1.5395E+00 5.8200E-01 4.2700E-03 1.9788E+00 7.8000E-01 1.9200E-02
2.4073E+00 9.7700E-01 9.8000E-02 2.4130E+00 9.7900E-01 5.8000E-03
3.0292E+00 1.2670E+00 8.2000E-02 3.5410E+00 1.5090E+00 7.8700E-01
1.1180E+00 4.0471E-01 4.1674E-03
0
0
8
5.1185E-01 2.0600E-01 6.1617E-01 7.0040E-03 6.2184E-01 9.8056E-02
8.7360E-01 4.1612E-03 1.0505E+00 1.7304E-02 1.1280E+00 3.9552E-03
1.5622E+00 1.5656E-03 1.3570E+00 5.7969E-03
PD-107 6.5E6 Y 46.
0
1 1 1
3.3101E-02 9.3000E-03 1.0000E+00
0
0
0
PD-109 13.453 H 46. (Includes daughter, AG-109M)
0
2
1.0279E+00 3.6100E-01 9.9879E-01 4.5010E-01 1.3988E-01 1.1295E-03
0
6
2.6100E-03 7.8738E-01 1.8500E-02 7.0890E-02 6.2518E-02 4.1700E-01
8.4226E-02 4.4000E-01 8.7314E-02 8.9400E-02 8.7937E-02 1.6000E-02
6
5.0860E-01 1.3536E-03
2.9800E-03 5.2940E-02 2.1990E-02 9.8760E-02 2.2163E-02 1.8705E-01
2.4900E-02 6.0305E-02 8.8032E-02 3.7200E-02
AG-110M 249.85 D 47. (Includes daughter, AG-110) 7/22/87 RAP
0
7
8.3866E-02 2.1800E-02 6.7300E-01 1.3381E-01 3.5700E-02 4.0700E-03
5.3067E-01 1.6560E-01 3.0500E-01 3.1530E-01 9.2836E-02 1.8630E-03
2.2350E+00 8.9410E-01 4.3537E-02 2.8928E+00 1.1993E+00 9.3762E-01
1.1248E+00 4.0685E-01 8.5301E-04
0
10

ENERGY.DAT

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5.6250E-04 1.3287E-02 2.6100E-03 1.1118E-02 1.8500E-02 1.4041E-03
9.0966E-02 8.2593E-03 1.1267E-01 3.9368E-03 2.7200E-03 2.2780E-03
1.9300E-02 4.1078E-04 6.3104E-01 2.5673E-03
2.5000E-03 2.6176E-03 1.7700E-02 4.6083E-04
36
2.9800E-03 7.4754E-04 2.1990E-02 1.9561E-03 2.2163E-02 3.7047E-03
2.4900E-02 1.1944E-03 9.8856E-02 9.5627E-05 3.1300E-03 1.6097E-04
2.2984E-02 6.1536E-04 2.3174E-02 1.1611E-03 2.6100E-02 3.8015E-04
3.6544E-01 1.0571E-03 4.4680E-01 3.6434E-02 6.2035E-01 2.7656E-02
6.2625E-01 2.3408E-03 6.5775E-01 9.4388E-01 6.7660E-01 1.4158E-03
6.7761E-01 1.0675E-01 6.8699E-01 6.4656E-02 7.0667E-01 1.6678E-01
7.0812E-01 2.8316E-03 7.4426E-01 4.6439E-02 7.6393E-01 2.2276E-01
8.1802E-01 7.2773E-02 8.8467E-01 7.2584E-01 9.3748E-01 3.4187E-01
9.9723E-01 1.2459E-03 1.3343E+00 1.3214E-03 1.3843E+00 2.4258E-01
1.4758E+00 4.0020E-02 1.5050E+00 1.3063E-01 1.5623E+00 1.1798E-02
2.8400E-03 1.5529E-04 2.1020E-02 5.9574E-04 2.1177E-02 1.1304E-03
2.3800E-02 3.5904E-04 6.5775E-01 4.4192E-02 1.0460E+00 9.5454E-04
AG-111      7.46 D      47.
0
4 1 2
6.8590E-01 2.2350E-01 7.0000E-02 7.8261E-01 2.7890E-01 1.1000E-02
1.0280E+00 3.6040E-01 9.1900E-01 2.3700E-01 6.7793E-02 5.6000E-04
0
3
2.7200E-03 9.0686E-04 1.9300E-02 1.6353E-04 3.1542E-01 1.0220E-03
8
3.1300E-03 6.4082E-05 2.2984E-02 2.4497E-04 2.3174E-02 4.6221E-04
2.6100E-02 1.5134E-04 9.6750E-02 1.2024E-03 2.4539E-01 1.2291E-02
3.4213E-01 6.6800E-02 6.5472E-01 5.5912E-04
CD-109      464 D      48.
0
0
0
2
2.6100E-03 8.6538E-01 1.8500E-02 1.3362E-01
4
2.9800E-03 5.8184E-02 2.1990E-02 1.8615E-01 2.2163E-02 3.5256E-01
2.4900E-02 1.1367E-01
CD-113M      13.7 Y      48.
0
1
5.8570E-01 1.8540E-01 9.9977E-01
0
0
0
0
CD-115M      44.6 D      48.
0
5 1 3

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ENERGY.DAT

2.0273E-01 5.5800E-02 1.9600E-03 3.3040E-01 9.6000E-02 6.0500E-03
6.8716E-01 2.4170E-01 1.1450E-02 1.6210E+00 6.1500E-01 9.8000E-01
4.1060E-01 1.2471E-01 5.5889E-04
0
0
4
4.8447E-01 1.9285E-03 9.3384E-01 1.3300E-02 1.2906E+00 5.9185E-03
9.3273E-01 9.7248E-04
CD-115 53.46 H 48.
0
5
5.8343E-01 1.8460E-01 3.5200E-01 6.1895E-01 1.9780E-01 3.4000E-02
8.5040E-01 2.8750E-01 1.2500E-02 1.1113E+00 3.9440E-01 6.0100E-01
2.5000E-01 7.0404E-02 1.5225E-04
0
5
2.8400E-03 4.5725E-02 7.5741E-03 4.1413E-02 2.0100E-02 6.2119E-03
3.1277E-02 1.0398E-02 3.4688E-02 2.7222E-03
10
3.2900E-03 3.6008E-03 2.4002E-02 1.0032E-02 2.4210E-02 1.8892E-02
2.7300E-02 6.2766E-03 3.5514E-02 4.4626E-03 2.3144E-01 7.8440E-03
2.6090E-01 2.0564E-02 4.9235E-01 8.5118E-02 5.2790E-01 2.9150E-01
2.9686E-01 1.1283E-03
IN-115M 4.36 H 49.
0
2
8.6130E-01 2.9100E-01 3.6000E-02 3.6390E-01 1.0700E-01 5.2000E-04
0
6
2.8400E-03 4.1821E-01 2.0100E-02 5.8791E-02 3.0836E-01 3.9194E-01
3.3206E-01 8.2722E-02 3.3548E-01 1.6853E-02 3.3618E-01 3.7268E-03
6
3.2900E-03 3.2934E-02 2.4002E-02 9.4944E-02 2.4210E-02 1.7880E-01
2.7300E-02 5.9403E-02 3.3630E-01 4.6706E-01 4.9737E-01 5.1430E-04
IN-111 2.83 D 49.
0
0
0
8
2.7200E-03 1.0027E+00 1.9300E-02 1.5772E-01 1.4457E-01 8.4090E-02
1.6726E-01 1.0499E-02 1.7051E-01 2.4497E-03 2.1868E-01 5.0384E-02
2.4137E-01 7.8490E-03 2.4462E-01 1.8142E-03
7
3.1300E-03 7.0853E-02 2.2984E-02 2.3628E-01 2.3174E-02 4.4581E-01
2.6100E-02 1.4597E-01 1.7128E-01 9.0240E-01 2.4539E-01 9.4000E-01
1.5081E-01 2.8200E-05
IN-114M 49.51 D 49. (Includes daughter, IN-114) 7/22/87 RAP
0

ENERGY.DAT

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2
6.8477E-01 2.2230E-01 1.9044E-03 1.9846E+00 7.7690E-01 9.4992E-01
0
10
2.8400E-03 6.4176E-01 2.0100E-02 5.9878E-02 1.6233E-01 3.9919E-01
1.8603E-01 3.1706E-01 1.8944E-01 6.6468E-02 1.9015E-01 1.3370E-02
2.7200E-03 3.8953E-02 1.9300E-02 6.1042E-03
2.7200E-03 7.8479E-03 1.9300E-02 1.2445E-03
18
3.2900E-03 5.0538E-02 2.4002E-02 9.6700E-02 2.4210E-02 1.8211E-01
2.7300E-02 6.0502E-02 1.9027E-01 1.5949E-01 3.1300E-03 2.7526E-03
2.2984E-02 9.1443E-03 2.3174E-02 1.7253E-02 2.6100E-02 5.6491E-03
5.5843E-01 4.4779E-02 7.2524E-01 4.4887E-02
3.1300E-03 5.5456E-04 2.2984E-02 1.8643E-03 2.3174E-02 3.5175E-03
2.6100E-02 1.1517E-03 5.7580E-01 4.8453E-02 5.5843E-01 4.8453E-05
1.2998E+00 1.9037E-03
SN-113      115.1 D      50.
0
0
0
2
2.8400E-03 8.5194E-01 2.0100E-02 1.2811E-01
6
3.2900E-03 6.7089E-02 2.4002E-02 2.0689E-01 2.4210E-02 3.8962E-01
2.7300E-02 1.2944E-01 2.5512E-01 1.9340E-02 6.3807E-01 9.7090E-06
IN-113M      1.658 H      49.
0
0
0
6
2.8400E-03 2.9653E-01 2.0100E-02 4.2300E-02 3.6375E-01 2.8200E-01
3.8745E-01 5.4800E-02 3.9086E-01 1.1100E-02 3.9157E-01 2.4500E-03
5
3.2900E-03 2.3351E-02 2.4002E-02 6.8312E-02 2.4210E-02 1.2865E-01
2.7300E-02 4.2740E-02 3.9169E-01 6.4900E-01
SN-117M      13.60 D      50.
0
0
0
9
2.9500E-03 9.0827E-01 2.1000E-02 1.0787E-01 1.2682E-01 6.4800E-01
1.2936E-01 1.1700E-01 1.5156E-01 2.6100E-01 1.5410E-01 1.4800E-02
1.5514E-01 5.6400E-02 1.5588E-01 1.3500E-02 1.5768E-01 3.5400E-03
6
3.4400E-03 7.8980E-02 2.5044E-02 1.8728E-01 2.5271E-02 3.5136E-01
2.8500E-02 1.1850E-01 1.5602E-01 2.1100E-02 1.5856E-01 8.6400E-01
SN-119M      293.0 D      50.
0

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ENERGY.DAT

0
0
8
2.9500E-03 1.3694E+00 1.9405E-02 6.6600E-01 2.1000E-02 4.5402E-02
2.2986E-02 1.7300E-01 3.6460E-02 3.2200E-01 6.1195E-02 5.2300E-01
6.4776E-02 1.2400E-01 6.5524E-02 3.1000E-02
6
3.4400E-03 1.1908E-01 2.3870E-02 1.6100E-01 2.5044E-02 7.8827E-02
2.5271E-02 1.4789E-01 2.8500E-02 4.9878E-02 6.5660E-02 2.0000E-04
SN-121M
0
0
0
0
0
SN-121
0
0
0
0
0
SN-123 129.2 D 50.
0
3 1 2
3.0835E-01 8.8600E-02 6.0000E-03 1.3970E+00 5.2310E-01 9.9400E-01
3.4700E-01 1.0176E-01 3.4340E-04
0
0
2
1.0886E+00 6.0000E-03 9.9290E-01 3.6276E-04
I -125 60.14 D 53.
0
0
0
6
3.1900E-03 1.5610E+00 3.6781E-03 7.7880E-01 2.2700E-02 1.9691E-01
3.0553E-02 1.2266E-01 3.4486E-02 2.4662E-02 3.5324E-02 8.1125E-03
5
3.7700E-03 1.5438E-01 2.7202E-02 3.9233E-01 2.7472E-02 7.3196E-01
3.1000E-02 2.5409E-01 3.5492E-02 6.4900E-02
SN-125 9.64 D 50.
0
12 1 11
6.2200E-02 1.6000E-02 2.2000E-03 7.5101E-02 1.9500E-02 1.9000E-03
9.6300E-02 2.5200E-02 1.1000E-03 1.0960E-01 2.8900E-02 5.3000E-03
3.4840E-01 1.0170E-01 2.2000E-02 3.6730E-01 1.0800E-01 3.9000E-02
4.6039E-01 1.3980E-01 5.9000E-02 5.4400E-01 1.6960E-01 1.3000E-03
1.0010E+00 3.4730E-01 3.1000E-03 1.2605E+00 4.5600E-01 2.7000E-02

ENERGY.DAT

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2.3500E+00 9.3800E-01 8.3000E-01 3.6600E-01 1.1486E-01 7.8700E-04
0
0
20
3.3190E-01 1.2900E-02 3.5090E-01 2.2360E-03 4.6970E-01 1.2900E-02
8.0050E-01 9.4600E-03 8.2260E-01 3.7840E-02 8.9370E-01 2.3220E-03
9.1550E-01 3.7840E-02 9.3470E-01 1.4620E-03 1.0171E+00 2.5800E-03
1.0666E+00 8.6000E-02 1.0874E+00 9.4600E-03 1.0889E+00 4.0420E-02
1.1513E+00 1.0320E-03 1.1732E+00 1.8920E-03 1.2210E+00 2.1500E-03
1.4195E+00 4.6440E-03 1.8057E+00 1.4620E-03 2.0017E+00 2.0640E-02
2.2752E+00 1.8060E-03 8.3321E-01 7.0314E-03
SB-125      2.77 Y      51.
0
7 1 7
9.5387E-02 2.4900E-02 1.3600E-01 1.2465E-01 3.3100E-02 5.8100E-02
1.3078E-01 3.4800E-02 1.8100E-01 2.4160E-01 6.7500E-02 1.5900E-02
3.0342E-01 8.7000E-02 3.9900E-01 4.4571E-01 1.3450E-01 7.4000E-02
6.2204E-01 2.1550E-01 1.3500E-01
0
10
3.1900E-03 5.0020E-01 3.6781E-03 4.9978E-01 1.4941E-02 1.8088E-03
2.2700E-02 6.4187E-02 3.0553E-02 7.8716E-02 3.4486E-02 1.5826E-02
3.5324E-02 5.2061E-03 1.4452E-01 1.0339E-02 1.7139E-01 1.8610E-03
3.9608E-01 3.3729E-03
22
3.7700E-03 4.9470E-02 2.7202E-02 1.2789E-01 2.7472E-02 2.3860E-01
3.1000E-02 8.2825E-02 3.5492E-02 4.1649E-02 1.1695E-01 2.6104E-03
1.7262E-01 1.8126E-03 1.7633E-01 6.8926E-02 2.0413E-01 3.2263E-03
2.0809E-01 2.4315E-03 2.2791E-01 1.3140E-03 3.2103E-01 4.1707E-03
3.8044E-01 1.4958E-02 4.0801E-01 1.8185E-03 4.2789E-01 2.9330E-01
4.4350E-01 3.0210E-03 4.6338E-01 1.0353E-01 6.0056E-01 1.7774E-01
6.0664E-01 5.0213E-02 6.3589E-01 1.1321E-01 6.7141E-01 1.8126E-02
1.5903E-01 6.9720E-04
TE-125M      58 D      52.
0
0
0
10
3.1900E-03 8.8444E-01 2.2700E-02 7.0498E-02 5.6646E-02 4.2699E-01
3.0553E-02 1.2266E-01 3.4486E-02 2.4662E-02 3.5324E-02 8.1125E-03
7.7462E-02 5.1899E-01 1.0434E-01 3.7300E-01 1.0827E-01 8.5899E-02
1.0911E-01 2.2500E-02
7
3.7700E-03 1.5090E-01 2.7202E-02 3.2322E-01 2.7472E-02 6.0302E-01
3.1000E-02 2.0933E-01 3.5492E-02 6.4900E-02 1.0928E-01 2.8300E-03
1.4478E-01 4.0000E-09
SN-126      1.0E5 Y      50.
0

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ENERGY.DAT

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1
2.5010E-01 7.0000E-02 1.0000E+00
0
24
3.0700E-03 1.2013E+00 1.2149E-02 3.1718E-02 1.6952E-02 2.1071E-02
1.8002E-02 5.7822E-01 1.8582E-02 3.1685E-01 2.0706E-02 4.1151E-03
2.1498E-02 1.3635E-03 2.1756E-02 1.2378E-01 2.1800E-02 4.4915E-02
2.2336E-02 6.2538E-02 2.2548E-02 4.0859E-02 2.3128E-02 2.0611E-02
3.3789E-02 5.3856E-02 3.7942E-02 4.1159E-03 4.1696E-02 1.0789E-03
5.6449E-02 1.6407E-01 5.7079E-02 8.8060E-02 5.9582E-02 7.1872E-03
6.3336E-02 1.7058E-03 8.2242E-02 6.3400E-02 8.2872E-02 1.1322E-02
8.5996E-02 1.3019E-02 8.6626E-02 2.7010E-03 8.6788E-02 2.7999E-03
11
3.6000E-03 1.1159E-01 2.1650E-02 1.2395E-02 2.3280E-02 6.4010E-02
2.6111E-02 8.3339E-02 2.6359E-02 1.5607E-01 2.9700E-02 5.3387E-02
4.2640E-02 4.9950E-03 6.4280E-02 9.5830E-02 8.6940E-02 8.9170E-02
8.7570E-02 3.7000E-01 2.2700E-02 9.9900E-04
S8-126M      19.0 M      51.
0
4
7.4520E-01 2.4500E-01 8.6000E-03 8.7840E-01 2.9700E-01 1.3000E-02
1.1865E+00 4.2400E-01 3.3000E-02 1.8066E+00 6.9400E-01 8.1000E-01
0
10
3.0700E-03 9.7100E-02 1.3002E-02 1.0612E-01 1.6756E-02 2.5480E-02
1.7548E-02 8.4140E-03 3.1900E-03 1.4176E-02 2.2700E-02 1.9351E-03
3.8289E-01 1.0195E-02 4.0976E-01 1.4907E-03 6.3452E-01 2.7844E-03
6.6319E-01 2.5016E-03
14
3.6000E-03 9.0202E-03 1.7700E-02 3.1348E-06 3.7700E-03 1.4021E-03
2.7202E-02 3.8556E-03 2.7472E-02 7.1932E-03 3.1000E-02 2.4970E-03
4.1470E-01 8.5672E-01 6.2000E-01 1.5421E-02 6.6633E-01 8.5672E-01
6.9500E-01 8.5672E-01 9.2820E-01 1.2851E-02 1.0348E+00 1.7991E-02
1.0613E+00 5.1403E-03 1.4762E+00 3.4269E-03
SB-126      12.4 D      51.
0
14  2  7  14
9.0401E-02 2.4000E-02 5.0000E-03 1.1430E-01 3.0000E-02 2.0900E-02
3.7140E-01 1.0900E-01 2.9000E-01 3.9350E-01 1.1700E-01 5.9000E-02
4.9470E-01 1.5200E-01 8.4000E-02 5.7590E-01 1.8100E-01 4.2000E-02
5.9100E-01 2.0400E-01 5.6000E-03 7.2510E-01 2.3700E-01 5.0000E-03
7.2750E-01 2.3800E-01 4.8000E-03 7.5390E-01 2.4800E-01 8.1000E-02
7.9960E-01 2.6600E-01 4.8000E-02 1.0684E+00 3.7400E-01 1.6000E-01
1.1688E+00 4.1600E-01 9.0000E-03 1.7889E+00 6.8900E-01 1.9000E-01
0
7
3.1900E-03 1.5803E-02 2.2700E-02 2.1864E-03 2.6469E-01 1.4345E-03
3.8289E-01 9.9105E-03 4.0976E-01 1.4491E-03 6.3452E-01 3.2376E-03

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ENERGY.DAT

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6.6319E-01 2.9089E-03
32
3.7700E-03 1.5630E-03 2.7202E-02 4.3563E-03 2.7472E-02 8.1274E-03
3.1000E-02 2.8213E-03 1.4930E-01 3.9848E-03 2.0860E-01 4.9809E-03
2.2380E-01 1.3947E-02 2.7860E-01 2.3909E-02 2.9650E-01 4.4829E-02
2.9710E-01 4.9809E-03 4.1470E-01 8.3281E-01 4.1530E-01 9.9619E-03
5.5520E-01 1.6935E-02 5.7380E-01 6.6745E-02 5.9300E-01 7.4714E-02
6.2020E-01 8.9657E-03 6.3970E-01 8.9657E-03 6.5630E-01 2.1916E-02
6.6633E-01 9.9619E-01 6.7500E-01 3.6859E-02 6.9500E-01 9.9619E-01
6.9700E-01 2.8890E-01 7.2050E-01 5.3794E-01 8.5680E-01 1.7633E-01
9.5400E-01 1.1954E-02 9.5960E-01 4.9809E-03 9.8930E-01 6.7741E-02
1.0348E+00 9.9619E-03 1.0613E+00 1.9924E-03 1.0639E+00 8.9657E-03
1.2130E+00 2.3909E-02 1.4762E+00 2.7893E-03
SB-122      2.70 D      51.
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4      2      3      4
7.2381E-01 2.3650E-01 4.5000E-02 1.4169E+00 5.2240E-01 6.7300E-01
1.9809E+00 7.7210E-01 2.5700E-01 4.2300E-01 1.3877E-01 2.2300E-04
0
5
2.9500E-03 2.0176E-02 2.1000E-02 2.8963E-03 3.1900E-03 2.5292E-03
2.2700E-02 4.4155E-04 5.3212E-01 3.5324E-03
13
3.4400E-03 1.7544E-03 2.5044E-02 5.0285E-03 2.5271E-02 9.4343E-03
2.8500E-02 3.1818E-03 1.1402E+00 7.7440E-03 3.7700E-03 2.8930E-04
2.7202E-02 8.7975E-04 2.7472E-02 1.6413E-03 3.1000E-02 5.6976E-04
5.6393E-01 7.0648E-01 6.9280E-01 3.7443E-02 1.2570E+00 7.7713E-03
1.1792E+00 2.1901E-04
SB-124      60.20 D      51.
0
13
1.3008E-01 3.4600E-02 5.2000E-03 2.0320E-01 5.5900E-02 5.0200E-03
2.1129E-01 5.8300E-02 8.7600E-02 4.2164E-01 1.2620E-01 3.7000E-03
6.1127E-01 1.9400E-01 5.2800E-01 7.2244E-01 2.3600E-01 2.5800E-03
8.1324E-01 2.7130E-01 6.4000E-03 8.6566E-01 2.9200E-01 4.0900E-02
9.4706E-01 3.2470E-01 2.1300E-02 1.5795E+00 5.9340E-01 5.1400E-02
1.6564E+00 6.2730E-01 2.5300E-02 2.3023E+00 9.1860E-01 2.1900E-01
4.4760E-01 1.3878E-01 3.8900E-03
0
3
3.1900E-03 3.4039E-03 2.2700E-02 5.1382E-04 5.7089E-01 4.1105E-03
29
3.7700E-03 3.3665E-04 2.7202E-02 1.0237E-03 2.7472E-02 1.9100E-03
3.1000E-02 6.6302E-04 4.0003E-01 1.2919E-03 4.4399E-01 2.0553E-03
5.2550E-01 1.6638E-03 6.0271E-01 9.7870E-01 6.3236E-01 1.4681E-03
6.4585E-01 7.2620E-02 7.0931E-01 1.4191E-02 7.1382E-01 2.3782E-02
7.2278E-01 1.1098E-01 7.3567E-01 1.2723E-03 7.9074E-01 7.4381E-03
9.6820E-01 1.9183E-02 1.0452E+00 1.8595E-02 1.3255E+00 1.4974E-02

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ENERGY.DAT

1.3552E+00 9.9827E-03 1.3682E+00 2.5055E-02 1.3763E+00 4.4041E-03
 1.4366E+00 1.1353E-02 1.4452E+00 2.1531E-03 1.4891E+00 6.2637E-03
 1.5264E+00 4.0127E-03 1.5799E+00 1.9574E-03 1.6910E+00 4.9033E-01
 2.0910E+00 5.7254E-02 1.2083E+00 1.3366E-02

SB-127 3.85 D 51.

0

14 1 13

2.5830E-01 7.2700E-02 1.1000E-03 2.9070E-01 8.2900E-02 6.1000E-03
 4.2520E-01 1.2750E-01 8.0000E-03 4.4080E-01 1.3280E-01 1.2500E-02
 5.0434E-01 1.5510E-01 5.2200E-02 6.5700E-01 2.1110E-01 1.2500E-02
 7.9483E-01 2.6400E-01 7.8000E-02 7.9751E-01 2.6510E-01 1.7200E-01
 8.9590E-01 3.0410E-01 3.4900E-01 9.4965E-01 3.2580E-01 4.1000E-02
 1.1080E+00 3.9090E-01 2.2800E-01 1.2401E+00 4.4650E-01 2.4000E-02
 1.4928E+00 5.6190E-01 2.0000E-02 5.0800E-01 1.6435E-01 1.4000E-03

0

7

3.1900E-03 3.9206E-02 2.2700E-02 5.2955E-03 2.9286E-02 3.4669E-02
 5.6161E-02 4.5325E-03 2.2059E-01 4.2786E-03 4.4119E-01 2.2023E-03
 6.5339E-01 1.2138E-03

38

3.7700E-03 3.8775E-03 2.7202E-02 1.0551E-02 2.7472E-02 1.9684E-02
 3.1000E-02 6.8331E-03 6.1100E-02 1.4209E-02 1.5430E-01 1.1424E-03
 2.5240E-01 8.3895E-02 2.8040E-01 5.3550E-03 2.9080E-01 1.8207E-02
 2.9330E-01 2.8560E-03 3.1000E-01 2.0349E-03 3.9180E-01 9.2820E-03
 4.0500E-01 1.1424E-03 4.1160E-01 3.4272E-02 4.4070E-01 2.4990E-03
 4.4490E-01 4.2126E-02 4.5100E-01 1.7850E-03 4.5600E-01 1.0710E-03
 4.7300E-01 2.5026E-01 5.0280E-01 6.0690E-03 5.4300E-01 2.6418E-02
 5.8420E-01 3.2130E-03 6.0360E-01 4.2483E-02 6.3780E-01 3.5700E-03
 6.5350E-01 2.4990E-03 6.6690E-01 5.3550E-03 6.8230E-01 5.3550E-03
 6.8520E-01 3.5700E-01 6.9850E-01 3.3915E-02 7.2220E-01 1.7493E-02
 7.4590E-01 1.0710E-03 7.8380E-01 1.4673E-01 8.1730E-01 2.6775E-03
 8.2010E-01 1.1424E-03 9.2350E-01 4.6053E-03 1.1412E+00 3.5700E-03
 1.2903E+00 3.4629E-03 7.3674E-01 5.3193E-03

TE-127M 109 D 52.

0

2 1 1

7.2465E-01 2.5290E-01 1.8200E-02 7.7000E-02 2.0075E-02 1.1264E-04

0

10

3.1900E-03 7.4028E-01 2.2700E-02 5.2276E-02 5.6446E-02 4.1820E-01
 8.3321E-02 4.3293E-01 8.7254E-02 1.0210E-01 8.8092E-02 2.7193E-02
 3.3100E-03 1.1564E-02 2.3600E-02 1.4328E-03 2.4431E-02 1.2142E-02
 5.2412E-02 1.7287E-03

11

3.7700E-03 7.3215E-02 2.7202E-02 1.0415E-01 2.7472E-02 1.9432E-01
 3.1000E-02 6.7455E-02 8.8260E-02 8.6684E-04 3.9400E-03 1.2139E-03
 2.8317E-02 3.0470E-03 2.8612E-02 5.6740E-03 3.2300E-02 1.9884E-03
 5.7600E-02 3.7826E-03 6.4861E-01 1.1269E-04

ENERGY.DAT

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TE-127          9.35 H      52.
0
3
2.7609E-01 7.8200E-02 1.1840E-02 6.9400E-01 2.2470E-01 9.8789E-01
4.8500E-01 1.4827E-01 2.6728E-04
0
0
3
3.6030E-01 1.3437E-03 4.1790E-01 9.8800E-03 1.7269E-01 1.3015E-03
TE-123M        119.7 D      52.
0
0
0
9
3.1900E-03 8.8444E-01 2.2700E-02 7.0498E-02 5.6646E-02 4.2699E-01
8.3521E-02 4.4099E-01 8.7454E-02 1.0400E-01 8.8292E-02 2.7599E-02
1.2719E-01 1.3700E-01 1.5406E-01 1.7699E-02 1.5799E-01 4.3599E-03
6
3.7700E-03 8.7472E-02 2.7202E-02 1.4046E-01 2.7472E-02 2.6205E-01
3.1000E-02 9.0969E-02 1.5900E-01 8.4100E-01 8.9071E-02 8.9745E-04
TE-129M        33.6 D      52.
0
5 2 4 5
2.0211E-01 5.5500E-02 1.6600E-03 8.7394E-01 2.9480E-01 7.6000E-03
9.0763E-01 3.0830E-01 3.3000E-02 1.6035E+00 6.0730E-01 3.2800E-01
6.7400E-01 2.3254E-01 8.3910E-04
0
8
3.1900E-03 4.8065E-01 2.2700E-02 3.9548E-02 7.3686E-02 3.1639E-01
1.0056E-01 2.4028E-01 1.0449E-01 5.5604E-02 1.0533E-01 1.4593E-02
3.3100E-03 1.0538E-03 2.2582E-02 1.1644E-03
10
3.7700E-03 4.7537E-02 2.7202E-02 7.8797E-02 2.7472E-02 1.4701E-01
3.1000E-02 5.1032E-02 1.0550E-01 1.4719E-03 3.9400E-03 1.1062E-04
5.5665E-01 1.2902E-03 6.9588E-01 3.2716E-02 7.2957E-01 7.6285E-03
7.4252E-01 3.0842E-03
TE-129          69.6 M      52.
0
7
3.8632E-01 1.1410E-01 8.1000E-03 6.6807E-01 2.1490E-01 1.9600E-03
9.3835E-01 3.2060E-01 2.3000E-03 1.0106E+00 3.5000E-01 8.6000E-02
1.2196E+00 4.3700E-01 5.2000E-03 1.4702E+00 5.4450E-01 9.0000E-01
2.6200E-01 7.4546E-02 5.6460E-04
0
4
3.3100E-03 5.8710E-01 2.2582E-02 6.4873E-01 2.6698E-02 1.3007E-01
2.7584E-02 4.3086E-02
12

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ENERGY.DAT

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3.9400E-03 6.1630E-02 2.7770E-02 1.6259E-01 2.0896E-01 1.6614E-03
2.5062E-01 3.5287E-03 2.7843E-01 5.2256E-03 2.8126E-01 1.5194E-03
4.5960E-01 7.1000E-02 4.8739E-01 1.3064E-02 8.0210E-01 1.7679E-03
1.0839E+00 4.5440E-03 1.1116E+00 1.7608E-03 6.5688E-01 3.7786E-03
I -129      1.57E7 Y      53.
0
1
1.5242E-01 4.0900E-02 1.0000E+00
0
6
3.4300E-03 7.3539E-01 5.0196E-03 7.8900E-01 2.4600E-02 8.7579E-02
3.4128E-02 1.0700E-01 3.8439E-02 2.1600E-02 3.9373E-02 7.1400E-03
5
4.1100E-03 8.1710E-02 2.9458E-02 1.9956E-01 2.9779E-02 3.7024E-01
3.3600E-02 1.3162E-01 3.9581E-02 7.5200E-02
TE-131M      30 H      52.
0
20 1 19
1.6061E-01 4.3300E-02 5.6000E-03 1.8957E-01 5.1800E-02 3.1000E-03
2.5462E-01 7.1500E-02 2.0000E-03 2.6052E-01 7.3300E-02 4.5000E-03
2.6280E-01 7.4000E-02 9.5000E-03 3.1703E-01 9.1300E-02 1.6500E-02
3.6793E-01 1.0800E-01 3.4100E-03 4.2021E-01 1.2560E-01 2.2700E-02
4.3024E-01 1.2900E-01 5.4000E-02 4.5098E-01 1.3620E-01 3.6900E-01
4.5705E-01 1.3830E-01 1.0000E-03 5.0668E-01 1.5570E-01 2.1400E-02
5.3211E-01 1.6480E-01 1.6600E-01 5.4360E-01 1.6900E-01 1.5000E-02
7.8525E-01 2.5990E-01 2.5000E-02 1.1161E+00 3.9400E-01 2.2000E-03
1.3715E+00 5.0200E-01 3.7000E-03 1.4255E+00 5.2500E-01 2.0000E-03
2.4313E+00 9.7000E-01 3.8000E-02 8.0000E-01 2.6913E-01 1.8170E-03
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19
3.1900E-03 1.6881E-01 2.2700E-02 1.8010E-02 1.5044E-01 1.4408E-01
1.7731E-01 5.4390E-02 1.8124E-01 1.1966E-02 1.8208E-01 3.0414E-03
3.3100E-03 1.0565E-01 2.3600E-02 1.3317E-02 4.7971E-02 4.8004E-02
6.8891E-02 4.8768E-02 7.5952E-02 6.3057E-03 8.0068E-02 1.5703E-03
9.6872E-02 6.3620E-03 1.0099E-01 1.5885E-03 1.1655E-01 1.0659E-02
1.4453E-01 1.3755E-03 1.6746E-01 1.9115E-03 2.0776E-01 1.1695E-03
3.0110E-01 2.3446E-03
93
3.7700E-03 1.6695E-02 2.7202E-02 3.5883E-02 2.7472E-02 6.6946E-02
3.1000E-02 2.3239E-02 1.8225E-01 8.5470E-03 3.9400E-03 1.1091E-02
2.8317E-02 2.8320E-02 2.8612E-02 5.2738E-02 3.2300E-02 1.8481E-02
7.9190E-02 1.2786E-03 8.1140E-02 4.0682E-02 8.6430E-02 1.4723E-03
1.0160E-01 1.7048E-03 1.0206E-01 7.9426E-02 1.3486E-01 7.0902E-03
1.4972E-01 5.0755E-02 1.5966E-01 1.2786E-03 1.8225E-01 7.3614E-03
1.8311E-01 1.5498E-03 1.8813E-01 2.1309E-03 1.8976E-01 5.0368E-03
1.9052E-01 1.1623E-03 2.0063E-01 7.5552E-02 2.1398E-01 4.2619E-03
2.3065E-01 1.9372E-03 2.4093E-01 7.5939E-02 2.5317E-01 6.5091E-03
2.5544E-01 3.0996E-03 2.6920E-01 1.0848E-03 2.7856E-01 1.7822E-02

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ENERGY.DAT

2.8320E-01	3.8744E-03	3.0947E-01	3.7582E-03	3.3427E-01	9.5699E-02
3.3544E-01	1.3561E-03	3.4292E-01	3.8744E-03	3.5130E-01	2.0922E-03
3.5470E-01	2.2859E-03	3.6498E-01	1.2011E-02	3.8390E-01	2.0147E-03
4.1740E-01	2.7896E-03	4.3240E-01	6.6253E-03	4.5232E-01	1.5498E-02
4.6292E-01	1.8210E-02	4.6816E-01	3.1383E-03	4.9266E-01	2.3247E-03
5.2480E-01	1.3561E-03	5.3070E-01	1.0461E-03	5.4140E-01	1.1236E-03
5.8630E-01	1.9760E-02	6.0204E-01	3.0996E-03	6.0940E-01	1.3948E-03
6.6505E-01	4.3394E-02	6.8590E-01	1.5498E-03	6.9562E-01	3.9907E-03
7.0250E-01	3.9132E-03	7.1310E-01	1.4335E-02	7.4420E-01	1.5885E-02
7.7367E-01	3.8202E-01	7.7410E-01	5.4242E-03	7.8249E-01	7.7876E-02
7.9375E-01	1.3870E-01	8.2278E-01	6.1216E-02	8.4490E-01	1.5498E-03
8.5221E-01	3.8744E-03	8.5221E-01	2.0651E-01	8.5608E-01	6.1991E-03
8.6510E-01	1.9372E-03	8.7230E-01	1.0074E-03	9.1000E-01	3.2933E-02
9.2062E-01	1.2011E-02	9.2340E-01	1.1623E-03	9.4127E-01	7.8264E-03
9.8780E-01	1.5498E-03	9.9926E-01	1.7048E-03	1.0354E+00	1.0461E-03
1.0597E+00	1.5498E-02	1.1255E+00	1.1430E-01	1.1280E+00	9.6861E-03
1.1489E+00	1.5110E-02	1.1489E+00	3.8357E-03	1.1509E+00	6.5865E-03
1.1655E+00	1.3948E-03	1.2066E+00	9.7636E-02	1.2373E+00	6.5865E-03
1.3152E+00	6.9740E-03	1.3406E+00	1.0074E-03	1.3948E+00	1.0848E-03
1.6460E+00	1.2398E-02	1.8877E+00	1.3561E-02	2.0009E+00	2.0147E-02
2.1685E+00	3.4870E-03	2.2707E+00	3.8357E-03	6.3194E-01	3.5532E-02
TE-131	25.0 M	52.			
0					
12					
7.4838E-01	2.4560E-01	1.1990E-02	8.0495E-01	2.6760E-01	1.1860E-02
8.2185E-01	2.7420E-01	1.3400E-02	9.0252E-01	3.0620E-01	1.1900E-03
9.5078E-01	3.2560E-01	5.4000E-03	1.1021E+00	3.8770E-01	9.9900E-02
1.1507E+00	4.0800E-01	2.5900E-02	1.3723E+00	5.0200E-01	1.1780E-02
1.6470E+00	6.2200E-01	2.1800E-01	1.7563E+00	6.7000E-01	7.8000E-03
2.0993E+00	8.2500E-01	5.9200E-01	4.4600E-01	1.3604E-01	2.0900E-03
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6					
3.3100E-03	1.3765E-01	2.3600E-02	1.7301E-02	1.1655E-01	1.4469E-01
1.4453E-01	1.8672E-02	1.4864E-01	4.6714E-03	4.1915E-01	1.9317E-03
33					
3.9400E-03	1.4449E-02	2.8317E-02	3.6793E-02	2.8612E-02	6.8516E-02
3.2300E-02	2.4011E-02	1.4972E-01	6.8900E-01	1.5110E-01	1.7225E-03
3.4295E-01	7.0278E-03	3.8406E-01	8.9570E-03	4.5232E-01	1.8224E-01
4.9266E-01	4.8368E-02	5.4488E-01	4.2718E-03	5.6733E-01	1.0266E-03
6.0204E-01	4.1960E-02	6.0555E-01	1.1713E-03	6.5426E-01	1.5296E-02
6.9619E-01	1.7914E-03	7.2700E-01	4.6852E-03	8.4199E-01	1.9981E-03
8.5608E-01	1.3091E-03	8.9854E-01	1.3780E-03	9.3448E-01	8.7503E-03
9.4854E-01	2.2599E-02	9.5139E-01	3.3072E-03	9.9725E-01	3.3416E-02
1.0080E+00	7.9924E-03	1.0983E+00	1.7225E-03	1.1470E+00	4.9608E-02
1.1485E+00	1.1024E-03	1.2774E+00	1.1782E-03	1.2943E+00	4.8230E-03
1.4271E+00	1.0542E-03	1.5006E+00	1.1506E-03	6.9601E-01	1.1932E-02
I -131	8.040 D	53.			
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ENERGY.DAT

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2.4791E-01 6.9360E-02 2.1200E-02 3.0388E-01 8.6950E-02 6.2700E-03
3.3383E-01 9.6620E-02 7.3600E-02 6.0637E-01 1.9158E-01 8.9300E-01
8.0687E-01 2.8325E-01 3.9300E-03 6.2970E-01 2.0022E-01 6.9000E-04
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8
3.4300E-03 4.9501E-02 2.4600E-02 5.9106E-03 4.5622E-02 3.5346E-02
7.4730E-02 4.6342E-03 7.9041E-02 1.1756E-03 2.4974E-01 2.4813E-03
3.2992E-01 1.5421E-02 3.5903E-01 2.4430E-03
14
4.1100E-03 5.5001E-03 2.9458E-02 1.3468E-02 2.9779E-02 2.4987E-02
3.3600E-02 8.8830E-03 8.0183E-02 2.6182E-02 1.7721E-01 2.6484E-03
2.8430E-01 6.0521E-02 3.2578E-01 2.5074E-03 3.6448E-01 8.1164E-01
5.0299E-01 3.6051E-03 6.3697E-01 7.2605E-02 6.4270E-01 2.1953E-03
7.2289E-01 1.8025E-02 3.2939E-01 2.3039E-03
XE-131M      11.84 D      54.
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0
6
3.4300E-03 7.5312E-01 2.4600E-02 6.7932E-02 1.2937E-01 6.1200E-01
1.5848E-01 2.8600E-01 1.6279E-01 6.5000E-02 1.6372E-01 1.7800E-02
5
4.1100E-03 8.3680E-02 2.9458E-02 1.5479E-01 2.9779E-02 2.8718E-01
3.3600E-02 1.0210E-01 1.6393E-01 1.9600E-02
TE-132      78.2 H      52.
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1
2.1514E-01 5.9400E-02 1.0000E+00
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13
3.3100E-03 6.9159E-01 1.6551E-02 6.4152E-01 2.3600E-02 8.6081E-02
4.4532E-02 8.4744E-02 4.8648E-02 1.6984E-02 4.9534E-02 5.6056E-03
7.8591E-02 8.7595E-03 8.3131E-02 8.2086E-03 1.0657E-01 1.1439E-03
1.1111E-01 1.0706E-03 1.9499E-01 7.1016E-02 2.2297E-01 1.3376E-02
2.2709E-01 3.3792E-03
8
3.9400E-03 7.2597E-02 2.8317E-02 1.8306E-01 2.8612E-02 3.4090E-01
3.2300E-02 1.1946E-01 4.9720E-02 1.3112E-01 1.1176E-01 1.8480E-02
1.1630E-01 1.9360E-02 2.2816E-01 8.8000E-01
I -132      2.30 H      53.
0
24
3.1910E-01 9.2000E-02 2.6000E-03 3.5320E-01 1.0300E-01 1.2000E-03
4.2440E-01 1.2700E-01 1.9000E-03 5.0332E-01 1.5400E-01 5.3000E-03
5.2176E-01 1.6100E-01 3.3000E-03 6.8919E-01 2.2300E-01 7.6000E-03
7.4114E-01 2.4200E-01 1.2400E-01 7.3974E-01 2.4200E-01 1.9000E-02
8.2557E-01 2.7500E-01 3.2000E-03 9.0999E-01 3.0900E-01 3.5500E-02

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ENERGY.DAT

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9.6640E-01 3.3100E-01 8.1000E-02 9.9132E-01 3.4200E-01 2.7500E-02
9.9607E-01 3.4300E-01 3.3600E-02 1.1551E+00 4.0900E-01 2.4900E-02
1.1851E+00 4.2200E-01 1.8900E-01 1.2291E+00 4.4000E-01 9.5000E-03
1.3927E+00 5.1000E-01 1.1300E-03 1.4126E+00 5.1900E-01 1.7000E-02
1.4698E+00 5.4300E-01 1.0100E-01 1.4680E+00 5.4300E-01 2.0000E-02
1.5396E+00 5.7400E-01 1.4000E-03 1.6169E+00 6.0800E-01 1.2400E-01
2.1396E+00 8.4100E-01 1.6900E-01 4.4000E-01 1.3448E-01 4.9540E-03
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5
3.4300E-03 5.5098E-03 2.4600E-02 7.5504E-04 4.8809E-01 1.3836E-03
6.3313E-01 3.5137E-03 7.3805E-01 1.9049E-03
69
4.1100E-03 6.1220E-04 2.9458E-02 1.7205E-03 2.9779E-02 3.1919E-03
3.3600E-02 1.1348E-03 1.4720E-01 2.3688E-03 1.8330E-01 1.3818E-03
2.5480E-01 1.8753E-03 2.6270E-01 1.4410E-02 2.8480E-01 7.2051E-03
3.1650E-01 1.3818E-03 3.6350E-01 4.9350E-03 3.8780E-01 2.9610E-03
4.1680E-01 4.7376E-03 4.3190E-01 4.8363E-03 4.4600E-01 6.0207E-03
4.7390E-01 1.7766E-03 4.7850E-01 1.4805E-03 4.8820E-01 4.1454E-03
5.0590E-01 5.0337E-02 5.2265E-01 1.6088E-01 5.3550E-01 5.2311E-03
5.4000E-01 1.0857E-03 5.4710E-01 1.2535E-02 6.0000E-01 1.3818E-03
6.2080E-01 3.9480E-03 6.2120E-01 1.5792E-02 6.3022E-01 1.3719E-01
6.5060E-01 2.6649E-02 6.5900E-01 3.9480E-03 6.6769E-01 9.8700E-01
6.6980E-01 4.9350E-02 6.7160E-01 5.2311E-02 7.2700E-01 3.1584E-02
7.2720E-01 2.1714E-02 7.2850E-01 1.0857E-02 7.6450E-01 3.9480E-03
7.7261E-01 7.6196E-01 7.8020E-01 1.2338E-02 7.8450E-01 4.2441E-03
8.0980E-01 2.8623E-02 8.1220E-01 5.6259E-02 8.6330E-01 5.8233E-03
8.7680E-01 1.0758E-02 9.1030E-01 9.1791E-03 9.2760E-01 4.1454E-03
9.5455E-01 1.8062E-01 9.8370E-01 5.6259E-03 1.0347E+00 4.7376E-03
1.1360E+00 2.9610E-02 1.1434E+00 1.3522E-02 1.1474E+00 2.7636E-03
1.1732E+00 1.0857E-02 1.2727E+00 1.7766E-03 1.2907E+00 1.1351E-02
1.2953E+00 1.9740E-02 1.2976E+00 8.8830E-03 1.3178E+00 1.1844E-03
1.3721E+00 2.4675E-02 1.3986E+00 7.1064E-02 1.4426E+00 1.4213E-02
1.4768E+00 1.3522E-03 1.7575E+00 2.9610E-03 1.9211E+00 1.1844E-02
2.0022E+00 1.0857E-02 2.0868E+00 2.3688E-03 2.1727E+00 1.9740E-03
2.2232E+00 1.1844E-03 2.3905E+00 1.6779E-03 1.0146E+00 3.1946E-02
TE-133M      55.4 M      52.
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1.5276E+00 5.7000E-01 1.9500E-01 1.7442E+00 6.7000E-01 2.9300E-01
2.3916E+00 9.6000E-01 3.8200E-01
0
14
3.1900E-03 6.0865E-02 2.2700E-02 7.3125E-03 3.0233E-01 5.8500E-02
3.2920E-01 1.3650E-02 3.3313E-01 3.5620E-03 3.3100E-03 1.5929E-01
2.3600E-02 1.6781E-02 4.0931E-02 7.9605E-02 4.8331E-02 4.8024E-03
5.4831E-02 1.6913E-02 6.1731E-02 4.0890E-02 6.8912E-02 2.3490E-02
8.2812E-02 3.9672E-03 8.9712E-02 1.9140E-02
72

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ENERGY.DAT

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3.7700E-03 6.0196E-03 2.7202E-02 1.4570E-02 2.7472E-02 2.7182E-02
3.1000E-02 9.4359E-03 3.3414E-01 5.4340E-02 3.9400E-03 1.6721E-02
2.8317E-02 3.5686E-02 2.8612E-02 6.6455E-02 3.2300E-02 2.3288E-02
7.4100E-02 1.3050E-02 8.1500E-02 6.9600E-03 8.8000E-02 2.0880E-02
9.4900E-02 8.7000E-02 1.6434E-01 2.3490E-02 1.6887E-01 1.1484E-01
1.7710E-01 1.4790E-02 1.7820E-01 8.7000E-03 1.8445E-01 3.4800E-03
1.9322E-01 6.0900E-03 1.9820E-01 5.2200E-03 2.1336E-01 2.8710E-02
2.2094E-01 4.3500E-03 2.2403E-01 3.4800E-03 2.4428E-01 6.0900E-03
2.5149E-01 5.2200E-03 2.5764E-01 8.7000E-03 2.6155E-01 1.5660E-01
2.8570E-01 8.7000E-03 3.4450E-01 2.2620E-02 3.4722E-01 1.1310E-02
3.5557E-01 1.4790E-02 3.6281E-01 9.5700E-03 3.7683E-01 5.2200E-03
3.9696E-01 1.4790E-02 4.2902E-01 1.2180E-02 4.3540E-01 1.0440E-02
4.4490E-01 2.2620E-02 4.6211E-01 2.0010E-02 4.7185E-01 2.0010E-02
4.7859E-01 1.5660E-02 5.1960E-01 4.3500E-03 5.3485E-01 1.7400E-02
5.7404E-01 2.3490E-02 6.2203E-01 1.3920E-02 6.4740E-01 2.9319E-01
7.0275E-01 3.7410E-02 7.3169E-01 1.4790E-02 7.3389E-01 2.8710E-02
7.7975E-01 3.3930E-02 7.9570E-01 1.3050E-02 8.0051E-01 1.9140E-02
8.6391E-01 1.9488E-01 8.8283E-01 5.6550E-02 8.9770E-01 4.3500E-03
9.1258E-01 8.7000E-01 9.1472E-01 1.6530E-01 9.3440E-01 1.3050E-02
9.7819E-01 9.4830E-02 9.8040E-01 2.3490E-02 9.8290E-01 1.1310E-02
1.0075E+00 1.0440E-02 1.0298E+00 1.3050E-02 1.3489E+00 2.5230E-02
1.4591E+00 2.1750E-02 1.5161E+00 9.5700E-03 1.5316E+00 8.7000E-03
1.6833E+00 5.7420E-02 1.7044E+00 9.5700E-03 1.8857E+00 1.1310E-02
2.0049E+00 3.3060E-02 2.0277E+00 2.0880E-02 2.0492E+00 1.0440E-02
TE-133      12.45 M      52.
0
11
4.2970E-01 1.2900E-01 3.5000E-03 7.7640E-01 2.5600E-01 1.8000E-02
8.3310E-01 2.7900E-01 8.5000E-03 1.2524E+00 4.5000E-01 8.7000E-02
1.4059E+00 5.2000E-01 4.4000E-02 1.5961E+00 6.0000E-01 5.0000E-03
1.6368E+00 6.2000E-01 1.3200E-01 1.6572E+00 6.3000E-01 7.0000E-02
2.1832E+00 8.6000E-01 1.3000E-02 2.2503E+00 8.9000E-01 3.3300E-01
2.6580E+00 1.0800E+00 2.8600E-01
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5
3.3100E-03 2.3367E-02 2.3600E-02 2.9533E-03 2.7882E-01 2.0815E-02
3.0680E-01 3.0444E-03 3.7446E-01 4.2126E-03
33
3.9400E-03 2.4529E-03 2.8317E-02 6.2805E-03 2.8612E-02 1.1696E-02
3.2300E-02 4.0985E-03 3.1199E-01 7.0800E-01 3.8460E-01 2.8320E-03
3.9290E-01 5.6640E-03 4.0763E-01 3.0090E-01 4.7472E-01 1.2036E-02
5.4640E-01 5.6640E-03 5.8710E-01 4.9560E-03 6.1360E-01 2.8320E-03
7.1965E-01 6.6552E-02 7.8677E-01 5.5932E-02 8.4439E-01 3.2568E-02
9.3067E-01 4.4604E-02 1.0008E+00 6.2304E-02 1.0211E+00 2.6904E-02
1.0618E+00 1.2744E-02 1.2522E+00 1.1328E-02 1.3077E+00 9.2040E-03
1.3135E+00 7.7880E-03 1.3332E+00 9.9120E-02 1.4057E+00 5.6640E-03
1.4740E+00 3.5400E-03 1.5186E+00 4.9560E-03 1.5882E+00 2.8320E-03
1.7177E+00 3.3984E-02 1.8251E+00 5.6640E-03 1.8815E+00 1.4160E-02

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ENERGY.DAT

2.1365E+00 2.8320E-03 2.2280E+00 2.8320E-03 2.5406E+00 7.0800E-04
I -133 20.8 H 53.
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11 1 10
1.6998E-01 4.6000E-02 4.1000E-03 3.7385E-01 1.1000E-01 1.2400E-02
4.0962E-01 1.2200E-01 3.9700E-03 4.6176E-01 1.4000E-01 3.7500E-02
5.2357E-01 1.6200E-01 3.1300E-02 7.0770E-01 2.3000E-01 5.4200E-03
8.8467E-01 2.9900E-01 4.1600E-02 1.0162E+00 3.5200E-01 1.8100E-02
1.2301E+00 4.4100E-01 8.3500E-01 1.5268E+00 5.7300E-01 1.0700E-02
8.5000E-01 2.8400E-01 2.7000E-04
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3
3.4300E-03 4.8454E-03 2.4600E-02 6.6400E-04 4.9531E-01 5.9820E-03
26
4.1100E-03 5.3838E-04 2.9458E-02 1.5130E-03 2.9779E-02 2.8070E-03
3.3600E-02 9.9793E-04 2.6270E-01 3.5650E-03 2.6717E-01 1.1653E-03
3.4543E-01 1.0358E-03 3.6108E-01 1.1222E-03 4.1805E-01 1.5279E-03
4.2291E-01 3.0903E-03 5.1053E-01 1.8127E-02 5.2987E-01 8.6320E-01
6.1797E-01 5.3950E-03 6.8025E-01 6.4481E-03 7.0658E-01 1.4933E-02
7.6838E-01 4.5663E-03 8.2051E-01 1.5365E-03 8.5628E-01 1.2344E-02
8.7533E-01 4.4714E-02 9.0967E-01 2.1235E-03 1.0523E+00 5.5158E-03
1.0601E+00 1.3725E-03 1.2364E+00 1.4933E-02 1.2982E+00 2.3306E-02
1.3504E+00 1.4847E-03 5.3524E-01 6.0717E-03
XE-133M 2.19 D 54.
0
0
0
6
3.4300E-03 6.9813E-01 2.4600E-02 7.0263E-02 1.9866E-01 6.3300E-01
2.2777E-01 2.0600E-01 2.3208E-01 4.5600E-02 2.3301E-01 1.2200E-02
5
4.1100E-03 7.7570E-02 2.9458E-02 1.6010E-01 2.9779E-02 2.9704E-01
3.3600E-02 1.0560E-01 2.3322E-01 1.0300E-01
XE-133 5.245 D 54.
0
3
2.6668E-01 7.5100E-02 6.9000E-03 3.4630E-01 1.0060E-01 9.9300E-01
4.3500E-02 1.1100E-02 7.5900E-05
0
7
3.5500E-03 4.9693E-01 2.5500E-02 5.6275E-02 4.3636E-02 3.2913E-03
4.5012E-02 5.3266E-01 7.5283E-02 8.1358E-02 7.9780E-02 1.6709E-02
8.0766E-02 4.3415E-03
7
4.2900E-03 6.1419E-02 3.0625E-02 1.3641E-01 3.0973E-02 2.5262E-01
3.5000E-02 9.0644E-02 7.9621E-02 2.1653E-03 8.0997E-02 3.6483E-01
1.7770E-01 7.1180E-04
TE-134 41.8 M 52.

ENERGY.DAT

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0
3
1.9353E-01 5.2941E-02 1.4700E-01 3.7657E-01 1.1083E-01 4.2900E-01
4.5331E-01 1.3699E-01 4.1100E-01
0
21
3.3100E-03 3.3754E-01 2.3600E-02 4.1224E-02 4.3661E-02 5.5800E-03
4.6276E-02 2.7090E-01 6.8251E-02 2.9370E-03 7.1642E-02 2.2320E-03
7.4257E-02 4.1580E-02 7.8373E-02 8.4000E-03 7.9259E-02 2.0370E-03
1.4772E-01 2.6820E-02 1.6807E-01 9.3960E-03 1.7570E-01 4.8600E-03
1.7730E-01 2.0586E-02 1.7982E-01 1.2240E-03 1.9605E-01 1.5660E-03
2.0528E-01 3.5040E-03 2.4478E-01 8.7543E-03 2.7276E-01 1.3206E-03
4.0189E-01 2.1762E-03 4.2783E-01 1.0908E-03 5.3282E-01 1.1151E-03
29
3.9400E-03 3.5433E-02 2.8317E-02 8.7667E-02 2.8612E-02 1.6325E-01
3.2300E-02 5.7210E-02 7.6830E-02 2.7900E-03 7.9445E-02 2.1000E-01
1.0142E-01 3.3000E-03 1.3105E-01 1.8000E-03 1.8089E-01 1.8000E-01
1.8305E-01 6.0000E-03 2.0124E-01 8.7000E-02 2.1047E-01 2.1900E-01
2.5980E-01 4.8000E-03 2.7795E-01 2.1300E-01 4.3506E-01 1.8600E-01
4.6100E-01 1.0800E-01 4.6464E-01 5.1000E-02 5.6599E-01 1.8900E-01
6.3626E-01 1.7100E-02 6.4540E-01 9.0000E-03 6.6585E-01 1.2000E-02
7.1297E-01 4.2000E-02 7.4259E-01 1.4700E-01 7.6720E-01 3.0000E-01
8.4406E-01 1.2000E-02 8.9602E-01 4.5000E-03 9.2555E-01 1.6500E-02
1.0270E+00 4.5000E-03 1.1014E-01 1.2000E-03
I -134      52.6 M      53.
0
15
7.7458E-01 2.5500E-01 1.4800E-02 7.8956E-01 2.6100E-01 3.3000E-03
8.3550E-01 2.7900E-01 1.5300E-03 1.0662E+00 3.7200E-01 1.2200E-02
1.2826E+00 4.6000E-01 3.2500E-01 1.3771E+00 5.0000E-01 5.3000E-03
1.4962E+00 5.5000E-01 8.1000E-02 1.5615E+00 5.8000E-01 1.6300E-01
1.6024E+00 6.0000E-01 3.6700E-02 1.7415E+00 6.6000E-01 7.6000E-02
1.7970E+00 6.9000E-01 1.1200E-01 1.8479E+00 7.1000E-01 1.1200E-02
2.2304E+00 8.8000E-01 3.7000E-02 2.4188E+00 9.7000E-01 1.1500E-01
7.9500E-01 2.6355E-01 2.2600E-03
0
8
3.4300E-03 1.5183E-02 2.4600E-02 1.8961E-03 1.0084E-01 1.1428E-02
1.2995E-01 1.4961E-03 2.0091E-01 1.4090E-03 3.7089E-01 1.1240E-03
8.1246E-01 1.9273E-03 8.4953E-01 1.1943E-03
73
4.1100E-03 1.6870E-03 2.9458E-02 4.3206E-03 2.9779E-02 8.0159E-03
3.3600E-02 2.8497E-03 1.3540E-01 3.7592E-02 1.3903E-01 6.8695E-03
1.5198E-01 1.0591E-03 1.6248E-01 2.5761E-03 1.8847E-01 6.9649E-03
2.1700E-01 2.4807E-03 2.3547E-01 1.9845E-02 2.7880E-01 1.3071E-03
3.1981E-01 5.1521E-03 3.5108E-01 4.9613E-03 4.0545E-01 7.3466E-02
4.1100E-01 6.1062E-03 4.3335E-01 4.1885E-02 4.5892E-01 1.2976E-02
4.6550E-01 3.6256E-03 4.8888E-01 1.4121E-02 5.1440E-01 2.3375E-02

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ENERGY.DAT

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5.4083E-01 7.8236E-02 5.6552E-01 8.7777E-03 5.7075E-01 2.0990E-03
5.9536E-01 1.1354E-01 6.2179E-01 1.0591E-01 6.2796E-01 2.3662E-02
6.7734E-01 8.4915E-02 7.0665E-01 8.3007E-03 7.3074E-01 1.9082E-02
7.3918E-01 7.6328E-03 7.6668E-01 4.1026E-02 8.1638E-01 5.2475E-03
8.4702E-01 9.5410E-01 8.5729E-01 6.9649E-02 8.6400E-01 1.9082E-03
8.8409E-01 6.5260E-01 9.2260E-01 1.4312E-03 9.4786E-01 4.0358E-02
9.6690E-01 3.5302E-03 9.7467E-01 4.6751E-02 1.0403E+00 1.9082E-02
1.0726E+00 1.5266E-01 1.1001E+00 6.8695E-03 1.1032E+00 7.2512E-03
1.1362E+00 9.7318E-02 1.1591E+00 3.5302E-03 1.1640E+00 1.3357E-03
1.1900E+00 3.5302E-03 1.2390E+00 2.0990E-03 1.2695E+00 5.6292E-03
1.3224E+00 1.0495E-03 1.3360E+00 1.4312E-03 1.3526E+00 4.4843E-03
1.4143E+00 2.1944E-03 1.4282E+00 1.7174E-03 1.4314E+00 1.7174E-03
1.4552E+00 2.2898E-02 1.4700E+00 7.7282E-03 1.5055E+00 1.1449E-03
1.5415E+00 5.0567E-03 1.6138E+00 4.3602E-02 1.6292E+00 2.5761E-03
1.6443E+00 4.0072E-03 1.6552E+00 2.2898E-03 1.7415E+00 2.6715E-02
1.8068E+00 5.7246E-02 1.9259E+00 1.8128E-03 2.0206E+00 1.7174E-03
2.1599E+00 2.0990E-03 2.3124E+00 2.3853E-03 2.4674E+00 1.5266E-03
1.7872E+00 1.3348E-02
CS-134M      2.90 H      55.
0
0
0
11
3.5500E-03 1.3280E+00 5.5457E-03 7.7277E-01 1.0043E-02 1.5872E-01
1.1029E-02 5.2278E-02 2.5500E-02 3.6921E-02 9.1435E-02 3.4720E-01
1.0270E-01 4.4240E-03 1.2171E-01 4.0374E-01 1.2620E-01 9.0074E-02
1.2719E-01 2.2717E-02 1.3297E-01 2.7040E-03
7
4.2900E-03 1.6414E-01 1.1260E-02 9.4000E-03 3.0625E-02 8.9498E-02
3.0973E-02 1.6574E-01 3.5000E-02 5.9470E-02 1.2742E-01 1.2900E-01
1.3868E-01 6.2000E-05
CS-134      2.062 Y      55.
0
4
8.8543E-02 2.3060E-02 2.7400E-01 4.1509E-01 1.2340E-01 2.4800E-02
6.5786E-01 2.1011E-01 7.0100E-01 9.7550E-01 3.3529E-01 5.3000E-04
0
5
3.6700E-03 6.5531E-03 2.6400E-02 8.2834E-04 5.3187E-01 1.2545E-03
5.6726E-01 4.9093E-03 7.5840E-01 2.2033E-03
14
4.4700E-03 8.9360E-04 3.1817E-02 2.1438E-03 3.2194E-02 3.9554E-03
3.6400E-02 1.4394E-03 4.7535E-01 1.4600E-02 5.6323E-01 8.3800E-02
5.6932E-01 1.5430E-01 6.0470E-01 9.7600E-01 7.9584E-01 8.5400E-01
8.0193E-01 8.7300E-02 1.0386E+00 1.0000E-02 1.1679E+00 1.8000E-02
1.3652E+00 3.0400E-02 2.7688E-01 3.5400E-04
I -130      12.36 H      53.
0

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ENERGY.DAT

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10
2.3162E-01 6.4000E-02 3.1600E-03 3.5465E-01 1.0300E-01 3.2800E-03
3.7550E-01 1.1000E-01 4.9200E-03 5.5681E-01 1.7300E-01 1.8400E-03
6.2191E-01 1.9700E-01 4.6700E-01 8.1236E-01 2.7000E-01 2.1400E-02
9.0203E-01 3.0600E-01 1.7300E-03 1.0399E+00 3.6100E-01 4.7500E-01
1.1758E+00 4.1800E-01 1.4300E-02 3.0800E-01 9.1433E-02 2.7000E-03
0
6
3.4300E-03 1.3506E-02 2.4600E-02 1.8508E-03 3.8345E-01 4.7475E-03
5.0153E-01 6.2271E-03 6.3398E-01 3.4126E-03 7.0492E-01 2.2871E-03
26
4.1100E-03 1.5007E-03 2.9458E-02 4.2174E-03 2.9779E-02 7.8244E-03
3.3600E-02 2.7817E-03 4.1801E-01 3.4155E-01 4.5772E-01 2.3661E-03
5.1035E-01 8.5239E-03 5.3609E-01 9.9000E-01 5.3910E-01 1.3959E-02
5.5390E-01 6.6231E-03 5.8605E-01 1.6929E-02 6.0353E-01 6.1479E-03
6.6854E-01 9.6129E-01 6.8599E-01 1.0692E-02 7.3948E-01 8.2269E-01
8.0023E-01 1.0098E-03 8.0829E-01 2.3562E-03 8.7735E-01 1.9107E-03
9.6702E-01 8.7714E-03 1.0965E+00 5.5242E-03 1.1222E+00 2.5344E-03
1.1575E+00 1.1306E-01 1.2226E+00 1.7919E-03 1.2721E+00 7.4844E-03
1.4039E+00 3.4452E-03 8.0994E-01 8.5378E-03
I -135      6.61 H      53.
0
21  1  20
2.3591E-01 6.6000E-02 1.4000E-03 2.4489E-01 6.8000E-02 1.2600E-03
2.6369E-01 7.4000E-02 1.4000E-03 3.0228E-01 8.6000E-02 1.0800E-02
3.3901E-01 9.8000E-02 9.1000E-03 3.5376E-01 1.0300E-01 1.3900E-02
4.5553E-01 1.3800E-01 4.7300E-02 4.7796E-01 1.4500E-01 7.3300E-02
6.1806E-01 1.9600E-01 1.5700E-02 6.6511E-01 2.1300E-01 1.1000E-02
7.4268E-01 2.4300E-01 7.9000E-02 8.1656E-01 2.7200E-01 6.1000E-03
9.1978E-01 3.1300E-01 8.7000E-02 1.0329E+00 3.5900E-01 2.1800E-01
1.1457E+00 4.0500E-01 7.9000E-02 1.2534E+00 4.5100E-01 7.4000E-02
1.2626E+00 4.5400E-01 1.0000E-03 1.4506E+00 5.3500E-01 2.3600E-01
1.5795E+00 5.9100E-01 1.2000E-02 2.1845E+00 8.5800E-01 1.9000E-02
6.4700E-01 2.0722E-01 1.5400E-03
0
4
3.4300E-03 2.1968E-03 2.4600E-02 3.0104E-04 1.8594E-01 1.5009E-03
2.5389E-01 1.2112E-03
50
4.1100E-03 2.4409E-04 2.9458E-02 6.8596E-04 2.9779E-02 1.2727E-03
3.3600E-02 4.5244E-04 2.2050E-01 1.7452E-02 2.2972E-01 2.3174E-03
2.6426E-01 1.8396E-03 2.8845E-01 3.0899E-02 2.9027E-01 3.0327E-03
3.6185E-01 1.8597E-03 4.0303E-01 2.3174E-03 4.1483E-01 3.0040E-03
4.1763E-01 3.5190E-02 4.2993E-01 3.0327E-03 4.3374E-01 5.5217E-03
4.5163E-01 3.1471E-03 5.4656E-01 7.1239E-02 5.7597E-01 1.2875E-03
6.4985E-01 4.5490E-03 6.9013E-01 1.2875E-03 7.0792E-01 6.5803E-03
7.8548E-01 1.5163E-03 7.9771E-01 1.7166E-03 8.3680E-01 6.6661E-02
9.6146E-01 1.4591E-03 9.7196E-01 8.8691E-03 9.7261E-01 1.2016E-02

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ENERGY.DAT

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9.9509E-01 1.5449E-03 1.0388E+00 7.9250E-02 1.1016E+00 1.6022E-02
1.1240E+00 3.6049E-02 1.1315E+00 2.2516E-01 1.1599E+00 1.0300E-03
1.1690E+00 8.7260E-03 1.2405E+00 9.0121E-03 1.2604E+00 2.8610E-01
1.3679E+00 6.0653E-03 1.4484E+00 3.1471E-03 1.4576E+00 8.6402E-02
1.5028E+00 1.0729E-02 1.5664E+00 1.2875E-02 1.6780E+00 9.5271E-02
1.7065E+00 4.0912E-02 1.7912E+00 7.6961E-02 1.8307E+00 5.7792E-03
1.9273E+00 2.9468E-03 2.0459E+00 8.6974E-03 2.2555E+00 6.1225E-03
2.4087E+00 9.5271E-03 1.0734E+00 1.4948E-02
XE-135M      15.36 M      54.
0
0
0
5
3.4300E-03 1.4912E-01 2.4600E-02 1.6871E-02 4.9200E-01 1.5199E-01
5.2111E-01 2.8899E-02 5.2542E-01 9.5197E-03
5
4.1100E-03 1.6569E-02 2.9458E-02 3.8443E-02 2.9779E-02 7.1324E-02
3.3600E-02 2.5356E-02 5.2656E-01 8.0997E-01
XE-135      9.11 H      54.
0
5
9.6581E-02 2.5300E-02 1.2300E-03 5.5081E-01 1.7100E-01 3.1300E-02
7.5101E-01 2.4600E-01 5.8500E-03 9.0921E-01 3.0800E-01 9.6100E-01
1.7800E-01 4.8000E-02 7.5000E-04
0
5
3.5500E-03 5.3166E-02 2.5500E-02 5.9658E-03 2.1381E-01 5.6817E-02
2.4408E-01 9.1698E-03 2.4858E-01 2.3374E-03
10
4.2900E-03 6.5710E-03 3.0625E-02 1.4461E-02 3.0973E-02 2.6780E-02
3.5000E-02 9.6093E-03 1.5820E-01 2.8858E-03 2.4979E-01 8.9900E-01
3.5839E-01 2.2025E-03 4.0799E-01 3.5780E-03 6.0819E-01 2.8948E-02
6.8433E-01 2.0929E-03
CS-135      2.3E6 Y      55.
0
1
2.0500E-01 5.6300E-02 1.0000E+00
0
0
0
0
XE-137      3.83 M      54.
0
8
1.4940E+00 5.5300E-01 7.2000E-03 2.2760E+00 9.0200E-01 1.3600E-03
2.5605E+00 1.0320E+00 3.8000E-03 2.7692E+00 1.1280E+00 1.7200E-03
3.4951E+00 1.4650E+00 6.4000E-03 3.8885E+00 1.6490E+00 3.0000E-01
4.3440E+00 1.8620E+00 6.7000E-01 1.9910E+00 7.8350E-01 5.7320E-03
0

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ENERGY.DAT

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3
3.5500E-03 2.8695E-03 2.5500E-02 3.8037E-04 4.1951E-01 3.6226E-03
16
4.2900E-03 3.5465E-04 3.0625E-02 9.2205E-04 3.0973E-02 1.7075E-03
3.5000E-02 6.1268E-04 2.9800E-01 1.1666E-03 3.9335E-01 1.3815E-03
4.5549E-01 3.0700E-01 8.4895E-01 6.1400E-03 9.8225E-01 2.0569E-03
1.1193E+00 1.0530E-03 1.2732E+00 2.2411E-03 1.5768E+00 1.0131E-03
1.6125E+00 1.2280E-03 1.7834E+00 4.0831E-03 2.8498E+00 1.8113E-03
1.4906E+00 1.3150E-02
CS-137      30.17 Y      55. (Includes daughter, BA-137M) 7/22/87 RAP
0
2
5.1155E-01 1.5680E-01 9.4600E-01 1.1732E+00 4.1520E-01 5.4000E-02
0
5
3.6700E-03 7.2020E-02 2.6400E-02 7.5672E-03 6.2421E-01 7.6437E-02
6.5566E-01 1.3812E-02 6.6036E-01 4.5408E-03
5
4.4700E-03 9.8204E-03 3.1817E-02 1.9585E-02 3.2194E-02 3.6134E-02
3.6400E-02 1.3149E-02 6.6165E-01 8.5121E-01
XE-138      14.13 M      54.
0
16 1 14
2.3162E-01 6.4000E-02 2.2700E-03 2.4903E-01 7.0000E-02 4.6000E-03
4.0242E-01 1.1900E-01 3.0600E-02 4.7694E-01 1.4500E-01 9.5000E-02
7.1332E-01 2.3100E-01 3.2600E-01 7.1788E-01 2.3300E-01 2.8000E-03
9.4599E-01 3.2300E-01 2.3000E-03 1.3679E+00 4.9800E-01 1.6000E-03
1.5348E+00 5.7100E-01 1.9000E-03 1.7880E+00 6.8200E-01 2.7000E-03
2.2898E+00 9.0800E-01 2.0100E-01 2.3279E+00 9.2500E-01 1.3800E-01
2.4816E+00 9.9600E-01 5.1000E-02 2.7292E+00 1.0990E+00 5.0000E-02
2.7243E+00 1.1070E+00 9.0000E-02 1.6800E+00 6.3717E-01 1.6800E-03
0
14
3.5500E-03 4.9107E-01 3.6329E-03 3.2089E-01 4.6192E-03 1.0587E-01
5.1357E-03 5.0958E-01 9.6329E-03 1.0373E-01 1.0619E-02 3.4251E-02
2.5500E-02 4.2346E-03 1.1777E-01 1.6074E-02 1.4804E-01 3.3935E-03
2.0658E-01 2.4056E-03 2.2233E-01 1.8050E-02 2.5260E-01 2.8980E-03
3.6045E-01 1.0773E-03 3.9851E-01 2.7225E-03
49
4.2900E-03 6.0694E-02 4.8500E-03 1.9215E-03 1.0850E-02 6.9615E-03
3.0625E-02 1.0265E-02 3.0973E-02 1.9009E-02 3.5000E-02 6.8208E-03
1.5375E-01 5.9535E-02 2.4256E-01 3.4965E-02 2.5831E-01 3.1500E-01
2.8251E-01 4.2840E-03 3.3528E-01 1.0710E-03 3.7144E-01 5.0085E-03
3.9643E-01 6.3000E-02 4.0136E-01 2.1735E-02 4.3449E-01 2.0318E-01
5.0022E-01 3.6225E-03 5.3007E-01 2.5200E-03 5.3776E-01 1.1655E-03
5.5595E-01 1.1655E-03 5.6853E-01 3.0555E-03 5.8884E-01 1.2285E-03
6.5408E-01 1.4490E-03 8.6582E-01 2.9610E-03 8.6935E-01 6.2055E-03
8.9687E-01 1.3230E-03 9.1251E-01 3.2760E-03 9.1713E-01 9.1980E-03

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ENERGY.DAT

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9.3636E-01 1.3545E-03 9.4125E-01 2.2995E-03 1.0939E+00 4.0950E-03
1.0988E+00 2.1420E-03 1.1022E+00 1.0710E-03 1.1143E+00 1.4742E-02
1.1416E+00 5.1345E-03 1.1454E+00 1.3230E-03 1.5718E+00 2.6460E-03
1.6146E+00 2.3625E-03 1.7683E+00 1.6727E-01 1.8125E+00 1.7955E-03
1.8509E+00 1.4238E-02 1.9254E+00 5.6385E-03 2.0048E+00 5.3550E-02
2.0158E+00 1.2254E-01 2.0792E+00 1.4427E-02 2.2523E+00 2.2869E-02
2.3219E+00 6.2055E-03 2.4753E+00 3.1185E-03 2.4976E+00 1.7325E-03
1.1186E+00 2.6586E-02
CS-138      32.2 M      55.
0
27
7.0012E-01 2.2600E-01 2.5700E-03 8.2190E-01 2.7300E-01 1.6300E-03
1.0875E+00 3.8000E-01 1.0000E-03 1.2499E+00 4.4700E-01 1.9000E-03
1.3947E+00 5.0900E-01 4.8000E-03 1.4074E+00 5.1400E-01 2.0400E-03
1.6360E+00 6.1400E-01 3.0000E-03 1.6829E+00 6.3400E-01 4.3000E-03
1.9630E+00 7.5900E-01 2.2700E-03 1.9909E+00 7.7100E-01 1.7100E-03
2.0873E+00 8.1500E-01 2.7300E-03 2.1664E+00 8.5000E-01 3.4000E-03
2.2800E+00 9.0200E-01 1.6900E-03 2.3388E+00 9.2900E-01 6.5000E-03
2.3985E+00 9.5600E-01 2.0000E-03 2.4490E+00 9.7900E-01 3.7000E-03
2.4783E+00 9.9200E-01 2.0000E-03 2.5505E+00 1.0250E+00 1.6000E-02
2.6904E+00 1.0900E+00 8.8000E-02 2.7468E+00 1.1150E+00 1.6800E-02
2.8843E+00 1.1790E+00 4.4100E-01 2.9145E+00 1.1930E+00 6.6000E-03
3.0223E+00 1.2430E+00 7.3000E-02 3.1120E+00 1.2840E+00 1.2800E-01
3.4313E+00 1.4330E+00 1.3800E-01 3.8941E+00 1.6490E+00 4.4000E-02
1.7800E+00 6.7955E-01 2.9130E-03
0
7
3.6700E-03 1.0053E-02 2.6400E-02 1.1169E-03 1.0066E-01 5.8026E-03
1.3211E-01 1.3837E-03 1.9032E-01 1.3264E-03 4.2534E-01 3.1671E-03
5.0950E-01 9.8546E-04
52
4.4700E-03 1.3709E-03 3.1817E-02 2.8906E-03 3.2194E-02 5.3333E-03
3.6400E-02 1.9408E-03 1.1260E-01 1.2971E-03 1.3810E-01 1.4879E-02
1.9196E-01 5.0358E-03 1.9389E-01 3.2809E-03 2.1232E-01 1.7473E-03
2.2776E-01 1.5107E-02 3.2490E-01 2.8994E-03 3.6393E-01 2.4416E-03
3.6529E-01 1.9075E-03 4.0898E-01 4.6619E-02 4.2159E-01 4.2728E-03
4.6279E-01 3.0749E-01 5.1674E-01 4.2728E-03 5.4694E-01 1.0758E-01
6.8359E-01 1.0835E-03 7.6610E-01 1.4573E-03 7.7331E-01 2.3271E-03
7.8208E-01 3.2809E-03 8.7180E-01 5.1121E-02 8.8080E-01 1.1445E-03
9.3503E-01 1.8083E-03 1.0098E+00 2.9833E-01 1.0543E+00 1.5870E-03
1.1472E+00 1.2437E-02 1.1992E+00 1.6786E-03 1.2037E+00 3.9676E-03
1.2649E+00 1.3734E-03 1.3436E+00 1.1445E-02 1.4157E+00 3.6624E-03
1.4359E+00 7.6300E-01 1.4450E+00 9.6901E-03 1.4956E+00 1.8312E-03
1.5553E+00 3.6624E-03 1.6141E+00 1.3734E-03 1.7171E+00 1.0682E-03
1.7277E+00 1.1140E-03 1.7783E+00 1.3734E-03 2.0239E+00 1.1750E-03
2.0623E+00 1.1064E-03 2.2107E+00 2.1364E-03 2.2180E+00 1.5184E-01
2.4994E+00 1.6786E-03 2.5832E+00 2.3882E-03 2.6396E+00 7.6300E-02
2.7311E+00 1.1979E-03 3.3390E+00 1.5107E-03 3.3670E+00 2.2737E-03

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ENERGY.DAT

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1.6132E+00 1.6214E-02
CS-139      9.40 M      55.
0
31
5.3833E-01 1.6600E-01 1.5000E-03 7.3969E-01 2.4100E-01 1.6000E-03
8.3967E-01 2.8000E-01 1.0000E-03 1.2067E+00 4.2900E-01 1.3000E-03
1.2096E+00 4.3000E-01 1.3000E-03 1.3563E+00 4.9300E-01 1.0000E-03
1.5547E+00 5.7800E-01 2.3000E-03 1.5983E+00 5.9700E-01 5.6000E-03
1.6721E+00 6.3000E-01 5.3000E-03 1.6743E+00 6.3100E-01 1.2000E-03
1.8233E+00 6.9600E-01 1.5000E-03 1.8542E+00 7.1000E-01 1.3000E-02
1.9851E+00 7.6900E-01 1.0000E-03 2.0301E+00 7.8900E-01 2.9000E-03
2.0931E+00 8.1700E-01 8.0000E-03 2.1141E+00 8.2700E-01 1.2000E-03
2.1661E+00 8.5000E-01 2.1000E-03 2.1831E+00 8.5800E-01 1.6000E-03
2.2549E+00 8.9000E-01 2.7000E-03 2.2705E+00 8.9800E-01 3.1000E-03
2.3165E+00 9.1800E-01 2.9000E-03 2.3266E+00 9.2300E-01 3.6000E-03
2.3530E+00 9.3500E-01 1.2000E-03 2.5053E+00 1.0050E+00 1.5000E-03
2.5232E+00 1.0130E+00 4.5000E-03 2.5833E+00 1.0400E+00 3.8000E-03
2.7833E+00 1.1320E+00 3.8000E-03 2.8958E+00 1.1840E+00 2.4000E-03
2.9207E+00 1.1960E+00 6.3000E-02 4.2040E+00 1.7940E+00 8.4000E-01
1.3570E+00 5.0841E-01 1.2740E-02
0
0
34
4.5466E-01 1.3104E-03 5.3198E-01 2.1384E-03 5.6772E-01 1.3464E-03
6.2724E-01 1.5408E-02 8.2752E-01 1.0944E-03 9.2918E-01 2.3040E-03
9.4646E-01 1.0080E-03 1.1904E+00 1.8432E-03 1.2832E+00 7.2000E-02
1.3061E+00 1.0584E-03 1.3081E+00 3.7440E-03 1.3218E+00 2.3400E-03
1.4106E+00 1.5048E-03 1.4207E+00 7.9920E-03 1.6207E+00 4.1760E-03
1.6807E+00 6.0480E-03 1.6987E+00 1.7712E-03 1.8775E+00 3.4056E-03
1.8876E+00 2.1960E-03 1.9045E+00 1.2312E-03 1.9335E+00 2.4408E-03
2.0208E+00 1.2960E-03 2.0899E+00 1.3608E-03 2.1109E+00 6.5520E-03
2.1740E+00 2.0088E-03 2.3499E+00 5.6160E-03 2.3807E+00 1.8720E-03
2.5318E+00 4.1760E-03 2.6058E+00 2.4336E-03 2.6493E+00 1.6704E-03
2.8476E+00 1.0080E-03 3.4643E+00 1.0872E-03 3.6656E+00 1.3680E-03
1.5695E+00 3.8697E-02
BA-139      83.1 M      56.
0
4
8.8547E-01 2.9740E-01 3.2000E-03 2.1401E+00 8.3700E-01 2.2000E-01
2.3060E+00 9.1200E-01 7.8000E-01 9.0100E-01 3.0467E-01 6.1700E-04
0
5
3.8000E-03 3.2007E-02 2.7400E-02 3.4105E-03 1.2693E-01 3.6282E-02
1.5959E-01 4.8608E-03 1.6449E-01 1.2846E-03
7
4.6500E-03 4.7826E-03 3.3034E-02 9.3441E-03 3.3442E-02 1.7208E-02
3.7800E-02 6.3195E-03 1.6585E-01 1.7360E-01 1.4205E+00 2.8000E-03
1.2711E+00 1.0532E-03

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ENERGY.DAT

BA-140 12.789 D 56.

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0
5 2 3 5
4.5385E-01 1.3600E-01 2.6000E-01 5.6747E-01 1.7700E-01 1.0200E-01
8.7232E-01 3.0600E-01 4.4000E-02 9.9117E-01 3.4000E-01 3.7000E-01
1.0050E+00 3.5700E-01 2.2000E-01
0
12
3.8000E-03 9.8464E-01 7.5837E-03 5.0556E-01 1.2489E-02 1.0440E-01
1.3580E-02 3.4486E-02 2.3704E-02 6.0588E-01 2.7400E-02 1.9417E-03
2.8609E-02 1.2482E-01 2.9700E-02 4.1233E-02 1.2372E-01 1.6022E-02
1.5637E-01 2.1542E-03 2.6592E-01 1.9826E-03 4.9840E-01 2.6520E-03
14
4.6500E-03 1.4713E-01 1.3850E-02 1.1730E-02 2.9970E-02 1.4025E-01
3.3034E-02 5.3199E-03 3.3442E-02 9.7972E-03 3.7800E-02 3.5979E-03
1.3284E-01 2.1420E-03 1.6264E-01 6.7320E-02 3.0484E-01 4.5058E-02
4.2370E-01 3.2461E-02 4.3755E-01 1.9941E-02 4.6757E-01 1.5300E-03
5.3732E-01 2.5500E-01 1.1884E-01 7.1400E-04

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LA-140 40.22 H 57.

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0
10 1 1
1.2131E+00 4.3820E-01 6.4000E-03 1.2388E+00 4.4110E-01 1.1110E-01
1.2444E+00 4.4350E-01 5.8900E-02 1.2793E+00 4.5820E-01 1.1900E-02
1.2962E+00 4.6530E-01 5.6300E-02 1.3482E+00 4.8740E-01 4.4500E-01
1.4123E+00 5.1470E-01 5.0800E-02 1.6770E+00 6.2950E-01 2.0700E-01
2.1640E+00 8.4620E-01 5.2000E-02 9.5780E-01 3.2889E-01 1.6150E-03
0
9
3.9400E-03 1.7058E-02 1.8046E-02 2.5032E-03 2.8400E-02 1.6214E-03
2.8473E-02 1.8558E-03 6.8974E-02 1.5126E-03 9.0678E-02 2.3815E-03
2.8832E-01 8.0684E-03 3.2222E-01 1.0717E-03 4.4659E-01 4.4000E-03
23
4.8400E-03 2.5489E-03 3.4279E-02 4.7176E-03 3.4720E-02 8.6562E-03
3.9300E-02 3.2231E-03 1.0942E-01 1.9098E-03 1.3112E-01 5.5384E-03
1.7355E-01 1.2414E-03 2.4197E-01 4.2970E-03 2.6655E-01 4.8700E-03
3.2877E-01 2.0530E-01 4.3253E-01 2.9411E-02 4.8703E-01 4.5549E-01
7.5179E-01 4.4021E-02 8.1585E-01 2.3491E-01 8.6782E-01 5.6339E-02
9.1963E-01 2.8838E-02 9.2524E-01 7.0854E-02 9.5090E-01 5.3474E-03
1.5965E+00 9.5490E-01 2.3488E+00 8.5082E-03 2.5217E+00 3.4567E-02
2.5471E+00 1.0408E-03 1.2080E+00 4.1632E-03

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CS-136 13.16 D 55.

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0
4
1.7439E-01 4.7200E-02 2.4900E-02 1.9155E-01 5.2300E-02 2.1000E-03
3.4100E-01 9.8800E-02 9.5100E-01 6.8154E-01 2.1900E-01 2.2000E-02
0
23
3.6700E-03 2.0665E-01 2.6400E-02 1.9108E-02 2.9469E-02 7.3155E-02

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ENERGY.DAT

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4.8849E-02 1.8404E-02 6.0921E-02 1.0419E-02 6.5617E-02 2.6670E-03
7.2219E-02 3.7729E-03 8.0301E-02 2.5313E-03 1.0367E-01 1.5411E-03
1.1578E-01 2.3790E-02 1.2645E-01 4.9746E-02 1.2909E-01 1.4070E-03
1.3911E-01 5.5050E-03 1.4723E-01 6.7267E-03 1.5193E-01 1.8122E-03
1.5790E-01 3.9751E-02 1.6260E-01 8.8899E-03 1.6364E-01 2.3261E-03
2.3621E-01 1.5827E-03 3.0313E-01 1.2114E-02 3.3458E-01 2.0835E-03
7.8106E-01 2.4127E-03 1.0106E+00 1.1218E-03
20
4.4700E-03 2.8180E-02 3.1817E-02 4.9454E-02 3.2194E-02 9.1244E-02
3.6400E-02 3.3205E-02 6.6910E-02 1.2463E-01 8.6290E-02 6.2811E-02
1.0966E-01 4.0877E-03 1.5322E-01 7.4576E-02 1.6389E-01 4.6061E-02
1.6653E-01 6.2811E-03 1.7655E-01 1.3559E-01 1.8725E-01 5.9820E-03
2.7365E-01 1.2662E-01 3.1987E-01 5.9820E-03 3.4057E-01 4.8454E-01
5.0721E-01 9.7706E-03 8.1850E-01 9.9700E-01 1.0481E+00 7.9561E-01
1.2353E+00 1.9741E-01 7.8724E-01 3.3001E-03
8A-141      18.27 M      56.
0
24
5.6103E-01 1.7400E-01 6.2000E-03 5.8920E-01 1.8400E-01 2.4000E-03
6.4410E-01 2.0500E-01 1.7000E-03 6.5397E-01 2.0800E-01 8.2000E-03
8.1309E-01 2.6900E-01 6.5000E-03 8.4944E-01 2.8300E-01 4.8000E-03
1.1041E+00 3.8600E-01 2.2600E-02 1.1573E+00 4.0800E-01 4.1000E-02
1.1857E+00 4.2000E-01 2.6000E-02 1.2891E+00 4.6300E-01 2.5100E-02
1.4020E+00 5.1100E-01 2.3200E-02 1.4639E+00 5.3800E-01 2.1000E-03
1.5283E+00 5.6600E-01 6.7000E-02 1.6040E+00 5.9900E-01 3.9000E-03
1.8408E+00 7.0300E-01 3.4000E-03 1.8580E+00 7.1100E-01 1.5800E-02
1.9634E+00 7.5800E-01 3.7000E-02 2.0382E+00 7.9100E-01 1.9000E-03
2.1006E+00 8.1900E-01 1.2600E-01 2.1983E+00 8.6300E-01 2.1300E-02
2.2036E+00 8.6600E-01 5.4000E-03 2.3821E+00 9.4700E-01 2.4500E-01
2.5627E+00 1.0290E+00 1.9000E-01 2.8397E+00 1.1560E+00 1.2000E-01
0
5
3.8000E-03 6.6797E-02 2.7400E-02 7.1267E-03 1.5130E-01 7.5816E-02
1.8395E-01 1.0060E-02 1.8886E-01 2.6584E-03
93
4.6500E-03 9.9812E-03 3.3034E-02 1.9526E-02 3.3442E-02 3.5959E-02
3.7800E-02 1.3205E-02 1.1294E-01 9.8658E-03 1.6296E-01 4.6656E-03
1.8050E-01 5.2002E-03 1.9022E-01 4.8600E-01 2.7699E-01 2.4592E-01
3.0424E-01 2.6584E-01 3.4371E-01 1.5017E-01 3.4935E-01 3.0132E-03
3.6438E-01 6.1236E-03 3.8131E-01 1.2150E-03 3.8978E-01 1.3948E-02
4.5758E-01 5.0544E-02 4.6215E-01 5.0544E-02 4.6726E-01 5.7834E-02
5.2219E-01 4.5684E-03 5.2420E-01 4.2768E-03 5.2742E-01 3.9852E-03
5.6190E-01 1.0206E-03 5.7209E-01 2.6730E-03 5.7209E-01 2.6730E-03
5.9928E-01 2.4786E-03 6.0891E-01 2.5758E-03 6.2523E-01 3.4506E-02
6.3605E-01 2.9646E-03 6.4138E-01 3.8394E-03 6.4788E-01 5.9292E-02
6.7004E-01 1.8954E-03 6.7420E-01 1.1178E-03 6.7570E-01 2.2842E-03
6.8570E-01 1.4094E-03 6.8780E-01 1.0692E-03 6.9850E-01 2.9646E-03
7.0000E-01 2.2356E-03 7.0480E-01 3.1590E-03 7.3910E-01 4.5198E-02

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ENERGY.DAT

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7.5390E-01 1.0206E-03 7.6220E-01 1.4580E-03 7.7820E-01 1.1178E-03
8.0540E-01 1.0206E-03 8.2634E-01 3.4506E-03 8.3172E-01 1.5989E-02
8.3260E-01 1.7010E-03 8.6790E-01 1.5552E-03 8.7629E-01 3.5964E-02
8.8060E-01 2.0898E-03 9.0880E-01 1.3122E-03 9.2947E-01 7.3386E-03
9.4325E-01 7.6788E-03 9.8163E-01 8.2134E-03 9.9660E-01 1.3122E-03
1.0123E+00 1.0692E-03 1.0345E+00 3.1104E-03 1.0404E+00 1.0206E-03
1.0463E+00 3.6450E-03 1.0940E+00 2.3328E-03 1.1608E+00 2.5272E-03
1.1608E+00 9.7200E-03 1.1975E+00 4.8600E-02 1.2248E+00 4.3254E-03
1.2355E+00 1.5066E-03 1.2642E+00 8.6508E-03 1.2736E+00 5.4432E-03
1.2782E+00 6.9498E-03 1.3091E+00 2.4786E-03 1.3112E+00 6.3180E-03
1.3237E+00 9.9630E-03 1.3453E+00 2.3328E-03 1.3575E+00 1.6524E-03
1.3770E+00 7.4358E-03 1.4056E+00 2.8674E-03 1.4368E+00 8.6994E-03
1.4586E+00 7.1442E-03 1.5018E+00 3.2562E-03 1.5506E+00 3.2562E-03
1.5688E+00 2.6730E-03 1.6540E+00 7.8732E-03 1.6824E+00 1.4143E-02
1.7132E+00 1.7982E-03 1.7356E+00 1.9440E-03 1.7408E+00 3.3048E-03
1.7959E+00 5.1030E-03 1.9127E+00 1.3608E-03 1.9903E+00 1.9440E-03
2.0266E+00 3.9852E-03 2.1367E+00 1.1664E-03 2.1647E+00 1.6524E-03
2.2789E+00 1.0206E-03 2.4690E+00 1.9440E-03 1.2520E+00 1.7302E-02
LA-141      3.94 H      57.
0
4
7.3668E-01 2.3900E-01 1.2000E-03 1.0755E+00 3.7300E-01 2.6100E-02
2.4300E+00 9.6700E-01 9.7000E-01 4.0000E-01 1.2545E-01 2.6180E-03
0
0
3
1.3545E+00 2.6200E-02 1.6933E+00 1.1790E-03 1.6743E+00 3.1073E-03
CE-141      32.50 D      58.
0
2
4.3456E-01 1.2960E-01 7.0500E-01 5.8000E-01 1.8070E-01 2.9500E-01
0
6
4.0800E-03 1.6282E-01 2.9400E-02 1.5962E-02 1.0345E-01 1.8779E-01
1.3861E-01 2.5942E-02 1.4393E-01 5.4208E-03 1.4514E-01 1.4907E-03
5
5.0300E-03 2.6505E-02 3.5550E-02 4.8821E-02 3.6026E-02 8.9416E-02
4.0700E-02 3.3592E-02 1.4544E-01 4.8400E-01
BA-142      10.70 M      56.
0
13
7.4256E-01 2.4000E-01 1.2600E-01 9.1660E-01 3.1000E-01 1.6000E-03
9.9600E-01 3.4000E-01 4.0000E-01 1.1216E+00 3.9000E-01 1.8000E-01
1.3331E+00 4.8000E-01 4.4000E-03 1.3918E+00 5.1000E-01 3.0000E-03
1.4078E+00 5.1000E-01 7.1000E-03 1.6094E+00 6.0000E-01 3.7000E-03
1.7750E+00 6.7000E-01 4.6000E-02 1.7680E+00 6.7000E-01 3.1000E-02
1.8998E+00 7.3000E-01 2.7000E-03 2.0451E+00 7.9000E-01 1.6000E-03
2.1224E+00 8.3000E-01 1.8000E-01

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ENERGY.DAT

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0
6
3.8000E-03 2.5683E-01 2.7400E-02 2.0239E-02 3.8675E-02 2.1531E-01
7.1334E-02 1.0573E-01 7.6239E-02 2.3069E-02 7.7330E-02 6.0556E-03
58
4.6500E-03 3.8376E-02 3.3034E-02 5.5450E-02 3.3442E-02 1.0212E-01
3.7800E-02 3.7501E-02 6.9400E-02 3.5600E-03 7.6800E-02 8.9000E-03
7.7600E-02 9.6120E-02 1.2289E-01 9.2560E-03 1.5422E-01 5.1620E-03
1.6200E-01 1.0680E-03 1.7682E-01 1.4774E-02 2.1630E-01 1.9580E-03
2.2260E-01 2.6700E-03 2.3152E-01 1.0146E-01 2.4270E-01 1.6020E-03
2.5512E-01 1.7800E-01 2.6933E-01 6.7640E-03 2.8390E-01 1.7800E-03
2.8620E-01 9.2560E-03 3.0902E-01 2.2606E-02 3.3480E-01 1.2460E-02
3.3710E-01 2.4920E-03 3.4670E-01 1.4240E-03 3.6380E-01 3.9160E-02
3.7910E-01 4.6280E-03 4.1780E-01 3.3820E-03 4.2503E-01 4.9840E-02
4.3230E-01 9.7900E-03 4.3440E-01 3.0260E-03 4.4810E-01 2.1360E-03
4.5730E-01 3.9160E-03 4.7340E-01 3.0260E-03 4.8830E-01 1.0680E-03
5.1330E-01 2.3140E-03 5.3750E-01 1.0680E-03 5.5830E-01 3.0260E-03
5.9070E-01 2.4920E-03 5.9984E-01 1.6020E-02 6.0420E-01 3.2040E-03
7.6940E-01 6.0520E-03 7.8640E-01 2.4920E-03 7.9220E-01 2.1360E-03
8.2340E-01 4.0940E-03 8.4023E-01 3.0260E-02 8.9490E-01 1.1036E-01
9.4875E-01 8.9000E-02 1.0009E+00 7.8320E-02 1.0328E+00 4.8060E-03
1.0785E+00 9.2560E-02 1.0936E+00 2.2072E-02 1.1226E+00 3.0260E-03
1.1265E+00 1.5308E-02 1.1483E+00 3.9160E-03 1.2022E+00 5.3400E-02
1.2041E+00 1.3706E-01 1.2834E+00 1.6020E-03 1.3799E+00 3.3998E-02
6.8510E-01 1.6020E-03
LA-142          95.4 M      57.
0
25  1  25
4.7413E-01 1.4330E-01 1.5000E-02 5.4160E-01 1.6710E-01 1.0000E-03
6.6650E-01 2.1270E-01 2.6000E-03 7.9788E-01 2.6260E-01 5.8000E-03
7.9996E-01 2.6350E-01 5.8000E-03 8.4155E-01 2.7960E-01 1.2000E-02
8.8417E-01 2.9640E-01 1.5000E-02 9.0389E-01 3.0420E-01 4.3000E-02
9.0492E-01 3.0460E-01 1.7000E-02 1.0473E+00 3.6190E-01 6.3000E-03
1.0577E+00 3.6610E-01 1.8000E-02 1.0967E+00 3.8210E-01 2.5000E-02
1.5172E+00 5.6000E-01 1.3600E-02 1.7754E+00 6.7300E-01 1.3100E-02
1.8207E+00 6.9300E-01 8.1000E-02 1.8503E+00 7.0600E-01 3.7000E-02
1.9744E+00 7.6100E-01 2.0100E-01 2.1193E+00 8.2600E-01 2.1500E-01
2.1528E+00 8.4100E-01 2.0000E-02 2.3298E+00 9.2100E-01 6.9000E-02
2.5128E+00 1.0040E+00 2.1000E-02 2.8644E+00 1.1650E+00 8.0000E-03
2.9809E+00 1.2190E+00 3.0000E-02 3.8758E+00 1.6340E+00 5.2000E-02
4.5170E+00 1.9100E+00 7.0000E-02
0
3
3.9400E-03 1.9132E-03 2.8400E-02 2.2241E-04 6.0073E-01 2.4990E-03
125
4.8400E-03 2.8589E-04 3.4279E-02 6.4711E-04 3.4720E-02 1.1874E-03
3.9300E-02 4.4211E-04 1.0610E-01 1.5750E-03 1.7410E-01 1.0500E-03
3.6730E-01 1.0500E-03 3.9370E-01 1.0500E-03 4.2080E-01 2.6250E-03

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ENERGY.DAT

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4.3334E-01 4.2000E-03 5.1470E-01 1.5750E-03 5.3200E-01 1.5750E-03
5.7809E-01 1.3650E-02 6.1950E-01 1.5750E-03 6.4117E-01 5.2500E-01
8.6157E-01 1.9950E-02 8.7820E-01 2.1000E-03 8.9485E-01 9.3975E-02
9.4650E-01 1.0500E-03 9.6220E-01 4.2000E-03 9.9120E-01 1.0500E-03
1.0067E+00 2.6250E-03 1.0114E+00 4.3575E-02 1.0392E+00 1.0500E-03
1.0437E+00 3.0450E-02 1.0618E+00 1.5750E-03 1.0703E+00 1.5750E-03
1.0742E+00 1.0500E-03 1.0889E+00 2.6250E-03 1.1126E+00 1.0500E-03
1.1167E+00 1.0500E-03 1.1306E+00 5.2500E-03 1.1445E+00 1.5750E-03
1.1602E+00 1.9425E-02 1.1743E+00 1.5750E-03 1.1909E+00 4.2000E-03
1.2315E+00 3.1500E-03 1.2331E+00 2.0475E-02 1.2423E+00 2.1000E-03
1.2647E+00 1.0500E-03 1.2701E+00 1.0500E-03 1.2880E+00 1.0500E-03
1.3232E+00 3.6750E-03 1.3323E+00 1.0500E-03 1.3546E+00 1.0500E-03
1.3630E+00 2.3625E-02 1.3736E+00 2.1000E-03 1.3893E+00 4.7250E-03
1.3953E+00 2.1000E-03 1.4022E+00 1.5750E-03 1.4455E+00 1.5750E-03
1.4551E+00 1.0500E-03 1.4937E+00 1.5750E-03 1.5163E+00 4.7250E-03
1.5355E+00 2.6250E-03 1.5402E+00 5.2500E-03 1.5458E+00 3.3075E-02
1.6182E+00 3.1500E-03 1.6514E+00 2.1000E-03 1.6881E+00 2.6250E-03
1.7229E+00 1.6800E-02 1.7524E+00 1.0500E-03 1.7564E+00 3.3075E-02
1.7680E+00 2.1000E-03 1.7710E+00 2.1000E-03 1.7938E+00 1.0500E-03
1.8063E+00 1.5750E-03 1.8171E+00 1.0500E-03 1.8854E+00 5.7750E-03
1.9013E+00 8.7150E-02 1.9230E+00 2.6250E-03 1.9335E+00 1.5750E-03
1.9482E+00 5.2500E-03 1.9606E+00 1.5750E-03 2.0042E+00 1.0500E-02
2.0255E+00 1.3650E-02 2.0387E+00 1.1025E-02 2.0504E+00 5.2500E-03
2.0552E+00 2.9400E-02 2.0769E+00 7.3500E-03 2.0861E+00 4.2000E-03
2.1004E+00 1.0500E-02 2.1262E+00 3.6750E-03 2.1393E+00 5.7750E-03
2.1803E+00 5.7750E-03 2.1872E+00 5.8275E-02 2.2905E+00 3.6750E-03
2.3584E+00 8.4000E-03 2.3644E+00 4.7250E-03 2.3977E+00 1.6275E-01
2.4195E+00 2.1000E-03 2.4594E+00 4.2000E-03 2.5132E+00 1.5750E-03
2.5323E+00 1.0500E-03 2.5394E+00 7.8750E-03 2.5427E+00 1.1235E-01
2.6635E+00 7.8750E-03 2.6668E+00 1.8900E-02 2.6726E+00 2.1000E-03
2.7823E+00 3.1500E-03 2.8008E+00 6.3000E-03 2.8181E+00 8.4000E-03
2.8286E+00 2.6250E-03 2.9700E+00 7.8750E-03 2.9720E+00 3.3075E-02
2.9917E+00 1.0500E-03 2.9999E+00 5.2500E-03 3.0071E+00 2.1000E-03
3.0129E+00 7.3500E-03 3.0223E+00 1.0500E-03 3.0343E+00 5.7750E-03
3.0469E+00 4.2000E-03 3.0759E+00 1.5750E-03 3.1550E+00 2.1000E-03
3.1810E+00 3.1500E-03 3.2367E+00 3.1500E-03 3.2424E+00 2.1000E-03
3.2732E+00 1.5750E-03 3.3147E+00 1.3650E-02 3.4019E+00 3.1500E-03
3.4593E+00 3.6750E-03 3.6121E+00 8.9250E-03 3.6327E+00 1.1550E-02
3.7191E+00 3.1500E-03 3.8504E+00 2.6250E-03
CE-143      33.0 H      58.
0
8
5.7301E-02 1.4700E-02 3.8000E-03 2.9456E-01 8.3600E-02 5.1000E-03
5.1725E-01 1.5820E-01 1.4200E-02 5.6440E-01 1.7500E-01 3.9000E-03
7.3309E-01 2.3740E-01 1.2100E-01 1.1044E+00 3.8460E-01 4.8000E-01
1.3976E+00 5.0750E-01 3.8000E-01 1.8700E-01 5.1705E-02 1.9400E-03
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ENERGY.DAT

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4.0800E-03 5.9167E-01 1.5374E-02 6.5621E-01 2.9400E-02 5.7818E-02
5.0530E-02 9.2786E-02 5.5854E-02 1.9522E-02 5.7061E-02 5.3273E-03
1.8957E-01 1.9958E-03 2.5127E-01 2.2008E-02 2.8643E-01 3.4230E-03
20
5.0300E-03 9.6319E-02 3.5550E-02 1.7684E-01 3.6026E-02 3.2388E-01
4.0700E-02 1.2167E-01 5.7365E-02 1.1760E-01 1.6900E-01 2.9400E-03
2.1600E-01 2.0580E-03 2.3156E-01 2.0160E-02 2.9326E-01 4.2000E-01
3.3800E-01 2.8560E-03 3.5059E-01 3.3600E-02 4.3302E-01 1.3440E-03
4.3900E-01 1.1760E-03 4.9036E-01 1.9740E-02 5.8728E-01 2.4360E-03
6.6455E-01 5.2500E-02 7.2196E-01 5.1240E-02 8.8039E-01 9.2400E-03
1.1030E+00 3.6540E-03 6.1062E-01 8.9250E-03
PR-143      13.56 D      59.
0
2 1 2
9.3530E-01 3.1560E-01 1.0000E+00 1.9330E-01 6.2600E-02 1.2000E-08
0
0
1
7.4198E-01 1.2000E-08
CE-144      284.3 D      58.
0
3
1.8466E-01 5.0200E-02 1.9600E-01 2.3809E-01 6.6100E-02 4.7000E-02
3.1820E-01 9.1100E-02 7.7200E-01
0
13
4.0800E-03 9.6963E-02 1.1441E-02 6.3809E-03 2.6785E-02 1.1234E-02
2.9400E-02 7.9484E-03 3.2109E-02 3.1409E-03 3.4095E-02 8.1648E-03
3.8115E-02 3.3886E-02 3.9419E-02 2.2667E-03 7.3271E-02 4.6833E-03
7.8595E-02 1.2499E-03 9.1553E-02 5.3244E-02 1.2671E-01 7.3116E-03
1.3203E-01 1.9548E-03
9
5.0300E-03 1.5785E-02 3.3620E-02 2.8296E-03 3.5550E-02 2.4311E-02
3.6026E-02 4.4525E-02 4.0700E-02 1.6727E-02 4.0930E-02 3.8880E-03
8.0106E-02 1.5984E-02 1.3354E-01 1.0800E-01 6.7350E-02 1.3252E-03
PR-144M      7.2 M      59.
0
0
0
6
4.0800E-03 6.8121E-01 1.7039E-02 3.3380E-01 2.9400E-02 2.8373E-02
5.2195E-02 5.0170E-01 5.7519E-02 1.2493E-01 5.8726E-02 3.8277E-02
5
5.0300E-03 1.1089E-01 3.5550E-02 8.6780E-02 3.6026E-02 1.5894E-01
4.0700E-02 5.9709E-02 5.9030E-02 8.1851E-04
PR-144      17.28 M      59.
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4 2 2 4

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ENERGY.DAT

8.1032E-01 2.6660E-01 1.0800E-02 2.2995E+00 8.9440E-01 1.1700E-02
2.9960E+00 1.2214E+00 9.7740E-01 1.0440E-01 3.6919E-01 1.1320E-04
0
0
4
6.9649E-01 1.4800E-02 1.4892E+00 3.0044E-03 2.1857E+00 7.7404E-03
1.0586E+00 2.0350E-04
PR-142 19.13 H 59.
0
3 1 2
5.8304E-01 1.8150E-01 3.7000E-02 2.1588E+00 8.3280E-01 9.6300E-01
7.4200E-02 1.9200E-02 2.5000E-04
0
0
2
1.5758E+00 3.6994E-02 5.0880E-01 2.4786E-04
ND-147 10.98 D 60.
0
6
2.0991E-01 5.7600E-02 2.2200E-02 3.6479E-01 1.0610E-01 1.5300E-01
4.0655E-01 1.1990E-01 8.1000E-03 4.8529E-01 1.4670E-01 5.8000E-03
8.0470E-01 2.6400E-01 8.1100E-01 2.1530E-01 5.9200E-02 6.6000E-04
0
9
4.3800E-03 4.1601E-01 3.1500E-02 3.7481E-02 4.5922E-02 4.8720E-01
7.5296E-02 3.1212E-03 8.3678E-02 7.1120E-02 8.9457E-02 1.5204E-02
9.0776E-02 4.3120E-03 2.7423E-01 1.0231E-03 4.8583E-01 1.8253E-03
17
5.4300E-03 7.9239E-02 3.8171E-02 1.2956E-01 3.8725E-02 2.3557E-01
4.3800E-02 9.0554E-02 9.1106E-02 2.8000E-01 1.2048E-01 3.9760E-03
1.9664E-01 2.0440E-03 2.7537E-01 8.0360E-03 3.1941E-01 1.9600E-02
3.9816E-01 8.7360E-03 4.1048E-01 1.4000E-03 4.3990E-01 1.2040E-02
4.8924E-01 1.5400E-03 5.3102E-01 1.3132E-01 5.9480E-01 2.6600E-03
6.8590E-01 8.1480E-03 6.1662E-01 6.5520E-04
PM-147 2.6234 Y 61.
0
2
2.2470E-01 6.1960E-02 9.9994E-01 1.0350E-01 2.7098E-02 5.7305E-05
0
0
1
1.2126E-01 2.8503E-05
SM-147 1.069E11 Y 62.
1
2.2476E+00 1.0000E+00
0
0
0

ENERGY.DAT

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0
PM-148M      41.3 D      61.
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4
4.0715E-01 1.2000E-01 5.4000E-01 5.0563E-01 1.5400E-01 1.8600E-01
6.9526E-01 2.2200E-01 2.2000E-01 1.0069E+00 3.4300E-01 9.2000E-03
0
21
4.3800E-03 4.9166E-02 3.0516E-02 2.7720E-02 3.1500E-02 2.1067E-03
5.4072E-02 3.0786E-02 5.9851E-02 8.7360E-03 6.1170E-02 2.3730E-03
6.8272E-02 3.9060E-03 7.4051E-02 1.0626E-03 4.5300E-03 5.2417E-02
3.2600E-02 4.5563E-03 5.1646E-02 3.7360E-02 9.0743E-02 6.0369E-03
9.6757E-02 1.6799E-03 1.4280E-01 2.3175E-03 2.4128E-01 8.0369E-03
2.8037E-01 1.3939E-03 3.6724E-01 1.0675E-03 5.0344E-01 7.8364E-03
5.4253E-01 1.2997E-03 5.8314E-01 5.2687E-03 6.7887E-01 1.3957E-03
29
5.4300E-03 9.3650E-03 3.8171E-02 7.2825E-03 3.8725E-02 1.3241E-02
4.3800E-02 5.0898E-03 7.5700E-02 9.3240E-03 6.1500E-02 3.1920E-06
5.6400E-03 1.0736E-02 3.9522E-02 1.6710E-02 4.0118E-02 3.0271E-02
4.5400E-02 1.1745E-02 9.8480E-02 2.4741E-02 1.8963E-01 1.1036E-02
2.8811E-01 1.2558E-01 3.1163E-01 3.9159E-02 3.6209E-01 1.7800E-03
4.1407E-01 1.8663E-01 4.3278E-01 5.3488E-02 4.6057E-01 4.1829E-03
5.0126E-01 6.7461E-02 5.5027E-01 9.4872E-01 5.5324E-01 4.0049E-03
5.7195E-01 2.1360E-03 5.9974E-01 1.2540E-01 6.1126E-01 5.4823E-02
6.2997E-01 8.8998E-01 7.2570E-01 3.2840E-01 9.1533E-01 1.7168E-01
1.0138E+00 2.0283E-01 7.1479E-01 1.9313E-03
PM-148      5.37 D      61.
0
6
4.0604E-01 1.2000E-01 1.3600E-02 9.9887E-01 3.4000E-01 3.3300E-01
1.0395E+00 3.5600E-01 2.3500E-03 1.9137E+00 7.2800E-01 9.4000E-02
2.4640E+00 9.7500E-01 5.5500E-01 5.8500E-01 1.9174E-01 2.2990E-03
0
3
4.5300E-03 1.2971E-03 3.2600E-02 1.3084E-04 5.0344E-01 1.8172E-03
12
5.6400E-03 2.6568E-04 3.9522E-02 4.7984E-04 4.0118E-02 8.6927E-04
4.5400E-02 3.3728E-04 5.5027E-01 2.2000E-01 5.9283E-01 3.5298E-03
6.1126E-01 1.0212E-02 8.7418E-01 2.3532E-03 8.9642E-01 9.8124E-03
9.1485E-01 1.1455E-01 1.4651E+00 2.2200E-01 1.2939E+00 3.0481E-03
PM-149      53.08 H      61.
0
4
1.8920E-01 5.1400E-02 1.2600E-03 7.8510E-01 2.5610E-01 3.3900E-02
1.0710E+00 3.6900E-01 9.6230E-01 4.4100E-01 1.3345E-01 2.5480E-03
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4
4.5300E-03 2.8659E-03 1.4757E-02 1.3521E-03 3.2600E-02 1.7588E-04

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ENERGY.DAT

2.3907E-01 2.4428E-03

7

5.6400E-03 5.8699E-04 3.9522E-02 6.4502E-04 4.0118E-02 1.1685E-03

4.5400E-02 4.5338E-04 2.8590E-01 3.1000E-02 8.5940E-01 1.0230E-03

5.9833E-01 2.9852E-03

PM-151 28.40 H 61.

0

23

2.2366E-01 6.2000E-02 1.5900E-03 2.3451E-01 6.5000E-02 1.0400E-02

3.0064E-01 8.5000E-02 3.2000E-03 3.1034E-01 8.8000E-02 2.3500E-02

3.6536E-01 1.0600E-01 6.2000E-02 4.1402E-01 1.2200E-01 1.1500E-02

4.4693E-01 1.3300E-01 3.1600E-02 5.2444E-01 1.6000E-01 2.0500E-03

6.6688E-01 2.1200E-01 7.5000E-03 6.9768E-01 2.2300E-01 4.4000E-03

7.4230E-01 2.4000E-01 7.1000E-02 7.9241E-01 2.5900E-01 1.9500E-02

8.4309E-01 2.7800E-01 4.2700E-01 8.6405E-01 2.8700E-01 3.3300E-02

8.8121E-01 2.9300E-01 1.8500E-02 8.8536E-01 2.9500E-01 1.9000E-03

9.7900E-01 3.3200E-01 2.4200E-02 1.0196E+00 3.4800E-01 1.4300E-02

1.0202E+00 3.4800E-01 8.5000E-02 1.0832E+00 3.7400E-01 3.3000E-02

1.1183E+00 3.8800E-01 2.7000E-02 1.1880E+00 4.1700E-01 1.0000E-01

6.0000E-01 1.9132E-01 3.2300E-03

0

37

3.0982E-03 5.0787E-01 4.5300E-03 2.7460E-01 1.6069E-02 1.7469E-03

1.7943E-02 1.4929E-02 1.8053E-02 9.9849E-02 1.9000E-02 5.6877E-02

2.2884E-02 1.9859E-02 2.3957E-02 4.2532E-03 2.7413E-02 6.1715E-03

2.9385E-02 5.0563E-03 3.2600E-02 2.2004E-02 3.3427E-02 1.8755E-03

5.3183E-02 3.7446E-02 5.5099E-02 2.8978E-03 5.7150E-02 1.5401E-02

5.8005E-02 4.5079E-02 5.8097E-02 8.1636E-03 6.1981E-02 3.1746E-03

6.3164E-02 4.2342E-03 6.4111E-02 2.2307E-03 6.8482E-02 6.6575E-03

7.4496E-02 1.9530E-03 9.2280E-02 5.2835E-03 9.2451E-02 2.8645E-03

9.6337E-02 1.0225E-03 9.7102E-02 6.4956E-03 9.8294E-02 1.4568E-03

1.0312E-01 1.7960E-03 1.1676E-01 5.8858E-03 1.2093E-01 5.0739E-03

1.2155E-01 3.0411E-03 1.3032E-01 1.0952E-02 1.6218E-01 3.2866E-03

1.6942E-01 1.7338E-03 1.8559E-01 1.4537E-03 2.2838E-01 1.1182E-03

2.9325E-01 2.1068E-03

76

5.6400E-03 5.6243E-02 2.5680E-02 9.3890E-03 3.9522E-02 8.0698E-02

4.0118E-02 1.4619E-01 4.5400E-02 5.6722E-02 6.2903E-02 2.1755E-03

6.4887E-02 1.9694E-02 6.5834E-02 1.1679E-02 6.9718E-02 4.8319E-03

7.6219E-02 2.1068E-03 9.8040E-02 3.6640E-03 1.0002E-01 2.5648E-02

1.0193E-01 1.3053E-02 1.0484E-01 3.5495E-02 1.3929E-01 5.0609E-03

1.4317E-01 2.1755E-03 1.4755E-01 1.4885E-03 1.5618E-01 1.5114E-03

1.6295E-01 8.9310E-03 1.6359E-01 1.6259E-02 1.6777E-01 8.7936E-02

1.6838E-01 9.1600E-03 1.7654E-01 8.7020E-03 1.7716E-01 3.8701E-02

1.8660E-01 1.6946E-03 2.0196E-01 9.4348E-03 2.0415E-01 1.3053E-03

2.0901E-01 1.7862E-02 2.2720E-01 3.4121E-03 2.3242E-01 1.0534E-02

2.3660E-01 1.6259E-03 2.3670E-01 1.9694E-03 2.3702E-01 5.2670E-03

2.4009E-01 3.8930E-02 2.5430E-01 1.6488E-03 2.5813E-01 5.9998E-03

ENERGY.DAT

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2.7521E-01 7.1677E-02 2.8010E-01 2.2671E-03 2.9076E-01 8.7936E-03
3.0674E-01 2.3587E-03 3.2395E-01 1.2137E-02 3.2580E-01 1.0763E-03
3.2976E-01 2.1068E-03 3.4008E-01 2.2900E-01 3.4491E-01 2.1755E-02
3.4983E-01 1.3511E-03 3.5332E-01 1.1450E-03 3.7987E-01 9.6638E-03
4.0702E-01 1.8778E-03 4.4088E-01 1.5343E-02 4.4569E-01 4.0762E-02
4.5142E-01 2.9999E-03 4.9030E-01 1.2824E-03 5.1625E-01 2.0152E-03
5.6501E-01 3.6182E-03 5.7497E-01 1.1679E-03 6.3623E-01 1.4656E-02
6.5425E-01 2.4961E-03 6.6870E-01 3.6182E-03 6.6920E-01 2.9083E-03
6.7130E-01 9.2745E-03 7.0422E-01 3.5266E-03 7.0929E-01 1.4885E-03
7.1202E-01 1.0534E-03 7.1775E-01 4.1220E-02 7.3613E-01 4.8548E-03
7.5283E-01 1.3282E-02 7.6910E-01 1.0992E-03 7.7280E-01 9.5951E-03
7.8507E-01 2.2900E-03 8.0791E-01 5.2670E-03 8.1765E-01 1.7175E-03
8.4867E-01 2.9999E-03 8.7769E-01 1.0076E-03 9.4871E-01 3.6411E-03
4.2881E-01 4.3579E-02
SM-151          90 Y      62.
0
2
5.4560E-02 1.3960E-02 8.8000E-03 7.6100E-02 1.9680E-02 9.9120E-01
0
3
4.6900E-03 4.8492E-03 1.3488E-02 5.9136E-03 1.9740E-02 2.0402E-03
2
5.8500E-03 1.0644E-03 2.1540E-02 2.9568E-04
SM-153          46.7 H    62.
0
5
6.3235E-01 1.9860E-01 3.4100E-01 7.0202E-01 2.2440E-01 4.4100E-01
7.0776E-01 2.2650E-01 5.5000E-03 8.0520E-01 2.6340E-01 2.1000E-01
2.6210E-01 8.0927E-02 1.4944E-03
0
16
4.6900E-03 5.4058E-01 1.1758E-02 3.2384E-03 2.1153E-02 2.3162E-01
3.3700E-02 4.4986E-02 3.4848E-02 4.7400E-03 4.0965E-02 3.4128E-03
4.8911E-02 1.8524E-03 5.4660E-02 4.1035E-01 6.1620E-02 3.7896E-02
6.7872E-02 8.2720E-03 6.9312E-02 2.3265E-03 7.5314E-02 2.2400E-03
8.1566E-02 1.3340E-03 9.5127E-02 6.1694E-02 1.0138E-01 1.3358E-02
1.0282E-01 3.8488E-03
11
5.8500E-03 1.1866E-01 4.0902E-02 1.7263E-01 4.1542E-02 3.1218E-01
4.7000E-02 1.2217E-01 6.9672E-02 5.1700E-02 7.5422E-02 1.9400E-03
8.3366E-02 2.0000E-03 8.9484E-02 1.5800E-03 9.7430E-02 7.1800E-03
1.0318E-01 2.8300E-01 4.2266E-01 2.7746E-03
EU-152M          9.32 H    63.
0
5 1 3
5.5013E-01 1.6890E-01 1.6700E-02 8.1695E-01 2.6750E-01 1.3100E-03
1.5205E+00 5.5410E-01 1.8000E-02 1.8648E+00 7.0410E-01 6.7000E-01
1.6810E-01 4.6697E-02 6.3800E-04

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ENERGY.DAT

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0
6
4.5300E-03 2.6792E-01 3.2600E-02 2.1502E-02 7.4945E-02 5.1029E-02
1.1404E-01 2.7861E-02 1.2006E-01 6.3693E-03 1.2143E-01 1.7506E-03
15
5.6400E-03 5.4875E-02 3.9522E-02 7.8854E-02 4.0118E-02 1.4285E-01
4.5400E-02 5.5426E-02 1.2178E-01 7.4495E-02 5.6292E-01 2.3374E-03
8.4154E-01 1.5080E-01 9.6106E-01 2.1112E-03 9.6339E-01 1.2411E-01
1.3891E+00 8.8218E-03 7.9420E-01 4.1176E-03 3.4427E-01 2.4900E-02
9.7038E-01 6.1578E-03 1.3147E+00 9.7511E-03 6.7671E-01 3.2007E-03
EU-152      13.6 Y      63.
0
8
1.7590E-01 4.7500E-02 1.7800E-02 3.8524E-01 1.1250E-01 2.4000E-02
6.9606E-01 2.2180E-01 1.3600E-01 7.1007E-01 2.2700E-01 2.3000E-03
8.8865E-01 2.9530E-01 2.9300E-03 1.0638E+00 3.6480E-01 8.9000E-03
1.4749E+00 5.3560E-01 8.4400E-02 2.5690E-01 7.4287E-02 1.8550E-03
0
12
4.5300E-03 7.3378E-01 3.2600E-02 5.6787E-02 7.4945E-02 1.9476E-01
1.1404E-01 1.0633E-01 1.2006E-01 2.4309E-02 1.2143E-01 6.6815E-03
1.9786E-01 6.0922E-03 2.3696E-01 1.5586E-03 4.8400E-03 7.1349E-03
3.4900E-02 5.4369E-04 2.9403E-01 8.2377E-03 3.3590E-01 1.8065E-03
52
5.6400E-03 1.5029E-01 3.9522E-02 2.0826E-01 4.0118E-02 3.7728E-01
4.5400E-02 1.4639E-01 1.2178E-01 2.8432E-01 2.4469E-01 7.4935E-02
2.9593E-01 4.2661E-03 3.2935E-01 1.2454E-03 4.1594E-01 1.0069E-03
4.4398E-01 2.8114E-02 4.4398E-01 3.0207E-03 4.8866E-01 4.1336E-03
5.6403E-01 4.8225E-03 5.6641E-01 1.2904E-03 6.5644E-01 1.4176E-03
6.7461E-01 1.4839E-03 6.8863E-01 8.3732E-03 7.1933E-01 2.6497E-03
8.1043E-01 3.1002E-03 8.4154E-01 1.6057E-03 8.6732E-01 4.1601E-02
9.1931E-01 4.0144E-03 9.2625E-01 2.5517E-03 9.6339E-01 1.1394E-03
9.6401E-01 1.4441E-01 1.0052E+00 6.5979E-03 1.0849E+00 2.4643E-03
1.0858E+00 9.9630E-02 1.1120E+00 1.3302E-01 1.2128E+00 1.3805E-02
1.2498E+00 1.7833E-03 1.2927E+00 1.0096E-03 1.4080E+00 2.0747E-01
1.4575E+00 4.8755E-03 1.5281E+00 2.5702E-03 6.8578E-01 8.6884E-03
6.0600E-03 1.6736E-03 4.2309E-02 2.1899E-03 4.2996E-02 3.9457E-03
4.8700E-02 1.5584E-03 3.4427E-01 2.6488E-01 3.6771E-01 8.5556E-03
4.1111E-01 2.2144E-02 5.0339E-01 1.5072E-03 5.8626E-01 4.5294E-03
6.7858E-01 4.6883E-03 7.6484E-01 1.6846E-03 7.7889E-01 1.2741E-01
1.0897E+00 1.6793E-02 1.1091E+00 1.6687E-03 1.2990E+00 1.6052E-02
6.3138E-01 7.1115E-03
EU-154      8.8 Y      63.
0
16
2.4741E-01 6.8800E-02 2.7900E-01 3.0608E-01 8.6900E-02 7.7000E-03
3.2121E-01 9.1700E-02 1.4900E-03 3.4983E-01 1.0090E-01 1.5800E-02
4.0740E-01 1.1980E-01 1.1700E-03 4.3566E-01 1.2930E-01 2.8100E-03

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ENERGY.DAT

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5.4860E-01 1.6830E-01 1.8800E-03 5.6940E-01 1.7570E-01 3.6500E-01
7.0318E-01 2.2450E-01 6.4000E-03 7.1541E-01 2.2900E-01 2.4500E-03
8.3918E-01 2.7600E-01 1.7400E-01 9.7072E-01 3.2750E-01 2.0000E-02
1.1515E+00 4.0040E-01 2.9000E-03 1.5960E+00 5.8740E-01 2.4000E-03
1.8439E+00 6.9500E-01 1.1400E-01 4.1200E-01 1.3126E-01 2.1390E-03
0
8
4.8400E-03 3.2536E-01 3.4900E-02 1.8034E-02 7.2831E-02 2.6787E-01
1.1469E-01 1.6793E-01 1.2119E-01 3.9048E-02 1.2269E-01 1.0966E-02
1.9770E-01 5.3741E-03 2.3956E-01 1.4921E-03
38
6.0600E-03 7.6319E-02 4.2309E-02 7.2639E-02 4.2996E-02 1.3088E-01
4.8700E-02 5.1694E-02 1.2307E-01 4.0464E-01 1.8825E-01 2.2717E-03
2.4794E-01 6.6021E-02 4.0130E-01 2.0942E-03 4.4450E-01 5.0403E-03
4.7826E-01 2.1652E-03 5.5756E-01 2.5556E-03 5.8200E-01 8.4123E-03
5.9181E-01 4.8273E-02 6.2522E-01 3.0881E-03 6.7659E-01 1.3985E-03
6.9241E-01 1.6931E-02 7.1576E-01 1.7393E-03 7.2330E-01 1.9700E-01
7.5687E-01 4.3304E-02 8.1555E-01 4.6498E-03 8.4539E-01 5.5017E-03
8.5064E-01 2.3072E-03 8.7319E-01 1.1500E-01 8.9273E-01 4.6144E-03
9.0405E-01 8.2348E-03 9.9632E-01 1.0294E-01 1.0048E+00 1.7889E-01
1.0474E+00 1.4198E-03 1.1185E+00 1.0294E-03 1.1284E+00 2.6621E-03
1.1409E+00 2.1652E-03 1.2416E+00 1.3133E-03 1.2462E+00 8.9802E-03
1.2745E+00 3.5495E-01 1.4944E+00 6.4956E-03 1.5930E+00 1.0294E-02
1.5965E+00 1.8457E-02 7.1054E-01 1.5850E-02
EU-155      4.96 Y      63.
0
6
9.9930E-02 2.6100E-02 7.2000E-03 1.2801E-01 3.3900E-02 2.2000E-02
1.4069E-01 3.7400E-02 4.6000E-01 1.5946E-01 4.2800E-02 2.6000E-01
1.8599E-01 5.0400E-02 7.7000E-02 2.4600E-01 6.8300E-02 1.8000E-01
0
27
2.0244E-03 1.2054E-02 4.8400E-03 3.4150E-01 8.5192E-03 3.4880E-03
9.7709E-03 8.2763E-02 1.0374E-02 1.3763E-01 1.2644E-02 9.5184E-03
1.6869E-02 3.1518E-02 1.8137E-02 4.9332E-03 1.8374E-02 1.0401E-02
1.9139E-02 2.9395E-03 2.3054E-02 3.8378E-03 2.4632E-02 1.4290E-03
2.9549E-02 1.2082E-03 3.4900E-02 1.6063E-02 3.5823E-02 3.9972E-03
3.6306E-02 1.1217E-01 3.6922E-02 6.1998E-03 4.3416E-02 1.8083E-03
5.1634E-02 1.6686E-02 5.5069E-02 4.4445E-02 5.8129E-02 3.6932E-03
5.9634E-02 1.0501E-03 7.8169E-02 1.7242E-02 8.4664E-02 3.7080E-03
8.6169E-02 1.0413E-03 9.6932E-02 6.6357E-03 1.0343E-01 1.8357E-03
11
6.0600E-03 8.0104E-02 2.6513E-02 3.1827E-03 4.2309E-02 6.4697E-02
4.2996E-02 1.1657E-01 4.5297E-02 1.2916E-02 4.8700E-02 4.6042E-02
6.0010E-02 1.1124E-02 8.6062E-02 1.5141E-03 8.6545E-02 3.0900E-01
1.0531E-01 2.0672E-01 6.9302E-02 1.8451E-03
EU-156      15.19 D      63.
0

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ENERGY.DAT

15

1.8311E-01	5.0000E-02	4.6000E-02	2.4752E-01	6.9000E-02	2.4000E-02
2.4950E-01	6.9000E-02	1.6000E-03	2.6627E-01	7.5000E-02	1.1300E-01
3.3158E-01	9.5000E-02	1.2700E-03	4.2641E-01	1.2600E-01	6.0000E-02
4.8709E-01	1.4700E-01	3.2000E-01	5.0063E-01	1.5200E-01	9.6000E-03
5.0662E-01	1.5400E-01	4.4000E-03	1.0866E+00	3.7400E-01	2.4000E-02
1.2106E+00	4.2500E-01	5.1000E-02	1.2849E+00	4.5600E-01	4.5000E-02
1.4036E+00	5.0500E-01	1.4500E-02	2.4530E+00	9.6600E-01	2.7000E-01
1.6400E-01	4.4555E-02	2.0300E-03			

0

7

4.8400E-03	2.3194E-01	3.4900E-02	9.5177E-03	3.8725E-02	1.4296E-01
8.0588E-02	1.6377E-01	8.7083E-02	3.8364E-02	8.8588E-02	1.0677E-02
1.4897E-01	1.2488E-03				

56

6.0600E-03	5.4406E-02	4.2309E-02	3.8335E-02	4.2996E-02	6.9073E-02
4.8700E-02	2.7282E-02	8.8964E-02	9.0480E-02	1.9921E-01	7.9040E-03
4.3440E-01	2.2048E-03	4.7270E-01	1.4664E-03	4.9034E-01	1.8200E-03
5.9947E-01	2.3088E-02	6.4629E-01	7.0928E-02	7.0986E-01	9.1520E-03
7.2347E-01	6.0216E-02	7.9773E-01	1.1024E-03	8.1177E-01	1.0400E-01
8.2036E-01	1.6016E-03	8.4110E-01	2.2568E-03	8.5836E-01	1.2584E-03
8.6598E-01	1.5600E-03	8.6701E-01	1.4040E-02	9.4435E-01	1.3936E-02
9.4746E-01	3.1200E-03	9.6050E-01	1.6224E-02	9.6100E-01	1.5600E-03
9.6983E-01	3.8688E-03	1.0119E+00	3.4008E-03	1.0274E+00	1.1960E-03
1.0404E+00	5.3040E-03	1.0651E+00	5.2416E-02	1.0760E+00	3.7440E-03
1.0792E+00	4.8880E-02	1.1295E+00	1.4248E-03	1.1405E+00	2.9640E-03
1.1535E+00	7.1760E-02	1.1541E+00	5.3040E-02	1.1560E+00	1.4040E-03
1.1691E+00	2.9328E-03	1.2307E+00	8.9440E-02	1.2424E+00	6.7600E-02
1.2774E+00	3.2136E-02	1.3664E+00	1.7576E-02	1.6821E+00	3.0160E-03
1.8574E+00	2.5480E-03	1.8770E+00	1.7264E-02	1.9377E+00	2.1424E-02
1.9463E+00	1.8928E-03	1.9660E+00	4.2016E-02	2.0266E+00	3.5360E-02
2.0325E+00	1.3000E-03	2.0977E+00	4.2744E-02	2.1165E+00	1.2584E-03
2.1809E+00	2.4336E-02	2.1867E+00	3.9520E-02	2.2054E+00	9.9840E-03
2.2699E+00	1.1232E-02	1.1027E+00	1.5851E-02		

GD-153 241.6 D 64.

0

0

0

19

4.6900E-03	1.1350E+00	6.0180E-03	1.6263E-03	1.1758E-02	3.9594E-03
1.8010E-02	1.2066E-03	2.1153E-02	1.1498E-01	3.3700E-02	9.3261E-02
3.4848E-02	5.1927E-03	4.0965E-02	1.5550E-03	4.8911E-02	8.0754E-02
5.4660E-02	3.2223E-01	6.1620E-02	1.8813E-02	6.7872E-02	4.1066E-03
6.9312E-02	1.1550E-03	7.5314E-02	2.4539E-03	8.9378E-02	1.2019E-02
9.5127E-02	4.8446E-02	9.5630E-02	3.2865E-03	1.0138E-01	1.0489E-02
1.0282E-01	3.0223E-03				

9

5.8500E-03	2.4915E-01	4.0902E-02	3.5789E-01	4.1542E-02	6.4718E-01
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ENERGY.DAT

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4.7000E-02 2.5328E-01 6.9672E-02 2.5666E-02 8.3366E-02 2.1910E-03
9.7430E-02 3.1300E-01 1.0318E-01 2.2223E-01 9.5828E-02 2.1988E-03
GD-159      18.56 H      64.
0
5
6.1115E-01 1.9040E-01 9.0000E-02 6.2651E-01 1.9600E-01 2.2000E-03
9.1670E-01 3.0570E-01 2.1000E-01 9.7470E-01 3.2860E-01 7.0000E-01
3.3700E-01 9.7588E-02 8.0800E-04
0
7
5.0000E-03 1.3118E-01 6.0043E-03 1.5999E-01 2.7514E-02 1.1587E-03
3.6000E-02 1.0153E-02 4.9292E-02 2.6989E-02 5.6033E-02 5.9623E-03
5.7602E-02 1.6899E-03
9
6.2700E-03 3.2794E-02 4.3744E-02 4.3043E-02 4.4482E-02 7.7276E-02
5.0400E-02 3.0681E-02 5.8000E-02 1.7640E-02 2.2600E-01 1.6464E-03
3.4817E-01 1.6800E-03 3.6356E-01 8.4000E-02 3.6404E-01 2.1129E-03
TB-160      72.3 D      65.
0
12
2.9901E-01 8.4600E-02 2.1800E-03 4.3446E-01 1.2860E-01 4.4000E-02
4.4703E-01 1.3280E-01 9.3000E-03 4.7483E-01 1.4230E-01 9.4000E-02
5.4581E-01 1.6690E-01 3.3100E-02 5.6873E-01 1.7500E-01 4.5600E-01
6.7766E-01 2.1440E-01 1.7000E-03 7.8437E-01 2.5430E-01 5.8000E-02
8.6730E-01 2.8600E-01 2.4600E-01 1.5496E+00 5.6520E-01 3.8000E-03
1.7466E+00 6.4990E-01 5.0000E-02 5.4780E-01 1.6760E-01 1.4200E-04
0
10
5.1600E-03 4.0181E-01 3.3000E-02 2.1147E-01 3.7200E-02 1.3495E-02
7.7742E-02 3.1654E-01 8.4741E-02 7.5411E-02 8.6372E-02 2.0748E-02
1.4325E-01 8.1863E-03 1.6186E-01 1.2555E-03 1.8799E-01 3.1520E-03
2.4478E-01 4.0071E-03
25
6.5000E-03 1.0681E-01 4.5208E-02 6.0309E-02 4.5998E-02 1.0789E-01
5.2100E-02 4.3227E-02 8.6788E-02 1.3300E-01 1.9704E-01 4.9020E-02
2.1565E-01 3.7145E-02 2.9857E-01 2.7075E-01 3.0956E-01 8.1510E-03
3.3732E-01 3.3250E-03 3.9249E-01 1.2825E-02 6.8233E-01 5.5100E-03
7.6528E-01 1.9285E-02 8.7203E-01 1.7860E-03 8.7936E-01 2.8500E-01
9.6229E-01 9.0250E-02 9.6615E-01 2.4225E-01 1.0029E+00 9.6900E-03
1.1026E+00 5.2250E-03 1.1151E+00 1.5010E-02 1.1779E+00 1.4440E-01
1.1999E+00 2.3560E-02 1.2719E+00 7.0300E-02 1.3122E+00 2.8500E-02
6.5135E-01 5.0891E-03
TB-161      65.
0
3
0.59      0.0      1.0000E-01 0.52      0.0      5.5000E-01
0.46      0.0      3.5000E-01
0

```

ENERGY.DAT

```

0
4
0.026      2.1000E-01 0.049      1.9000E-01 0.057      0.05
0.075      0.1
DY-165      2.334 H      66.
0
5
2.0547E-01 5.6100E-02 1.5200E-03 2.9001E-01 8.1700E-02 1.6700E-02
1.1904E+00 4.1410E-01 1.4600E-01 1.2851E+00 4.5310E-01 8.3400E-01
5.2770E-01 1.6540E-01 1.5050E-03
0
7
2.2463E-03 1.4969E-03 5.3300E-03 7.4643E-02 3.8400E-02 5.4787E-03
3.9082E-02 9.2681E-02 8.5306E-02 1.4958E-02 9.2572E-02 4.2583E-03
3.0606E-01 1.9404E-03
12
6.7200E-03 2.1053E-02 4.6700E-02 2.5873E-02 4.7547E-02 4.6120E-02
5.3900E-02 1.8646E-02 9.4700E-02 3.5784E-02 2.7976E-01 5.0484E-03
3.6168E-01 8.4000E-03 5.4583E-01 1.6212E-03 5.6572E-01 1.2768E-03
6.3341E-01 5.6784E-03 7.1533E-01 5.3424E-03 6.4145E-01 6.7034E-03
HO-166M      1.20E3 Y      67.
0
7
3.1784E-02 8.0000E-03 1.7200E-01 7.2373E-02 1.8700E-02 7.3400E-01
3.0360E-01 8.5900E-02 4.0400E-03 4.8329E-01 1.4490E-01 9.0000E-03
6.4336E-01 2.0130E-01 2.1300E-02 9.4808E-01 3.1640E-01 1.1200E-02
1.3138E+00 4.6410E-01 3.4000E-02
0
24
5.5000E-03 7.0908E-01 2.3104E-02 2.1726E-01 3.7165E-02 3.3694E-03
3.9700E-02 2.2186E-02 6.1555E-02 1.7729E-03 6.3675E-02 2.4466E-03
7.0838E-02 5.0185E-01 7.8382E-02 1.2159E-01 8.0140E-02 3.3287E-02
8.4899E-02 1.7649E-03 1.1141E-01 1.0031E-03 1.2693E-01 1.5028E-01
1.5839E-01 3.3668E-03 1.7466E-01 7.0640E-02 1.8221E-01 1.6771E-02
1.8397E-01 4.6391E-03 2.0613E-01 1.3107E-03 2.2296E-01 1.8217E-02
2.4326E-01 1.8771E-03 2.7070E-01 5.4798E-03 2.7824E-01 1.6291E-03
4.7232E-01 1.0842E-03 6.5420E-01 1.2170E-03 7.5282E-01 2.4911E-03
45
6.9500E-03 2.1180E-01 4.8221E-02 1.0889E-01 4.9128E-02 1.9341E-01
5.5700E-02 7.8899E-02 8.0589E-02 1.2705E-01 9.4650E-02 1.6045E-03
1.1904E-01 1.6117E-03 1.2116E-01 2.4466E-03 1.8442E-01 7.2600E-01
1.9071E-01 2.2070E-03 2.1476E-01 4.2544E-03 2.1588E-01 2.5700E-02
2.3128E-01 2.0618E-03 2.5972E-01 1.0527E-02 2.8045E-01 2.9621E-01
3.0074E-01 3.7171E-02 3.3978E-01 1.6988E-03 3.6578E-01 2.4176E-02
4.1094E-01 1.1108E-01 4.5152E-01 2.9185E-02 4.6483E-01 1.1979E-02
4.9670E-01 2.1780E-03 5.2981E-01 9.5106E-02 5.7100E-01 5.4668E-02
5.9437E-01 5.5902E-03 6.1152E-01 1.4157E-02 6.4445E-01 1.5464E-03
6.7051E-01 5.3506E-02 6.9121E-01 1.3576E-02 7.1169E-01 5.4087E-01

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ENERGY.DAT

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7.1240E-01 2.1780E-03 7.3667E-01 3.6736E-03 7.5227E-01 1.2052E-01
7.7882E-01 3.0274E-02 8.1031E-01 5.7136E-01 8.3056E-01 9.6558E-02
8.7564E-01 7.1874E-03 9.5094E-01 2.6935E-02 1.1203E+00 2.3740E-03
1.1468E+00 1.9675E-03 1.2414E+00 8.2764E-03 1.2821E+00 1.7860E-03
1.4007E+00 4.9804E-03 1.4271E+00 4.8424E-03 4.1661E-01 6.2856E-03
HO-166      26.80 H      67.
0
5 1 3
1.9183E-01 5.2100E-02 3.0400E-03 3.9436E-01 1.1500E-01 9.5000E-03
1.7737E+00 6.5110E-01 4.8000E-01 1.8543E+00 6.9380E-01 5.1000E-01
2.3070E-01 7.7626E-02 4.4880E-04
0
6
5.5000E-03 2.5715E-01 2.3104E-02 1.0602E-01 3.9700E-02 5.8311E-03
7.0838E-02 2.4490E-01 7.8382E-02 5.9334E-02 8.0140E-02 1.6244E-02
9
6.9500E-03 7.6810E-02 4.8221E-02 2.8619E-02 4.9128E-02 5.0833E-02
5.5700E-02 2.0737E-02 8.0589E-02 6.2000E-02 1.3794E+00 9.3000E-03
1.5819E+00 1.8300E-03 1.6624E+00 1.2100E-03 1.1822E+00 7.9280E-04
ER-169      9.40 D      68.
0
3 1 3
3.4180E-01 9.7900E-02 4.5000E-01 3.5020E-01 1.0060E-01 5.5000E-01
2.3200E-01 7.3800E-02 4.8000E-05
0
1
6.0942E-03 4.4865E-01
2
8.4010E-03 1.5600E-03 1.1054E-01 1.4300E-05
ER-171      7.52 H      68.
0
7
2.0543E-01 5.6000E-02 3.3300E-03 4.9184E-01 1.4760E-01 5.0000E-03
5.7738E-01 1.7740E-01 2.1800E-02 8.1452E-01 2.6450E-01 1.8800E-03
1.0655E+00 3.6220E-01 9.4000E-01 1.4854E+00 5.3470E-01 2.3000E-02
5.6860E-01 1.8197E-01 1.7830E-03
0
21
2.2693E-03 6.2289E-02 2.7182E-03 9.0609E-01 5.6700E-03 4.5514E-01
1.0078E-02 1.8387E-02 2.6210E-02 2.4240E-03 4.0900E-02 2.5090E-02
5.2231E-02 3.9155E-01 5.7266E-02 1.6859E-02 6.4627E-02 5.6966E-02
1.0151E-01 6.3550E-02 1.0654E-01 1.7779E-02 1.0931E-01 1.4227E-02
1.1115E-01 4.1410E-03 1.1390E-01 5.3326E-02 1.1435E-01 4.3010E-03
1.1618E-01 1.2052E-03 1.2171E-01 1.2922E-02 1.2355E-01 3.6036E-03
2.3651E-01 4.8552E-03 2.4890E-01 9.8532E-03 2.9818E-01 1.4426E-03
19
7.1800E-03 1.4373E-01 4.9773E-02 1.3085E-01 5.0742E-02 2.3160E-01
5.7500E-02 9.4963E-02 1.1162E-01 2.0500E-01 1.1666E-01 2.3000E-02

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ENERGY.DAT

```

1.2402E-01 9.1000E-02 2.1060E-01 6.4200E-03 2.3714E-01 3.0200E-03
2.7743E-01 5.8000E-03 2.9590E-01 2.8900E-01 3.0829E-01 6.4400E-01
3.7196E-01 2.5700E-03 6.7070E-01 2.5200E-03 6.7610E-01 2.8500E-03
7.8410E-01 2.4000E-03 7.9660E-01 6.4000E-03 9.0770E-01 6.3500E-03
5.3518E-01 1.0894E-02
TA-182      114.74 D      73.
0
8
2.5808E-01 7.1600E-02 2.8900E-01 3.0109E-01 8.4800E-02 1.2800E-03
3.2380E-01 9.1900E-02 2.4000E-02 3.6842E-01 1.0600E-01 6.9600E-03
4.3747E-01 1.2860E-01 2.1000E-01 4.8018E-01 1.4290E-01 2.3000E-02
5.2215E-01 1.5720E-01 4.0800E-01 5.8990E-01 1.8070E-01 3.2000E-02
0
36
6.5300E-03 5.8865E-01 1.5155E-02 1.6313E-01 1.9637E-02 1.0259E-02
2.8917E-02 3.1419E-03 3.0579E-02 1.2565E-01 3.0614E-02 1.3818E-03
4.4144E-02 4.8843E-02 4.5700E-02 1.6271E-02 5.3621E-02 6.4960E-02
5.5649E-02 6.6913E-02 6.2901E-02 1.4840E-02 6.4929E-02 1.5246E-02
6.5126E-02 4.4800E-03 6.7154E-02 4.3620E-03 7.2580E-02 4.0781E-02
8.1860E-02 9.6342E-03 8.2903E-02 7.6055E-03 8.4085E-02 2.8738E-03
8.6858E-02 2.6767E-03 8.8004E-02 3.2502E-01 9.7284E-02 8.1606E-02
9.9509E-02 2.3919E-02 1.0157E-01 1.0320E-02 1.0987E-01 1.6562E-02
1.1085E-01 3.1358E-03 1.2882E-01 2.6248E-03 1.4033E-01 1.2556E-03
1.5258E-01 3.0391E-03 1.5979E-01 4.2952E-03 1.6729E-01 4.5864E-03
1.7657E-01 1.4205E-03 1.8625E-01 1.6744E-03 1.9454E-01 2.9338E-03
2.1722E-01 2.2277E-03 2.5197E-01 1.2740E-03 1.0518E+00 1.0430E-03
37
8.4000E-03 2.5228E-01 3.1737E-02 8.0150E-03 4.2714E-02 2.4500E-03
5.7982E-02 1.0410E-01 5.9318E-02 1.8104E-01 6.5721E-02 2.8000E-02
6.7200E-02 7.6987E-02 6.7749E-02 4.2350E-01 8.4680E-02 2.7370E-02
1.0010E-01 1.4070E-01 1.1367E-01 1.9005E-02 1.1642E-01 4.4100E-03
1.5243E-01 7.1750E-02 1.5638E-01 2.7230E-02 1.7939E-01 3.1850E-02
1.9835E-01 1.5085E-02 2.2210E-01 7.5600E-02 2.2932E-01 3.6400E-02
2.6407E-01 3.6400E-02 9.2799E-01 6.2300E-03 9.5974E-01 3.5000E-03
1.0017E+00 2.0930E-02 1.0444E+00 2.3730E-03 1.1134E+00 4.4100E-03
1.1213E+00 3.5000E-01 1.1573E+00 6.3000E-03 1.1581E+00 3.5000E-03
1.1891E+00 1.6310E-01 1.2214E+00 2.7055E-01 1.2239E+00 2.1000E-03
1.2310E+00 1.1515E-01 1.2575E+00 1.4945E-02 1.2738E+00 6.5100E-03
1.2892E+00 1.3545E-02 1.3427E+00 2.5200E-03 1.3738E+00 2.1980E-03
9.4300E-01 3.9585E-03
W -181      120.95 D      74.
0
0
0
3
3.5020E-03 8.4882E-01 6.3500E-03 5.7346E-01 4.6200E-02 2.9952E-02
6
6.2100E-03 9.8700E-03 8.1500E-03 2.2301E-01 5.6277E-02 1.8695E-01

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ENERGY.DAT

5.7532E-02 3.2627E-01 6.5200E-02 1.3754E-01 1.4769E-01 1.4015E-03

W -185 75.1 D 74.

0

2 1 2

4.3240E-01 1.2680E-01 9.9921E-01 3.0700E-01 9.6900E-02 7.9000E-04

0

0

1

1.2536E-01 2.1014E-04

W -187 23.83 H 74.

0

11 1 9

4.3306E-01 1.2700E-01 4.8400E-03 4.4795E-01 1.3190E-01 6.7000E-03

4.9594E-01 1.4800E-01 2.0000E-03 5.3963E-01 1.6300E-01 4.3000E-02

6.2670E-01 1.9350E-01 5.8700E-01 6.8698E-01 2.1510E-01 5.5000E-02

6.9413E-01 2.1760E-01 3.5000E-02 8.0073E-01 2.5680E-01 1.0000E-03

1.1783E+00 4.0170E-01 2.3000E-02 1.3125E+00 4.5710E-01 2.5100E-01

1.9730E-01 5.5688E-02 2.1738E-04

0

19

3.8360E-04 8.6919E-02 4.1683E-03 3.5039E-02 6.7000E-03 1.9326E-01

1.6703E-02 1.0681E-03 2.3703E-02 4.2449E-03 3.1133E-02 1.3107E-03

3.3298E-02 1.3374E-03 4.2074E-02 2.5055E-03 4.7000E-02 1.1290E-02

5.9533E-02 1.6669E-02 6.2544E-02 1.7597E-01 6.9128E-02 4.9413E-03

1.2169E-01 2.9896E-02 1.3129E-01 6.8590E-03 1.3360E-01 2.1003E-03

1.3461E-01 3.9597E-03 4.0785E-01 4.2734E-03 4.6700E-01 1.0859E-03

5.4669E-01 1.7447E-03

20

8.6500E-03 8.6825E-02 5.9718E-02 7.6022E-02 6.1140E-02 1.3175E-01

6.9300E-02 5.6307E-02 7.2060E-02 1.1907E-01 1.3422E-01 9.4608E-02

2.0629E-01 1.5230E-03 2.4618E-01 1.2737E-03 4.7953E-01 2.3352E-01

5.1176E-01 6.8948E-03 5.5155E-01 5.4365E-02 5.8909E-01 1.3014E-03

6.1837E-01 6.7102E-02 6.2552E-01 1.1630E-02 6.8581E-01 2.9167E-01

7.4521E-01 3.1843E-03 7.7287E-01 4.4027E-02 8.6455E-01 3.5905E-03

8.7943E-01 1.5137E-03 2.7622E-01 4.2302E-03

RE-187 4.7E10 Y 75.

0

1

2.6405E-03 6.6100E-04 1.0000E+00

0

0

0

OS-185 93.6 D 76.

0

0

0

10

6.7000E-03 5.7194E-01 4.7000E-02 3.1172E-02 5.3682E-02 7.8120E-03

ENERGY.DAT

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5.8786E-02 5.0221E-03 6.8381E-02 1.4917E-03 9.1176E-02 6.1136E-03
1.1283E-01 1.3377E-03 1.6248E-01 1.5211E-03 5.7444E-01 7.5709E-03
6.3359E-01 1.5719E-03
14
8.6500E-03 2.5696E-01 5.9718E-02 2.0989E-01 6.1140E-02 3.6377E-01
6.9300E-02 1.5546E-01 7.1313E-02 2.4862E-03 1.2536E-01 3.4566E-03
1.6285E-01 5.5579E-03 2.3416E-01 4.1223E-03 5.9207E-01 1.3153E-02
6.4612E-01 8.0200E-01 7.1742E-01 4.0822E-02 8.7481E-01 6.5443E-02
8.8027E-01 4.9483E-02 9.1003E-01 5.5779E-04
OS-191      15.4 D      76.
0
1
1.3875E-01 3.6700E-02 1.0000E+00
0
12
6.2870E-03 1.6656E-03 7.0600E-03 8.7471E-01 2.8431E-02 7.1100E-01
3.3632E-02 3.1054E-03 3.8676E-02 2.8900E-01 4.3876E-02 1.0570E-03
4.9600E-02 2.1913E-02 5.3289E-02 5.7498E-01 6.8979E-02 1.0643E-03
1.1598E-01 1.2328E-01 1.2623E-01 2.9267E-02 1.2871E-01 9.0909E-03
6
9.1800E-03 4.3083E-01 6.3287E-02 1.6014E-01 6.4896E-02 2.7563E-01
7.3600E-02 1.1896E-01 1.2940E-01 2.5900E-01 7.3201E-02 3.6985E-04
IR-192      74.02 D      77.
0
5 1 4
2.5595E-01 7.0800E-02 5.6500E-02 5.3608E-01 1.6120E-01 4.1400E-01
6.7242E-01 2.0890E-01 4.8300E-01 8.4453E-01 2.7590E-01 4.0000E-03
9.3000E-02 2.4933E-02 9.8700E-04
0
22
6.8800E-03 3.1078E-02 4.8300E-02 1.5940E-03 1.3192E-01 5.2268E-03
1.9283E-01 3.6489E-03 2.0275E-01 1.1801E-03 7.2400E-03 7.6020E-02
5.1000E-02 3.5049E-03 5.7951E-02 1.1921E-03 1.2247E-01 1.3005E-03
2.1756E-01 1.9237E-02 2.3006E-01 1.7896E-02 2.3811E-01 4.4658E-02
2.8208E-01 8.7916E-03 2.9266E-01 2.8667E-03 2.9458E-01 7.7163E-03
3.0263E-01 1.9470E-02 3.0516E-01 2.5108E-03 3.1321E-01 4.8386E-03
3.1579E-01 1.4831E-03 3.8968E-01 1.0236E-02 4.5419E-01 2.9458E-03
5.2602E-01 1.5092E-03
26
8.9100E-03 1.4625E-02 6.1487E-02 1.1323E-02 6.3001E-02 1.9555E-02
7.1400E-02 8.3988E-03 2.0131E-01 4.6736E-03 2.0580E-01 3.2873E-02
2.8326E-01 2.6149E-03 3.7448E-01 7.2636E-03 4.8458E-01 3.1628E-02
4.8906E-01 3.9846E-03 4.2307E-01 7.9692E-04 9.4400E-03 4.0934E-02
6.5122E-02 2.6350E-02 6.6832E-02 4.5197E-02 7.5700E-02 1.9675E-02
1.3635E-01 1.8062E-03 2.9596E-01 2.9015E-01 3.0846E-01 2.9678E-01
3.1651E-01 8.2853E-01 4.1646E-01 6.6448E-03 4.6807E-01 4.8055E-01
5.8858E-01 4.5735E-02 6.0441E-01 8.2024E-02 6.1246E-01 5.3357E-02
8.8451E-01 3.0158E-03 8.7173E-01 9.8595E-04

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ENERGY.DAT

HG-203 46.60 D 80.
0
1
2.1221E-01 5.7700E-02 1 0000E+00
0
6
7.7800E-03 1.0823E-01 5.5200E-02 5.5770E-03 1.9366E-01 1.6900E-01
2.6384E-01 4.3500E-02 2.7548E-01 1.0600E-02 2.7834E-01 3.4000E-03
5
1.0300E-02 7.2156E-02 7.0832E-02 4.7450E-02 7.2871E-02 8.0424E-02
8.2600E-02 3.5549E-02 2.7919E-01 7.7300E-01
TH-230 7.7E4 Y 90.
4
4.4760E+00 1.2000E-03 4.6210E+00 2.3400E-01 4.6875E+00 7.6300E-01
4.3678E+00 3.1000E-03
0
0
4
9.0900E-03 8.4298E-02 4.8435E-02 1.6860E-01 6.2850E-02 4.5506E-02
6.6464E-02 1.6412E-02
3
1.2300E-02 8.4298E-02 6.7672E-02 3.7300E-03 1.6809E-01 6.8917E-04
RA-226 1600 Y 88.
3
4.6019E+00 5.5500E-02 4.7845E+00 9.4550E-01 4.3146E+00 7.7700E-05
0
0
6
8.7100E-03 9.0466E-03 6.2700E-02 1.7725E-04 8.7807E-02 6.3304E-03
1.6816E-01 1.2005E-02 1.8173E-01 3.1947E-03 1.8511E-01 1.1119E-03
6
1.1700E-02 8.0225E-03 8.1070E-02 1.8022E-03 8.3780E-02 2.9937E-03
9.4900E-02 1.3572E-03 1.8621E-01 3.2800E-02 3.0970E-01 6.6700E-05
RN-222 3.8235 D 86. (PO-218, PB-214, 8I-214, PO-214)
6
5.4897E+00 9.9920E-01 4.9860E+00 7.8500E-04
6.0025E+00 9.9979E-01 5.1810E+00 1.0998E-05
7.6871E+00 9.9989E-01 6.8924E+00 1.0560E-04
36
1.8494E-01 5.0000E-02 2.5500E-02 4.9046E-01 1.4500E-01 8.3000E-03
6.7208E-01 2.0700E-01 4.8000E-01 7.2880E-01 2.2700E-01 4.2500E-01
1.0240E+00 3.3700E-01 6.3000E-02
5.4141E-01 1.6200E-01 4.1000E-03 5.5076E-01 1.6500E-01 2.1100E-03
5.7530E-01 1.7300E-01 1.1800E-03 7.6180E-01 2.3900E-01 1.1000E-03
7.6439E-01 2.4000E-01 2.0500E-03 7.8757E-01 2.4800E-01 1.0700E-02
8.2227E-01 2.6100E-01 2.8100E-02 9.7668E-01 3.1800E-01 5.6000E-03
1.0033E+00 3.2800E-01 1.4000E-03 1.0614E+00 3.5000E-01 3.3600E-03
1.0657E+00 3.5200E-01 5.6100E-02 1.0774E+00 3.5700E-01 8.9000E-03

ENERGY.DAT

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1.1222E+00 3.7400E-01 4.3000E-03 1.1514E+00 3.8500E-01 4.4300E-02
1.1815E+00 3.9700E-01 1.4400E-03 1.2527E+00 4.2500E-01 2.5000E-02
1.2592E+00 4.2700E-01 1.5000E-02 1.2754E+00 4.3400E-01 1.1900E-02
1.3797E+00 4.7500E-01 1.5900E-02 1.4226E+00 4.9200E-01 8.3400E-02
1.5055E+00 5.2500E-01 1.7700E-01 1.5270E+00 5.3400E-01 2.5600E-03
1.5404E+00 5.3900E-01 1.7900E-01 1.6088E+00 5.6700E-01 8.8000E-03
1.7266E+00 6.1500E-01 3.3800E-02 1.8545E+00 6.6800E-01 1.0100E-02
1.8923E+00 6.8400E-01 7.8600E-02 1.9952E+00 7.2600E-01 2.2000E-03
2.6607E+00 1.0070E+00 6.0000E-03 3.2700E+00 1.2690E+00 1.7200E-01
5.2600E-01 1.5859E-01 3.6160E-03

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8.1500E-03 1.8650E-01 3.6839E-02 1.0679E-01 4.9227E-02 2.5093E-02
5.2288E-02 8.4456E-03 5.8200E-02 6.8273E-03 1.5146E-01 5.2889E-02
1.6826E-01 1.8792E-03 2.0469E-01 7.4676E-02 2.2559E-01 9.2143E-03
2.3798E-01 2.8991E-03 2.6140E-01 9.0792E-02 2.7883E-01 1.3357E-02
2.9121E-01 3.1564E-03 2.9427E-01 1.0509E-03 3.3553E-01 1.6000E-02
3.4792E-01 3.7582E-03 3.5098E-01 1.2503E-03
8.3300E-03 6.9107E-03 5.9700E-02 3.8159E-04 5.1621E-01 6.9421E-03
5.9237E-01 1.9484E-03 1.0272E+00 1.9237E-03 1.3227E+00 3.8537E-03

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76

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5.1200E-01 7.6000E-04
1.0800E-02 1.3505E-01 5.3226E-02 1.1054E-02 7.4815E-02 6.2130E-02
7.7108E-02 1.0460E-01 8.7300E-02 4.6683E-02 2.4198E-01 7.4913E-02
2.5879E-01 5.5272E-03 2.7453E-01 3.2571E-03 2.9521E-01 1.9247E-01
3.5192E-01 3.7210E-01 4.6210E-01 1.6779E-03 4.8042E-01 3.3953E-03
4.8708E-01 4.4119E-03 5.3369E-01 1.9049E-03 5.8015E-01 3.6519E-03
7.8591E-01 1.0956E-02 8.3902E-01 5.8924E-03 2.8068E-01 3.2670E-03
1.1100E-02 5.2133E-03 7.6862E-02 3.6005E-03 7.9290E-02 6.0310E-03
8.9800E-02 2.7064E-03 2.7370E-01 1.7762E-03 3.8700E-01 3.6511E-03
3.8910E-01 4.1445E-03 4.0574E-01 1.6775E-03 4.2650E-01 1.0855E-03
4.5477E-01 3.1972E-03 4.6969E-01 1.3322E-03 4.7438E-01 1.1842E-03
6.0931E-01 4.6281E-01 6.6545E-01 1.5690E-02 7.0311E-01 4.7366E-03
7.1986E-01 4.0459E-03 7.5284E-01 1.3322E-03 7.6836E-01 5.0425E-02
7.8610E-01 3.1577E-03 8.0617E-01 1.2335E-02 8.2118E-01 1.5098E-03
9.0425E-01 1.0559E-03 9.3406E-01 3.2071E-02 9.6408E-01 3.8485E-03
1.0520E+00 3.1676E-03 1.0700E+00 2.8617E-03 1.1203E+00 1.5147E-01
1.1337E+00 2.5558E-03 1.1552E+00 1.6973E-02 1.2077E+00 4.6182E-03
1.2381E+00 5.9405E-02 1.2810E+00 1.4802E-02 1.3038E+00 1.2138E-03
1.3777E+00 4.1051E-02 1.3853E+00 7.7957E-03 1.4015E+00 1.3914E-02
1.4080E+00 2.4867E-02 1.5092E+00 2.2203E-02 1.5385E+00 4.1445E-03
1.5433E+00 3.5525E-03 1.5832E+00 7.2036E-03 1.5947E+00 2.6643E-03
1.5993E+00 3.3551E-03 1.6613E+00 1.1545E-02 1.6840E+00 2.3683E-03
1.7296E+00 2.9702E-02 1.7645E+00 1.5838E-01 1.8384E+00 3.8485E-03
1.8474E+00 2.0920E-02 1.8732E+00 2.2696E-03 1.8963E+00 1.7762E-03
2.1186E+00 1.1743E-02 2.2042E+00 4.9833E-02 2.2934E+00 3.2564E-03
2.4479E+00 1.5591E-02 1.1580E+00 3.5073E-02
7.9730E-01 1.0450E-04

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ENERGY.DAT

PB-210 22.26 Y 82.
0
2
1.6498E-02 4.1400E-03 8.0200E-01 6.3001E-02 1.6130E-02 1.9800E-01
0
3
8.1500E-03 3.3591E-01 3.0116E-02 5.7915E-01 4.2504E-02 1.8104E-01
2
1.0800E-02 2.4324E-01 4.6503E-02 4.0500E-02
BI-210 5.013 D 83.
0
1
1.1614E+00 3.8900E-01 1.0000E+00
0
0
0
0
PO-210 138.378 D 84.
2
5.3045E+00 9.9999E-01 4.5240E+00 1.0700E-05
0
0
0
1
8.0310E-01 1.0590E-05
U -232 72 Y 92.
4
5.1390E+00 2.8000E-03 5.2635E+00 3.1200E-01 5.3203E+00 6.8600E-01
4.9831E+00 3.3598E-05
0
0
5
9.4800E-03 1.1091E-01 3.7308E-02 2.2933E-01 5.2598E-02 6.2563E-02
5.6451E-02 2.2933E-02 1.0861E-01 1.7366E-03
3
1.3000E-02 1.2016E-01 5.7780E-02 2.0117E-03 1.4198E-01 7.2871E-04
TH-232 1.405E10 Y 90.
3
3.8300E+00 2.0000E-03 3.9530E+00 2.3000E-01 4.0100E+00 7.7000E-01
0
0
5
9.0900E-03 8.3904E-02 3.9763E-02 1.6675E-01 5.4178E-02 4.5080E-02
5.7792E-02 1.6192E-02 1.0576E-01 1.0580E-03
3
1.2300E-02 8.3904E-02 5.9000E-02 1.9000E-03 1.2500E-01 4.2000E-04
RA-228 5.75 Y 88.
0
1

ENERGY.DAT

3.8930E-02 9.9000E-03 1.0000E+00

0

1

1.6680E-03 1.0000E+00

1

6.6700E-03 6.2112E-07

AC-228 6.13 H 89.

0

32 1 29

1.2680E-01 3.3300E-02 1.9700E-03 1.9254E-01 5.1700E-02 2.9000E-03
2.3711E-01 6.4600E-02 1.6000E-03 2.4427E-01 6.6700E-02 2.1500E-03
3.7700E-01 1.0720E-01 2.1600E-03 3.9330E-01 1.1230E-01 3.7000E-03
4.0140E-01 1.1490E-01 1.5800E-03 4.1290E-01 1.1850E-01 1.5900E-02
4.4870E-01 1.3000E-01 2.4200E-02 4.5395E-01 1.3170E-01 1.5400E-02
4.9106E-01 1.4380E-01 4.9000E-02 4.9439E-01 1.4490E-01 7.8000E-03
4.9900E-01 1.4640E-01 1.3000E-02 5.9820E-01 1.7960E-01 2.6000E-03
6.0563E-01 1.8210E-01 8.0000E-02 6.8678E-01 2.1000E-01 2.2000E-03
7.9260E-01 2.4700E-01 1.4000E-03 9.1039E-01 2.9000E-01 8.2000E-03
9.6231E-01 3.0900E-01 1.9000E-03 9.6871E-01 3.1100E-01 3.3000E-02
9.8348E-01 3.1700E-01 7.0000E-02 1.0144E+00 3.2800E-01 6.6000E-02
1.0460E+00 3.4000E-01 2.4000E-03 1.1146E+00 3.6600E-01 3.4000E-02
1.1210E+00 3.6800E-01 4.6000E-03 1.1577E+00 3.8200E-01 2.1000E-03
1.1681E+00 3.8600E-01 3.2000E-01 1.1932E+00 3.9600E-01 1.5000E-03
1.6178E+00 5.3800E-01 1.1000E-03 1.7409E+00 6.1100E-01 1.2000E-01
2.0792E+00 7.4800E-01 8.0000E-02 2.8300E-01 7.8844E-02 1.0300E-03

0

25

9.4800E-03 3.6100E-01 1.9429E-02 7.4513E-03 3.7308E-02 5.7156E-01
4.4549E-02 1.3091E-03 5.2598E-02 1.5593E-01 5.6451E-02 5.7156E-02
6.9200E-02 1.7777E-03 7.4849E-02 4.8475E-02 7.8978E-02 4.0099E-02
9.4268E-02 9.6601E-03 9.8120E-02 3.5542E-03 9.9629E-02 3.0005E-03
1.0861E-01 7.1466E-02 1.2390E-01 1.9584E-02 1.2775E-01 7.2851E-03
1.6058E-01 1.3648E-03 1.6403E-01 9.6950E-03 1.6935E-01 1.9324E-03
1.7932E-01 3.0054E-03 2.2867E-01 2.6235E-03 2.3145E-01 1.1634E-03
3.5335E-01 1.4005E-03 6.8505E-01 1.4803E-03 8.0142E-01 2.5179E-03
8.5946E-01 1.3529E-03

71

1.3000E-02 3.9108E-01 5.7780E-02 5.0137E-03 8.9953E-02 2.1326E-02
9.3350E-02 3.4846E-02 9.9450E-02 1.3019E-02 1.0500E-01 1.6121E-02
1.2908E-01 2.7700E-02 1.4610E-01 2.1052E-03 1.5420E-01 9.4180E-03
1.9120E-01 1.1634E-03 1.9970E-01 3.3240E-03 2.0440E-01 1.6343E-03
2.0928E-01 4.4320E-02 2.1000E-01 2.1606E-03 2.7023E-01 3.6010E-02
2.7900E-01 2.2160E-03 3.2170E-01 2.4099E-03 3.2764E-01 3.2132E-02
3.3236E-01 4.4320E-03 3.3832E-01 1.1357E-01 3.4110E-01 4.1550E-03
4.0951E-01 2.1329E-02 4.4030E-01 1.3850E-03 4.6300E-01 4.4320E-02
4.7820E-01 2.2991E-03 5.0360E-01 2.0498E-03 5.0960E-01 4.7090E-03
5.2300E-01 1.1634E-03 5.4630E-01 2.1052E-03 5.6230E-01 9.4180E-03
5.7070E-01 1.7728E-03 5.7210E-01 1.5512E-03 5.8320E-01 1.4404E-03

ENERGY.DAT

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6.2380E-01 1.1357E-03 7.0150E-01 1.8836E-03 7.0710E-01 1.4958E-03
7.2700E-01 7.7560E-03 7.5518E-01 1.0526E-02 7.7217E-01 1.5512E-02
7.8200E-01 5.2630E-03 7.9470E-01 4.6259E-02 8.3050E-01 5.9001E-03
8.3550E-01 1.7451E-02 8.4000E-01 9.4180E-03 9.0450E-01 8.3100E-03
9.1107E-01 2.7700E-01 9.4410E-01 1.0249E-03 9.4800E-01 1.1634E-03
9.5850E-01 3.0193E-03 9.6460E-01 5.2076E-02 9.6911E-01 1.6620E-01
9.8780E-01 1.8282E-03 1.0332E+00 2.1606E-03 1.0651E+00 1.4127E-03
1.0957E+00 1.2742E-03 1.1104E+00 3.3240E-03 1.1536E+00 1.5235E-03
1.2464E+00 5.4015E-03 1.2875E+00 1.1357E-03 1.4593E+00 9.9720E-03
1.4958E+00 9.9720E-03 1.5015E+00 5.5400E-03 1.5569E+00 1.9390E-03
1.5802E+00 6.9250E-03 1.5880E+00 3.5456E-02 1.6247E+00 3.0470E-03
1.6304E+00 1.8614E-02 1.6380E+00 5.2630E-03 1.6663E+00 1.9944E-03
1.8870E+00 1.0526E-03 9.4777E-01 4.1168E-02
TH-228      1.9132 Y      90.
5
5.1750E+00 1.8000E-03 5.2120E+00 3.6000E-03 5.3405E+00 2.6700E-01
5.4233E+00 7.2700E-01 5.1387E+00 5.0044E-04
0
0
4
9.0900E-03 9.5590E-02 6.5134E-02 1.9118E-01 7.9549E-02 5.1909E-02
8.3163E-02 1.8755E-02
5
1.2300E-02 9.5590E-02 8.4371E-02 1.2100E-02 1.3161E-01 1.2400E-03
2.1598E-01 2.3900E-03 1.7254E-01 1.1484E-03
RA-224      3.62 D      88. (Includes daughters, RN-220, PO-216)
7
5.4490E+00 4.9000E-02 5.6856E+00 9.5100E-01 5.0936E+00 1.7600E-04
6.2883E+00 9.9903E-01 5.7470E+00 9.7000E-04
6.7785E+00 9.9998E-01 5.9850E+00 1.8000E-05
0
0
5
8.7100E-03 4.4717E-03 6.2700E-02 1.2387E-04 1.4258E-01 4.4240E-03
2.2293E-01 4.8980E-03 2.3650E-01 1.7420E-03
8
1.1700E-02 3.9655E-03 8.1070E-02 1.2595E-03 8.3780E-02 2.0921E-03
9.4900E-02 9.4851E-04 2.4098E-01 3.9500E-02 4.6495E-01 1.8000E-04
5.4973E-01 9.5000E-04
8.0490E-01 1.8000E-05
PB-212      10.643 H      82.
0
3
1.5752E-01 4.1900E-02 5.2200E-02 3.3418E-01 9.4400E-02 8.5100E-01
5.7280E-01 1.7270E-01 9.9000E-02
0
11
8.1500E-03 2.1394E-01 2.4664E-02 3.4821E-02 5.8200E-02 1.1751E-02

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ENERGY.DAT

9.8802E-02 6.1450E-03 1.1119E-01 1.9218E-03 1.4810E-01 3.3082E-01
2.0956E-01 1.3422E-02 2.2224E-01 5.7146E-02 2.3463E-01 1.3483E-02
2.3769E-01 4.5092E-03 2.8370E-01 2.3234E-03
8
1.0800E-02 1.5493E-01 7.4815E-02 1.0694E-01 7.7108E-02 1.8003E-01
8.7300E-02 8.0351E-02 1.1519E-01 6.0245E-03 2.3863E-01 4.4646E-01
3.0009E-01 3.4067E-02 1.7667E-01 5.1997E-04
8I-212 60.55 M 83. (Includes daughters, PO-212, TL-208) 7/22/87
RAP
6
5.6071E+00 4.0242E-03 5.7681E+00 6.0003E-03 6.0508E+00 2.5223E-01
6.0901E+00 9.6292E-02 5.6127E+00 6.5073E-04
8.7849E+00 6.4070E-01
15
4.4015E-01 1.2810E-01 1.1700E-02 5.6667E-01 1.7030E-01 4.3000E-03
6.2536E-01 1.9060E-01 3.4400E-02 7.3330E-01 2.2870E-01 2.6100E-02
1.5188E+00 5.3070E-01 8.0000E-02 2.2460E+00 8.3160E-01 4.8400E-01
4.4500E-01 1.2970E-01 4.8000E-04
8.1154E-01 2.5780E-01 7.9765E-04 8.6664E-01 2.7820E-01 5.8925E-04
1.0310E+00 3.4020E-01 1.0492E-02 1.0721E+00 3.5600E-01 2.0839E-03
1.2835E+00 4.3870E-01 8.3576E-02 1.5168E+00 5.3250E-01 8.1561E-02
1.7942E+00 6.4650E-01 1.7713E-01 7.1200E-01 2.2352E-01 7.3297E-04
0
24
7.7800E-03 1.1530E-01 2.4510E-02 1.9121E-01 3.6153E-02 5.9203E-02
5.5200E-02 3.8864E-05 2.0254E-01 1.1777E-03 8.3300E-03 5.7178E-04
5.9700E-02 3.7617E-05 6.3406E-01 1.2539E-03
7.9700E-03 1.4917E-02 5.6700E-02 8.2977E-04 1.2340E-01 5.8095E-04
1.4536E-01 4.6687E-04 1.6461E-01 9.7536E-04 1.8935E-01 1.0973E-02
2.6149E-01 1.8824E-03 2.7350E-01 5.8275E-04 4.2284E-01 6.7541E-03
4.9498E-01 1.1385E-03 4.9513E-01 4.6001E-03 5.0699E-01 3.7486E-04
5.6728E-01 1.2590E-03 5.7929E-01 4.1463E-04 7.7237E-01 1.0069E-03
2.5267E+00 5.7373E-04
41
1.0300E-02 7.6864E-02 3.9857E-02 1.0225E-02 7.0832E-02 3.3066E-04
7.2871E-02 5.6045E-04 8.2600E-02 2.4773E-04 2.8807E-01 3.1744E-03
3.2796E-01 1.2965E-03 4.5283E-01 3.4751E-03 3.7950E-01 9.4564E-04
1.1100E-02 4.3134E-04 7.6862E-02 3.5494E-04 7.9290E-02 5.9454E-04
8.9800E-02 2.6680E-04 7.2717E-01 1.1829E-01 7.8546E-01 1.9694E-02
8.9343E-01 6.5221E-03 9.5210E-01 3.1332E-03 1.0786E+00 9.5273E-03
1.5128E+00 5.5629E-03 1.6206E+00 2.7495E-02 1.6795E+00 1.2149E-03
1.8060E+00 1.9822E-03 1.0740E+00 2.8134E-04
1.0600E-02 1.0366E-02 7.2804E-02 7.2977E-03 7.4969E-02 1.2328E-02
8.4900E-02 5.4754E-03 2.1140E-01 6.0959E-04 2.3336E-01 1.1116E-03
2.5261E-01 2.8678E-03 2.7735E-01 2.4384E-02 5.1084E-01 7.7454E-02
5.8314E-01 3.0264E-01 7.2204E-01 7.2791E-04 7.6313E-01 5.8807E-03
8.6037E-01 4.4751E-02 9.2760E-01 4.4823E-04 9.8270E-01 7.0642E-04
1.0939E+00 1.3268E-03 2.6147E+00 3.5858E-01 8.4036E-01 1.2837E-03

ENERGY.DAT

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U -234      2.445E5 Y      92.
4
4.6047E+00 2.4000E-03 4.7237E+00 2.7400E-01 4.7758E+00 7.2400E-01
4.2162E+00 7.3000E-07
0
0
5
9.4800E-03 9.6954E-02 3.2728E-02 2.0060E-01 4.8018E-02 5.4634E-02
5.1870E-02 2.0178E-02 1.0043E-01 1.3880E-03
3
1.3000E-02 1.0503E-01 5.3200E-02 1.1800E-03 1.2143E-01 4.0055E-04
U -236      2.3415E7 Y      92.
3
4.3320E+00 2.6000E-03 4.4450E+00 2.6000E-01 4.4940E+00 7.4000E-01
0
0
4
9.4800E-03 9.2116E-02 2.8897E-02 1.9032E-01 4.4187E-02 6.8900E-02
9.2278E-02 1.5886E-03
2
1.3000E-02 9.9792E-02 6.8212E-02 1.1100E-03
U -235      7.038E8 Y      92.
14
4.1500E+00 9.0000E-03 4.2170E+00 5.7000E-02 4.2190E+00 9.0000E-03
4.2710E+00 4.0000E-03 4.3250E+00 4.6000E-02 4.3440E+00 1.5000E-02
4.3640E+00 1.1000E-01 4.3700E+00 6.0000E-02 4.3960E+00 5.5000E-01
4.4140E+00 2.1000E-02 4.4350E+00 7.0000E-03 4.5020E+00 1.7000E-02
4.5560E+00 4.2000E-02 4.5980E+00 5.0000E-02
0
0
38
9.4800E-03 2.8535E-01 1.1078E-02 1.7600E-01 1.4408E-02 6.8000E-01
2.0928E-02 1.2000E-02 2.1488E-02 1.9557E-01 2.6368E-02 6.5600E-02
3.0828E-02 4.0400E-02 3.3628E-02 1.7376E-02 3.4109E-02 1.7220E-02
3.6218E-02 3.8400E-03 3.6778E-02 6.6780E-02 4.1289E-02 1.9760E-03
4.6118E-02 1.1040E-02 4.8918E-02 4.4640E-03 4.9971E-02 4.0800E-03
5.2228E-02 4.1470E-02 5.2770E-02 1.6320E-03 5.3699E-02 5.6870E-03
6.7518E-02 1.1330E-02 6.9200E-02 2.2748E-03 7.1370E-02 4.1910E-03
7.3049E-02 6.0000E-03 7.4064E-02 4.9572E-02 7.5618E-02 8.6860E-03
8.8668E-02 1.0695E-03 9.0908E-02 3.2594E-03 9.2469E-02 1.1000E-02
9.5660E-02 3.3276E-03 9.9528E-02 5.2110E-03 1.1482E-01 1.9620E-03
1.2329E-01 3.6645E-03 1.3858E-01 1.1970E-03 1.4288E-01 1.1797E-03
1.6223E-01 2.1800E-03 1.6324E-01 1.0044E-02 1.7853E-01 3.2778E-03
1.8165E-01 3.8100E-03 1.9694E-01 1.3300E-03
17
1.3000E-02 3.0913E-01 7.2700E-02 1.1000E-03 8.9953E-02 2.7289E-02
9.3350E-02 4.4590E-02 1.0500E-01 2.0629E-02 1.0914E-01 1.5000E-02
1.2000E-01 1.5000E-03 1.4077E-01 2.2000E-03 1.4376E-01 1.0500E-01

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ENERGY.DAT

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1.6335E-01 4.7000E-02 1.8270E-01 4.0000E-03 1.8372E-01 5.4000E-01
1.9494E-01 5.9000E-03 2.0212E-01 1.0000E-02 2.0531E-01 4.7000E-02
2.2138E-01 1.0000E-03 1.9035E-01 9.1940E-03
TH-231      25.52 H      90.
0
9
1.4167E-01 3.7400E-02 2.7000E-02 1.7077E-01 4.5500E-02 3.2000E-03
2.0551E-01 5.5400E-02 1.5000E-01 2.1483E-01 5.8100E-02 1.2500E-02
2.8674E-01 7.9300E-02 9.0000E-02 2.8761E-01 7.9600E-02 4.1000E-01
3.0479E-01 8.4800E-02 3.5000E-01 3.1132E-01 8.6800E-02 4.1000E-03
1.2210E-01 3.3364E-02 1.1527E-03
0
33
3.8331E-03 4.9500E-03 4.5354E-03 4.8645E-01 4.8831E-03 7.5240E-03
9.6800E-03 6.0290E-01 1.1833E-02 4.5312E-01 1.2703E-02 1.9741E-01
2.0273E-02 1.6703E-01 2.2975E-02 1.7325E-03 2.3079E-02 5.0193E-03
3.3339E-02 1.1405E-03 3.7465E-02 5.4648E-01 4.2755E-02 5.9202E-03
4.7395E-02 3.0698E-03 5.0519E-02 5.9845E-03 5.3203E-02 1.5064E-01
5.7183E-02 5.5598E-02 5.8493E-02 2.0493E-03 6.0135E-02 7.9299E-02
6.1005E-02 2.3681E-02 6.3105E-02 1.4543E-01 6.3133E-02 1.1568E-03
6.8845E-02 1.1353E-03 7.0800E-02 2.7932E-04 7.5873E-02 2.0265E-02
7.6743E-02 5.7420E-03 7.8175E-02 5.4292E-03 7.8843E-02 3.6679E-02
7.9853E-02 7.9299E-03 8.0723E-02 2.1028E-03 8.2823E-02 8.3655E-03
9.3913E-02 1.8889E-03 1.1458E-01 1.1429E-03 1.4202E-01 1.2859E-03
16
1.3300E-02 7.0775E-01 1.7200E-02 1.8810E-03 2.5640E-02 1.4652E-01
5.8570E-02 4.7520E-03 7.2780E-02 2.4849E-03 8.1240E-02 8.8110E-03
8.2110E-02 3.9600E-03 8.4210E-02 6.4350E-02 8.9950E-02 9.3060E-03
9.2287E-02 3.5072E-03 9.5868E-02 5.7120E-03 9.9280E-02 1.1880E-03
1.0227E-01 4.0590E-03 1.0800E-01 2.6459E-03 1.6312E-01 1.5345E-03
1.1427E-01 5.6896E-03
PA-231      3.276E4 Y      91.
15
4.6310E+00 1.0000E-01 4.6420E+00 1.0000E-03 4.6800E+00 1.5000E-02
4.7120E+00 1.0000E-02 4.7360E+00 8.4000E-02 4.8510E+00 1.4000E-02
4.9330E+00 3.0000E-02 4.9500E+00 2.2800E-01 4.9740E+00 4.0000E-03
4.9840E+00 1.4000E-02 5.0110E+00 2.5400E-01 5.0280E+00 2.0000E-01
5.0305E+00 2.5000E-02 5.0573E+00 1.1000E-01 4.7062E+00 6.9800E-04
0
0
40
3.7600E-03 7.5500E-03 4.8600E-03 6.6800E-03 5.7000E-03 1.3680E-01
7.5200E-03 2.5110E-01 9.2800E-03 4.1515E-01 1.0110E-02 2.0240E-01
1.3898E-02 4.1664E-01 1.8360E-02 7.9566E-02 1.8598E-02 2.4100E-03
1.9698E-02 2.1400E-03 2.0538E-02 4.3560E-02 2.2358E-02 8.4537E-02
2.4320E-02 1.8000E-02 2.4948E-02 6.9276E-02 2.6530E-02 1.4019E-03
3.2900E-02 1.5045E-02 3.3198E-02 2.5926E-02 3.7260E-02 6.6000E-03
3.7350E-02 4.2900E-02 3.9158E-02 5.7420E-03 4.3830E-02 3.2800E-02

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ENERGY.DAT

4.7738E-02 3.6210E-03 5.1471E-02 1.3090E-03 5.2098E-02 2.5300E-03
5.2188E-02 1.1700E-02 5.4340E-02 7.9000E-03 5.5921E-02 4.2120E-03
5.7520E-02 3.9372E-03 5.8668E-02 8.9500E-03 6.2401E-02 3.2300E-03
6.7500E-02 5.4043E-04 6.9178E-02 2.9250E-03 7.7040E-02 7.8672E-03
8.1080E-02 2.3616E-03 8.2660E-02 3.0228E-03 9.1878E-02 2.9304E-03
1.9333E-01 1.5065E-02 2.2332E-01 6.5520E-03 2.8024E-01 2.8060E-03
3.1023E-01 1.2194E-03
17
1.2700E-02 4.3210E-01 1.8900E-02 3.5000E-03 2.7360E-02 9.3000E-02
3.8200E-02 1.4900E-03 4.6370E-02 2.0800E-03 8.7670E-02 6.2033E-03
9.0884E-02 1.0186E-02 1.0200E-01 4.6873E-03 2.5580E-01 1.0100E-03
2.6022E-01 1.7300E-03 2.8367E-01 1.6000E-02 3.0008E-01 2.3000E-02
3.0267E-01 2.3000E-02 3.3007E-01 1.3000E-02 3.4081E-01 1.6500E-03
3.5716E-01 1.7300E-03 1.6552E-01 1.4489E-02
AC-227 21.773 Y 89.
3
4.9381E+00 4.9680E-03 4.9505E+00 6.7620E-03 4.8368E+00 1.8754E-03
3
1.9201E-02 4.8000E-03 1.0000E-01 3.4401E-02 8.7000E-03 3.5000E-01
4.3701E-02 1.1100E-02 5.4000E-01
0
6
8.0480E-03 5.0053E-03 4.0279E-03 2.2160E-02 4.1177E-03 4.1420E-01
9.4800E-03 1.0637E-02 1.0018E-02 6.8758E-02 1.9318E-02 7.3373E-03
3
1.1535E-01 9.8234E-04 1.3000E-02 1.1523E-02 1.7357E-02 3.6223E-04
TH-227 18.718 D 90.
20
5.5859E+00 1.7600E-03 5.6006E+00 1.7000E-03 5.6133E+00 2.1600E-03
5.6680E+00 2.0600E-02 5.6930E+00 1.5000E-02 5.7008E+00 3.6300E-02
5.7090E+00 8.2000E-02 5.7132E+00 4.8900E-02 5.7571E+00 2.0300E-01
5.7623E+00 2.2800E-03 5.7955E+00 3.1100E-03 5.8075E+00 1.2700E-02
5.8666E+00 2.4200E-02 5.9099E+00 1.7400E-03 5.9160E+00 7.8000E-03
5.9597E+00 3.0000E-02 5.9779E+00 2.3400E-01 6.0088E+00 2.9000E-02
6.0382E+00 2.4500E-01 5.5625E+00 1.9613E-03
0
0
61
1.0633E-03 1.1480E-02 1.4780E-03 4.6000E-03 3.4780E-03 3.0800E-02
9.0900E-03 4.1800E-01 9.1780E-03 1.5228E-03 1.0363E-02 5.3220E-03
1.0673E-02 4.1800E-01 1.2393E-02 1.4480E-01 1.5478E-02 3.9800E-03
2.4463E-02 1.7687E-03 2.4778E-02 1.6920E-03 2.4863E-02 6.8600E-03
2.5063E-02 1.6900E-02 2.5088E-02 1.4600E-01 2.6808E-02 4.9600E-02
2.8963E-02 2.1000E-02 3.0663E-02 1.0800E-03 3.0863E-02 4.4856E-02
3.1463E-02 1.6000E-02 3.4963E-02 1.1920E-03 3.7313E-02 2.9304E-03
3.9278E-02 2.3800E-03 3.9478E-02 5.8500E-03 4.2263E-02 6.4440E-02
4.3378E-02 7.5000E-03 4.3463E-02 1.1340E-03 4.5278E-02 1.0920E-02
4.5878E-02 4.3200E-03 4.8892E-02 3.6876E-03 4.9463E-02 4.3890E-03

ENERGY.DAT

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4.9492E-02 1.6000E-03 5.1728E-02 1.0296E-03 5.3663E-02 1.5200E-03
5.4463E-02 3.6000E-03 5.6678E-02 1.7460E-02 6.0292E-02 6.2550E-03
6.0563E-02 3.0800E-03 6.3878E-02 1.5180E-03 6.5900E-02 1.2776E-03
6.8878E-02 1.3000E-03 7.4763E-02 1.3958E-03 7.5963E-02 1.0728E-03
8.1163E-02 5.5760E-03 9.3863E-02 6.8170E-03 9.5578E-02 2.0720E-03
1.0108E-01 2.8220E-03 1.0828E-01 2.5160E-03 1.3098E-01 5.1520E-03
1.3208E-01 5.6695E-03 1.4618E-01 2.6950E-03 1.5228E-01 6.5520E-03
1.8218E-01 9.8400E-03 1.9268E-01 2.4360E-03 2.0048E-01 6.4260E-03
2.0868E-01 2.2059E-03 2.1676E-01 1.0684E-03 2.3028E-01 3.8180E-03
2.3696E-01 7.1820E-03 2.5138E-01 2.6019E-03 2.6686E-01 1.9200E-03
2.8516E-01 1.3041E-03

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42

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8.3000E-03 1.4000E-03 1.2300E-02 4.1800E-01 2.0300E-02 2.0000E-03
2.9910E-02 1.0000E-03 4.3700E-02 2.3000E-03 4.9900E-02 2.0000E-03
5.0100E-02 8.4000E-02 6.2200E-02 2.4000E-03 7.9800E-02 2.0000E-02
8.5430E-02 1.4069E-02 8.8470E-02 2.3178E-02 9.4000E-02 1.4000E-02
1.0000E-01 1.0615E-02 1.1310E-01 1.7000E-03 1.1310E-01 5.4000E-03
1.1720E-01 1.8000E-03 1.4120E-01 1.4000E-03 2.0430E-01 2.3000E-03
2.0500E-01 1.7000E-03 2.0600E-01 2.6000E-03 2.1060E-01 1.2600E-02
2.3490E-01 4.6000E-03 2.3600E-01 1.1500E-01 2.5010E-01 4.9000E-03
2.5250E-01 1.1000E-03 2.5470E-01 9.1000E-03 2.5620E-01 6.3000E-02
2.6290E-01 1.0000E-03 2.7300E-01 4.9000E-03 2.8130E-01 1.7000E-03
2.8610E-01 1.6000E-02 2.9660E-01 4.2000E-03 2.9980E-01 1.8400E-02
3.0030E-01 2.8000E-03 3.0440E-01 1.3500E-02 3.1260E-01 4.3000E-03
3.1480E-01 4.2000E-03 3.2970E-01 2.9000E-02 3.3420E-01 1.1500E-02
3.4240E-01 3.4000E-03 3.5050E-01 1.1800E-03 1.8497E-01 1.7273E-02
FR-223      21.8 M      87.

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2.2122E-01 6.0100E-02 1.2400E-03 3.2179E-01 9.0200E-02 4.9000E-03
3.4406E-01 9.7100E-02 1.0800E-03 7.7807E-01 2.4300E-01 1.3500E-02
8.1327E-01 2.5570E-01 1.5100E-03 9.1266E-01 2.9190E-01 1.0300E-01
1.0174E+00 3.3090E-01 1.7000E-01 1.0679E+00 3.4990E-01 1.2700E-01
1.0975E+00 3.6110E-01 5.7000E-01 6.7070E-01 2.0824E-01 3.8957E-03

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1.0633E-03 4.3667E-02 1.4780E-03 5.5408E-02 9.0900E-03 3.3681E-01
1.0363E-02 1.9681E-02 1.0673E-02 1.9938E-01 1.2393E-02 4.0161E-02
1.5478E-02 1.5139E-02 2.4778E-02 6.2572E-03 2.5088E-02 6.9783E-02
2.6808E-02 1.3757E-02 3.0663E-02 4.1081E-03 3.0863E-02 1.6927E-01
4.2263E-02 1.8157E-02 4.5078E-02 1.0042E-03 4.5278E-02 4.1208E-02
4.8892E-02 1.3915E-02 4.9463E-02 5.0590E-02 5.6678E-02 4.9195E-03
6.0292E-02 1.7624E-03 6.0563E-02 1.1716E-02 6.3878E-02 1.2895E-02
6.5900E-02 1.3361E-03 6.7492E-02 4.6026E-03 6.9478E-02 1.9019E-03
7.4978E-02 3.7962E-03 8.1163E-02 6.6281E-02 9.5578E-02 1.8068E-02
9.9192E-02 6.5235E-03 1.0108E-01 1.7890E-02 1.3098E-01 3.1597E-02
1.8576E-01 3.4380E-03 2.0018E-01 1.1208E-03 2.1566E-01 6.0654E-03
2.3008E-01 1.9720E-03

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ENERGY.DAT

21

6.3000E-03 1.2045E-03 1.2300E-02 3.3681E-01 2.0300E-02 7.6075E-03
4.9900E-02 7.6075E-03 5.0100E-02 3.1698E-01 6.8700E-02 3.8038E-03
7.9800E-02 7.6075E-02 8.5430E-02 1.4713E-02 8.8470E-02 2.4239E-02
1.0000E-01 1.1101E-02 1.0040E-01 9.5094E-03 1.3460E-01 5.0717E-03
1.7340E-01 1.2679E-03 1.8480E-01 2.8528E-03 2.0500E-01 1.0777E-02
2.3490E-01 2.8211E-02 2.8950E-01 2.2823E-03 3.1940E-01 5.1351E-03
3.6940E-01 1.0143E-03 7.7530E-01 3.8989E-03 4.8203E-01 1.2278E-02
RA-223 11.434 D 88. (RN-219/PO-215/PB-211/BI-211/TL-207)

21

5.2880E+00 1.6000E-03 5.3390E+00 1.3000E-03 5.3670E+00 1.3000E-03
5.3450E+00 2.2700E-02 5.5010E+00 1.0000E-02 5.5370E+00 9.1600E-02
5.6060E+00 2.4200E-01 5.7150E+00 5.2500E-01 5.7450E+00 9.5000E-02
5.8575E+00 3.2000E-03 5.8700E+00 8.5000E-03 5.3482E+00 2.9469E-03
6.4247E+00 7.5000E-02 6.5290E+00 1.2000E-03 6.5528E+00 1.2900E-01
6.8193E+00 7.9600E-01 6.2307E+00 8.8700E-04
7.3864E+00 9.9944E-01 6.9541E+00 5.6000E-04
6.2788E+00 1.6226E-01 6.6231E+00 8.3501E-01

8

2.6357E-01 7.2800E-02 6.6000E-03 5.4107E-01 1.6190E-01 5.0000E-02
9.6816E-01 3.1560E-01 1.3000E-02 1.3730E+00 4.7330E-01 9.3000E-01
2.5300E-01 7.0858E-02 8.8000E-04
5.7900E-01 1.7460E-01 2.7300E-03
5.2417E-01 1.5630E-01 2.5000E-03 1.4220E+00 4.9410E-01 9.9750E-01

0

54

3.3430E-03 5.1800E-01 5.5080E-03 1.2687E-01 8.3760E-03 1.7010E-03
8.7100E-03 2.7900E-01 9.9480E-03 1.2675E-01 1.3551E-02 1.1880E-02
2.3915E-02 7.3661E-02 2.7118E-02 4.2300E-03 4.5831E-02 1.2539E-01
5.5805E-02 1.8079E-01 6.0230E-02 1.9739E-02 6.2700E-02 1.4625E-02
8.1116E-02 2.3664E-03 9.2808E-02 1.7568E-03 1.0427E-01 1.3804E-02
1.1784E-01 3.2963E-03 1.2122E-01 1.1507E-03 1.2619E-01 2.3296E-02
1.3616E-01 3.2922E-02 1.3975E-01 5.5404E-03 1.4059E-01 3.7702E-03
1.4314E-01 1.9343E-02 1.4973E-01 7.8678E-03 1.5311E-01 2.7230E-03
1.5415E-01 1.2157E-03 1.7106E-01 9.0440E-02 2.2547E-01 1.5404E-02
2.3988E-01 9.5004E-03 2.5141E-01 1.6592E-02 2.6498E-01 3.9168E-03
2.6836E-01 1.3450E-03 2.7327E-01 1.2650E-03 3.0582E-01 2.8052E-03
3.2023E-01 1.7390E-03 3.4663E-01 2.0532E-03
8.3300E-03 1.3793E-02 3.7485E-02 3.9672E-03 5.9700E-02 5.5693E-04
1.1365E-01 1.1101E-03 1.7813E-01 1.2296E-02 2.5429E-01 7.2292E-03
2.6708E-01 2.4910E-03 3.0871E-01 2.3010E-03 3.8487E-01 1.0075E-03
8.1500E-03 3.8422E-03 4.9033E-02 3.0870E-03 5.8200E-02 1.3707E-04
3.1432E-01 2.4108E-03 3.3655E-01 2.0110E-03
7.7800E-03 1.5707E-02 5.5200E-02 8.7813E-04 2.6554E-01 2.6610E-02
3.3572E-01 4.6243E-03 3.4737E-01 1.4230E-03

47

1.1700E-02 2.4741E-01 8.0190E-02 2.0000E-03 8.1070E-02 1.4870E-01
8.3780E-02 2.4700E-01 9.4900E-02 1.1198E-01 9.8234E-02 4.5000E-03

ENERGY.DAT

1.2232E-01	1.1900E-02	1.4424E-01	3.2400E-02	1.5421E-01	5.5800E-02
1.5863E-01	6.8300E-03	1.7952E-01	1.3600E-03	2.6946E-01	1.3600E-01
2.8818E-01	1.5100E-03	3.2387E-01	3.8800E-02	3.2838E-01	1.9500E-03
3.3828E-01	2.7300E-02	3.4290E-01	2.2000E-03	3.4980E-01	3.4000E-03
3.7168E-01	4.7200E-03	4.4503E-01	1.1800E-02	2.9205E-01	1.3533E-02
1.1100E-02	1.0405E-02	7.6862E-02	5.2549E-03	7.9290E-02	8.8023E-03
8.9800E-02	3.9501E-03	1.3059E-01	1.1600E-03	2.7123E-01	1.0600E-01
4.0181E-01	6.5000E-02	3.8845E-01	1.9510E-03		
4.3870E-01	3.4000E-04				
1.0800E-02	2.7823E-03	7.4815E-02	1.2474E-03	7.7108E-02	2.1000E-03
8.7300E-02	9.3727E-04	4.0484E-01	2.9400E-02	4.2708E-01	1.3230E-02
7.0459E-01	3.6946E-03	7.6647E-01	5.3900E-03	8.3196E-01	2.8616E-02
5.1763E-01	4.7187E-03				
1.0300E-02	1.0471E-02	7.0832E-02	7.4713E-03	7.2871E-02	1.2663E-02
8.2600E-02	5.5974E-03	3.5107E-01	1.2945E-01		
8.9783E-01	2.4000E-03	4.5907E-01	3.1440E-05		
U -237	6.75 D	92.			
0					
5					
1.4847E-01	3.9200E-02	1.8500E-03	1.5079E-01	3.9900E-02	2.4800E-03
1.8704E-01	5.0100E-02	3.4000E-02	2.3805E-01	6.4800E-02	5.3100E-01
2.5185E-01	6.8800E-02	4.3700E-01			
0					
26					
3.9182E-03	1.5259E-01	8.0868E-03	5.3357E-01	1.0100E-02	5.1515E-01
1.0778E-02	1.5876E-01	2.0622E-02	5.2381E-02	2.0996E-02	4.1013E-02
2.7482E-02	5.3185E-02	2.8583E-02	1.1933E-03	3.7110E-02	2.9257E-01
3.7700E-02	1.4454E-02	4.2403E-02	3.6146E-03	4.5932E-02	3.7047E-03
5.3814E-02	7.2463E-02	5.8036E-02	2.5515E-02	5.9107E-02	1.2049E-03
7.4300E-02	1.1780E-02	8.9327E-02	5.5046E-01	1.1572E-01	1.1594E-03
1.4218E-01	2.0850E-02	1.4886E-01	5.6388E-03	1.5889E-01	5.7525E-03
1.6311E-01	2.1967E-03	1.8558E-01	1.1097E-01	2.0228E-01	2.7083E-02
2.0650E-01	1.0062E-02	2.4511E-01	1.8073E-03		
16					
1.3810E-02	1.0301E-03	1.3900E-02	7.1139E-01	2.6345E-02	2.2774E-02
3.3205E-02	1.1340E-03	5.1010E-02	2.0790E-03	5.9537E-02	3.4020E-01
6.4830E-02	1.1813E-02	9.7080E-02	1.6290E-01	1.0107E-01	2.6316E-01
1.1400E-01	1.2313E-01	1.6461E-01	1.8617E-02	2.0801E-01	2.2019E-01
2.6754E-01	7.2292E-03	3.3235E-01	1.2191E-02	3.7093E-01	1.1246E-03
2.6290E-01	2.4949E-03				
NP-237	2.14E6 Y	93.			
17					
4.5811E+00	4.0000E-03	4.5987E+00	3.4000E-03	4.6395E+00	6.1800E-02
4.6592E+00	5.7000E-03	4.6641E+00	3.3200E-02	4.6945E+00	4.8000E-03
4.7083E+00	1.0000E-02	4.7124E+00	1.2600E-03	4.7661E+00	8.0000E-02
4.7711E+00	2.5000E-01	4.7881E+00	4.7000E-01	4.8034E+00	1.5600E-02
4.8174E+00	2.5000E-02	4.8629E+00	2.4000E-03	4.8710E+00	3.0000E-03
4.8731E+00	2.6000E-02	4.5873E+00	1.9400E-03		

ENERGY.DAT

0
0
33
1.3131E-03 2.5200E-02 2.8531E-03 4.7880E-02 5.0786E-03 1.6330E-02
8.2684E-03 3.2727E-01 9.6800E-03 5.0423E-01 1.2033E-02 2.5200E-01
2.1629E-02 2.6813E-03 2.4006E-02 1.1063E-01 3.0607E-02 2.4116E-02
3.6045E-02 5.4054E-01 3.8769E-02 1.1726E-02 4.1395E-02 6.3000E-03
4.2825E-02 1.2400E-02 4.9645E-02 4.5864E-03 5.1783E-02 1.4844E-01
5.5763E-02 5.4886E-02 5.7133E-02 2.2680E-03 5.8563E-02 3.4070E-03
6.2543E-02 1.2629E-03 6.5383E-02 1.6380E-03 6.5398E-02 1.4238E-01
7.0800E-02 1.2616E-03 8.1136E-02 3.4650E-02 8.5015E-02 4.0743E-03
8.5116E-02 1.2222E-02 8.6895E-02 2.1367E-03 9.6575E-02 3.9973E-03
1.0075E-01 1.5456E-03 1.1231E-01 1.3608E-03 1.1313E-01 1.3406E-03
1.2210E-01 5.1559E-03 1.3027E-01 2.6445E-03 1.3784E-01 1.7173E-03
16
1.3300E-02 5.9193E-01 2.9373E-02 1.3986E-01 4.6530E-02 1.3986E-03
5.7150E-02 4.1580E-03 8.6503E-02 1.2600E-01 8.8040E-02 1.6002E-03
9.2287E-02 1.5841E-02 9.4660E-02 8.3160E-03 9.5868E-02 2.5800E-02
1.0800E-01 1.1951E-02 1.1768E-01 1.7010E-03 1.4321E-01 4.1580E-03
1.5137E-01 2.4948E-03 1.9510E-01 2.1042E-03 2.1242E-01 1.6002E-03
1.6363E-01 1.0470E-02
PA-233 27.0 D 91.
0
4
1.5651E-01 4.1500E-02 2.4300E-01 1.7377E-01 4.6300E-02 1.5700E-01
2.3180E-01 6.3000E-02 2.8000E-01 2.6036E-01 7.1400E-02 3.3000E-01
0
28
6.7826E-03 1.7092E-01 9.8900E-03 3.8437E-01 1.1712E-02 1.9489E-02
1.8593E-02 9.2640E-02 2.2992E-02 5.7668E-02 3.4802E-02 3.4740E-02
3.6143E-02 1.2228E-03 5.3523E-02 1.0658E-01 6.4833E-02 1.0649E-01
6.9732E-02 2.5922E-02 7.2600E-02 8.2302E-03 7.3839E-02 9.4125E-03
8.1042E-02 2.5912E-02 8.2103E-02 2.7421E-02 8.5149E-02 9.4570E-03
9.8312E-02 6.7442E-03 1.0242E-01 2.4457E-03 1.8451E-01 5.6101E-02
1.9637E-01 2.9375E-01 2.2489E-01 2.2581E-02 2.7836E-01 1.0888E-02
2.9022E-01 5.7128E-02 2.9457E-01 3.5918E-03 3.0015E-01 1.6698E-03
3.0643E-01 1.3742E-02 3.1054E-01 5.0180E-03 3.1874E-01 4.7420E-03
3.3495E-01 1.5807E-03
15
1.3600E-02 4.8920E-01 7.5280E-02 1.2584E-02 8.6590E-02 1.8914E-02
9.4665E-02 1.0839E-01 9.8439E-02 1.7567E-01 1.0386E-01 7.4112E-03
1.1100E-01 8.1809E-02 2.7148E-01 3.0494E-03 3.0012E-01 6.6392E-02
3.1198E-01 3.8600E-01 3.4050E-01 4.5162E-02 3.7545E-01 6.1760E-03
3.9862E-01 1.2738E-02 4.1576E-01 1.6212E-02 1.2049E-01 2.0668E-03
U -233 1.592E5 Y 92.
6
4.7290E+00 1.6100E-02 4.7540E+00 1.6300E-03 4.7835E+00 1.3200E-01
4.7960E+00 2.8000E-03 4.8242E+00 8.4400E-01 4.6736E+00 2.7970E-03

ENERGY.DAT

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0
0
10
4.7979E-03 2.0345E-03 8.6779E-03 7.3224E-03 9.4800E-03 3.6209E-02
2.2008E-02 5.7600E-02 2.3968E-02 2.3458E-03 3.4268E-02 5.4163E-03
3.7298E-02 2.0736E-02 4.9558E-02 1.9354E-03 5.1368E-02 1.0151E-03
7.6668E-02 2.0463E-03
2
1.3000E-02 3.9226E-02 1.1451E-01 1.8182E-03
TH-229      7.34E3 Y      90.
17
4.6880E+00 1.5000E-03 4.7610E+00 6.3000E-03 4.7978E+00 1.2700E-02
4.8090E+00 2.2000E-03 4.8146E+00 9.3000E-02 4.8330E+00 2.9000E-03
4.8370E+00 4.8000E-02 4.8453E+00 5.6200E-01 4.8610E+00 1.8000E-03
4.9010E+00 1.0200E-01 4.9290E+00 1.1000E-03 4.9675E+00 5.9700E-02
4.9785E+00 3.1700E-02 5.0330E+00 2.4000E-03 5.0500E+00 5.2000E-02
5.0520E+00 1.6000E-02 4.7655E+00 2.6700E-03
0
0
67
3.2480E-03 9.1168E-02 6.1533E-03 4.8909E-01 9.0900E-03 8.1055E-01
1.2063E-02 7.5888E-02 1.2538E-02 2.4449E-01 2.0568E-02 1.7243E-01
2.0578E-02 8.6904E-02 2.0778E-02 4.3268E-02 2.3523E-02 1.0102E-01
2.6478E-02 2.5174E-02 2.8048E-02 1.9584E-02 3.3108E-02 8.8128E-02
3.7363E-02 4.2758E-02 3.7938E-02 3.4435E-02 3.9028E-02 2.0520E-02
4.4378E-02 2.0392E-03 4.8943E-02 1.0812E-02 4.9663E-02 4.6563E-02
5.0478E-02 2.5525E-02 5.1778E-02 1.0216E-02 5.2558E-02 4.1626E-02
5.5392E-02 3.6230E-03 5.5963E-02 1.4201E-01 6.3358E-02 3.6516E-03
6.4078E-02 1.2566E-02 6.5900E-02 1.4961E-02 6.7063E-02 2.7286E-02
6.7203E-02 1.1597E-01 6.7692E-02 4.5217E-03 6.8978E-02 6.2608E-03
7.0378E-02 3.8547E-02 7.3992E-02 1.3837E-02 8.0078E-02 3.2375E-03
8.1478E-02 7.0951E-03 8.1618E-02 2.7754E-02 8.5092E-02 2.5512E-03
8.5232E-02 9.9144E-03 8.7933E-02 1.7063E-02 8.9708E-02 9.3177E-02
1.0235E-01 4.0733E-03 1.0526E-01 1.6157E-02 1.0546E-01 8.0784E-03
1.0596E-01 1.4637E-03 1.0705E-01 5.1898E-02 1.1273E-01 3.6557E-03
1.1418E-01 2.0706E-03 1.1779E-01 1.6483E-02 1.1968E-01 3.8801E-03
1.1988E-01 2.6194E-03 1.2329E-01 1.3831E-03 1.2371E-01 3.8128E-03
1.2715E-01 1.1848E-03 1.3221E-01 3.9168E-03 1.3516E-01 4.7338E-03
1.3582E-01 1.4003E-03 1.3724E-01 7.7194E-03 1.3813E-01 1.2381E-03
1.4958E-01 1.5382E-03 1.5166E-01 2.5021E-03 1.5366E-01 1.1624E-03
1.6056E-01 2.5500E-03 1.6476E-01 1.0369E-03 1.7439E-01 1.7258E-02
1.8881E-01 4.1264E-03 1.9173E-01 9.6614E-03 1.9242E-01 1.4596E-03
2.0615E-01 3.1171E-03
29
1.2300E-02 8.1055E-01 1.7360E-02 1.7340E-03 3.1300E-02 4.0800E-02
4.2760E-02 1.6320E-03 5.6600E-02 3.2640E-03 6.8180E-02 1.0200E-03
6.8900E-02 1.1220E-03 7.5200E-02 5.2020E-03 8.5430E-02 1.6474E-01
8.6300E-02 3.7740E-03 8.6440E-02 3.0600E-02 8.8470E-02 2.7140E-01

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ENERGY.DAT

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1.0000E-01 1.2430E-01 1.0717E-01 8.3640E-03 1.2450E-01 1.2240E-02
1.2470E-01 6.1200E-03 1.3197E-01 3.2640E-03 1.3703E-01 1.6320E-02
1.4295E-01 4.2840E-03 1.4830E-01 1.3872E-02 1.5440E-01 6.6300E-03
1.5648E-01 1.1220E-02 1.7290E-01 2.2440E-03 1.7980E-01 5.1000E-03
1.8400E-01 2.3460E-03 1.9363E-01 4.5900E-02 2.1097E-01 3.2640E-02
2.1810E-01 1.4280E-03 1.3080E-01 7.1400E-04
RA-225      14.8 D      88.
  0
  2
3.2200E-01 9.0000E-02 7.2000E-01 3.6200E-01 1.0300E-01 2.8000E-01
  0
  3
9.2800E-03 1.5144E-01 2.0160E-02 3.0907E-01 3.4998E-02 1.0137E-01
  2
1.2700E-02 1.5763E-01 4.0000E-02 3.1000E-01
AC-225      10.0 D      89. (FR-221/AT-217/BI-213/PO-213/TL-209/PB-209)
7/22/87 RAP
 27
5.2860E+00 2.3000E-03 5.4440E+00 1.3000E-03 5.5530E+00 1.0000E-03
5.5790E+00 1.2000E-02 5.6080E+00 1.1000E-02 5.6362E+00 4.4000E-02
5.6810E+00 1.4000E-02 5.7226E+00 2.9000E-02 5.7310E+00 1.0000E-01
5.7910E+00 8.6000E-02 5.7920E+00 1.8100E-01 5.8290E+00 5.1600E-01
5.4504E+00 3.7800E-03
5.9380E+00 1.3000E-03 5.9650E+00 1.0000E-03 5.9790E+00 4.9000E-03
6.0750E+00 1.3000E-03 6.1255E+00 1.5100E-01 6.2418E+00 1.3500E-02
6.3398E+00 8.3400E-01 5.8332E+00 1.1500E-03
7.0660E+00 9.9934E-01 6.6223E+00 6.6000E-04
5.5490E+00 1.5984E-03 5.8700E+00 2.0002E-02
8.3770E+00 9.7836E-01 7.6120E+00 3.9136E-05
  6
3.1982E-01 9.0000E-02 1.0600E-02 9.7958E-01 3.1900E-01 3.2000E-01
1.1272E+00 3.7600E-01 7.0000E-03 1.4200E+00 4.9100E-01 6.4000E-01
1.8248E+00 6.5900E-01 0.0216E+00
6.4460E-01 1.9760E-01 1.0000E+00
  0
 71
7.2630E-03 2.1532E-02 7.3610E-03 6.7200E-02 8.9000E-03 2.2164E-01
1.7961E-02 1.3090E-01 1.9861E-02 6.4380E-02 2.1348E-02 2.3100E-02
2.3663E-02 1.7000E-03 3.1948E-02 4.6410E-02 3.3848E-02 2.2866E-02
4.4261E-02 4.8015E-02 4.5461E-02 9.4200E-03 4.8953E-02 1.0082E-03
5.1161E-02 1.5000E-03 5.3061E-02 2.9000E-03 5.4961E-02 4.8000E-03
5.5761E-02 1.2800E-02 5.6113E-02 9.6720E-03 5.6261E-02 6.0000E-03
5.8248E-02 1.1440E-02 5.9448E-02 3.2400E-03 6.1747E-02 4.0205E-03
6.4261E-02 1.5000E-02 6.4300E-02 9.6099E-04 6.7048E-02 1.0600E-03
6.8741E-02 9.6570E-03 6.8948E-02 1.7600E-03 6.9748E-02 3.3600E-03
7.0248E-02 2.2000E-03 7.3247E-02 1.2000E-03 7.6261E-02 4.3840E-03
7.7661E-02 1.5120E-03 7.8248E-02 3.9000E-03 8.0911E-02 1.5795E-02
8.1161E-02 1.4042E-03 8.1747E-02 1.3500E-03 8.2161E-02 1.8800E-03

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ENERGY.DAT

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8.2728E-02 3.1320E-03 8.9761E-02 6.6080E-03 9.0248E-02 1.4240E-03
9.4553E-02 1.6800E-03 9.4898E-02 3.8155E-03 9.8397E-02 1.3520E-03
1.0375E-01 2.2512E-03 1.3861E-01 1.9530E-03
3.7700E-03 6.4000E-03 8.5200E-03 2.7697E-02 2.2470E-02 2.1600E-03
5.4270E-02 1.1000E-03 6.1200E-02 7.8764E-04 8.2007E-02 6.8800E-03
9.5183E-02 2.4000E-03 1.2187E-01 1.7500E-02 2.0011E-01 2.1750E-02
2.1328E-01 5.7500E-03 2.1656E-01 1.9625E-03
8.3300E-03 2.4264E-02 5.9700E-02 1.3268E-03 1.9976E-01 3.3951E-03
3.4731E-01 4.0831E-02 4.2348E-01 7.1874E-03 4.3627E-01 2.2625E-03
7.9700E-03 2.7097E-03 2.9207E-02 3.9528E-03 5.6700E-02 1.4442E-04
1.0135E-01 7.6464E-04 1.1336E-01 1.7949E-04 1.1632E-01 5.7456E-05
3.7706E-01 5.0976E-04 4.4920E-01 1.7258E-04 4.6121E-01 5.6808E-05
1.4789E+00 5.0544E-05
51
1.2000E-02 2.1295E-01 6.2900E-02 5.5000E-03 7.3830E-02 3.2000E-03
8.2900E-02 1.5000E-03 8.3230E-02 1.0156E-02 8.6100E-02 1.6815E-02
8.7380E-02 2.9000E-03 9.4900E-02 1.6000E-03 9.7500E-02 7.6599E-03
9.9550E-02 6.5000E-03 9.9800E-02 1.7000E-02 1.0840E-01 2.8000E-03
1.1150E-01 3.2000E-03 1.2380E-01 1.9000E-03 1.3820E-01 2.0000E-03
1.4500E-01 1.3000E-03 1.5009E-01 7.1000E-03 1.5400E-01 1.9000E-03
1.5725E-01 3.1000E-03 1.8800E-01 4.6000E-03 1.9569E-01 1.4000E-03
2.5350E-01 1.0000E-03 4.5240E-01 1.1000E-03 1.6516E-01 9.2570E-03
1.1400E-02 2.2661E-02 7.8950E-02 7.7062E-03 8.1520E-02 1.2865E-02
9.2300E-02 5.8011E-03 9.9500E-02 1.6000E-03 2.1760E-01 1.2500E-01
4.1200E-01 1.0000E-03 2.1098E-01 3.3000E-03
5.9450E-01 4.0000E-04
3.2381E-01 1.3267E-03 1.1100E-02 1.8304E-02 7.6862E-02 1.2519E-02
7.9290E-02 2.0970E-02 8.9800E-02 9.4104E-03 2.9286E-01 7.3967E-03
4.4042E-01 2.7967E-01 6.5981E-01 1.4793E-03 8.0736E-01 4.4380E-03
1.1001E+00 4.7902E-03
7.7900E-01 3.8275E-05
1.0600E-02 1.8831E-03 7.2804E-02 1.2702E-03 7.4969E-02 2.1455E-03
8.4900E-02 9.5299E-04 1.1721E-01 1.6632E-02 4.6507E-01 2.0861E-02
1.5670E+00 2.1533E-02
U -238 4.468E9 Y 92.
3
4.0390E+00 2.3000E-03 4.1470E+00 2.3000E-01 4.1960E+00 7.7000E-01
0
0
4
9.4800E-03 8.1519E-02 2.9078E-02 1.6836E-01 4.4368E-02 6.0950E-02
8.9528E-02 1.4720E-03
2
1.3000E-02 8.8313E-02 6.6376E-02 9.7000E-04
TH-234 24.10 D 90. (Includes daughter, PA-234M) 7/22/87 RAP
0
8
7.5770E-02 1.9500E-02 2.0000E-02 9.5780E-02 2.4800E-02 6.8000E-02

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ENERGY.DAT

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9.6200E-02 2.4900E-02 1.8500E-01 1.8858E-01 5.0600E-02 7.2500E-01
1.2364E+00 4.1020E-01 7.3852E-03 1.4710E+00 5.0080E-01 6.1876E-03
2.2809E+00 8.2540E-01 9.8403E-01 7.4700E-01 2.0819E-01 1.8675E-03
0
20
8.3854E-03 4.3625E-02 9.6800E-03 8.1484E-02 1.4653E-02 1.6744E-02
2.4123E-02 1.5779E-02 4.1755E-02 3.4653E-03 4.2185E-02 1.1778E-02
5.7493E-02 1.2022E-03 5.7923E-02 2.8892E-03 6.1903E-02 1.0063E-03
7.1275E-02 1.1526E-01 7.1695E-02 3.0110E-03 8.7013E-02 2.7793E-02
9.0993E-02 1.0245E-02
9.6800E-03 5.0756E-04 5.2815E-02 1.1034E-03 9.8900E-03 3.4761E-03
2.1723E-02 4.7529E-03 3.7932E-02 1.7397E-03 7.2600E-02 8.7648E-05
6.9439E-01 3.9840E-03
15
1.3300E-02 9.5655E-02 6.3290E-02 3.8116E-02 9.2380E-02 2.7248E-02
9.2800E-02 2.6884E-02 1.1281E-01 2.4180E-03 7.6765E-02 1.2841E-03
1.3300E-02 5.9583E-04 7.3920E-02 1.3525E-04 1.3600E-02 4.4241E-03
9.4665E-02 1.1543E-03 9.8439E-02 1.8709E-03 1.1100E-01 8.7123E-04
7.6641E-01 2.0626E-03 1.0010E+00 5.8788E-03 9.2618E-01 3.7320E-03
PA-234      6.70 H      91.
0
18
5.4774E-01 1.6300E-02 4.7000E-03 5.6395E-01 9.1000E-02 1.2000E-02
5.7709E-01 1.1270E-01 9.8000E-03 5.8339E-01 1.2190E-01 4.0000E-02
6.1739E-01 1.2860E-01 2.1000E-02 6.8069E-01 1.3630E-01 2.3000E-02
6.8869E-01 1.4100E-01 2.4000E-01 6.9264E-01 1.4120E-01 1.1000E-01
6.9439E-01 1.5080E-01 4.2000E-02 7.1069E-01 1.9810E-01 1.6000E-01
7.1124E-01 2.1760E-01 3.8000E-02 7.6763E-01 2.9660E-01 9.6000E-03
8.1039E-01 3.6430E-01 7.7000E-02 8.3339E-01 3.7290E-01 2.3000E-02
1.1830E+00 3.9000E-01 1.0000E-01 1.2378E+00 4.1070E-01 6.2000E-02
1.2444E+00 4.1330E-01 1.7000E-02 1.2592E+00 4.1890E-01 8.0000E-03
0
114
9.7939E-03 3.1214E-03 9.8900E-03 1.0314E-03 1.2543E-02 1.3586E-03
1.5594E-02 4.0680E-03 1.8764E-02 6.7106E-03 2.1723E-02 1.4341E-03
2.3433E-02 1.8360E-03 2.4694E-02 1.8564E-03 2.8394E-02 1.5194E-03
2.8752E-02 1.3872E-03 3.6443E-02 1.2807E-03 3.7094E-02 1.2974E-03
3.7932E-02 1.0906E-03 3.9642E-02 1.9584E-03 4.1243E-02 0.0
4.5343E-02 2.4674E-02 5.2652E-02 3.1228E-03 5.5094E-02 2.0859E-02
5.6759E-02 1.1579E-03 5.7452E-02 3.4598E-03 5.7933E-02 3.5129E-02
5.8994E-02 4.0800E-03 6.1552E-02 6.7402E-03 6.5659E-02 2.4915E-03
7.0394E-02 6.5484E-02 7.2600E-02 1.1919E-02 7.4142E-02 9.7186E-03
7.7994E-02 1.7564E-02 7.8103E-02 4.8617E-01 7.8249E-02 3.6353E-03
8.0794E-02 9.9960E-03 8.1653E-02 1.0331E-02 8.4094E-02 1.2876E-02
8.5374E-02 1.7503E-03 8.7394E-02 1.0771E-02 9.4312E-02 1.3464E-01
9.7862E-02 2.8642E-03 9.8419E-02 5.0918E-02 1.0197E-01 1.0796E-03
1.0364E-01 3.5394E-02 1.0419E-01 4.1004E-03 1.0944E-01 9.5676E-03
1.1079E-01 5.4583E-02 1.1159E-01 1.0266E-01 1.1261E-01 3.3844E-03

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ENERGY.DAT

1.1854E-01	1.6616E-02	1.1985E-01	9.8328E-03	1.2224E-01	5.7120E-03
1.2396E-01	3.6924E-03	1.2565E-01	3.1620E-03	1.2844E-01	3.1416E-03
1.2882E-01	1.1203E-03	1.2959E-01	1.3586E-02	1.3094E-01	9.7726E-02
1.3329E-01	1.3566E-03	1.3475E-01	4.4431E-03	1.3845E-01	2.0349E-03
1.3886E-01	1.6524E-03	1.4715E-01	2.7063E-02	1.4894E-01	4.0800E-03
1.5126E-01	1.0114E-02	1.5284E-01	1.5728E-03	1.5649E-01	1.1322E-02
1.5989E-01	1.5912E-03	1.6424E-01	1.2811E-02	1.6515E-01	1.3464E-03
1.7184E-01	3.4333E-03	1.7464E-01	1.9278E-03	1.7794E-01	2.5165E-03
1.7809E-01	1.7861E-02	1.7922E-01	4.8470E-03	1.8045E-01	3.1008E-03
1.8124E-01	5.3611E-03	1.8456E-01	1.1261E-03	1.8805E-01	1.1322E-03
1.9543E-01	1.8289E-03	1.9689E-01	1.2546E-03	1.9745E-01	1.9339E-03
2.0464E-01	1.8475E-02	2.0544E-01	2.0028E-02	2.1499E-01	2.2032E-03
2.2085E-01	4.7362E-03	2.2165E-01	4.8414E-03	2.2344E-01	2.6530E-03
2.2496E-01	1.7392E-03	2.2576E-01	1.7615E-03	2.5034E-01	2.2032E-03
2.5419E-01	1.4169E-02	2.5679E-01	5.0521E-03	2.7194E-01	5.1316E-03
2.8815E-01	1.7782E-03	3.4319E-01	1.8513E-03	3.4804E-01	2.7332E-03
3.5064E-01	1.0528E-03	3.9809E-01	1.4586E-03	4.1239E-01	1.1200E-03
4.5029E-01	1.5708E-03	4.5309E-01	4.5900E-03	4.5389E-01	1.6262E-02
4.9589E-01	1.0118E-03	1.3600E-02	1.1363E+00	4.3480E-02	1.2240E-03
6.3000E-02	3.2640E-02	6.9900E-02	2.3460E-03	7.9690E-02	1.2240E-03
9.4665E-02	1.5697E-01	9.8439E-02	2.5442E-01	9.9860E-02	4.8960E-02
1.0341E-01	1.2240E-03	1.1100E-01	1.1848E-01	1.2540E-01	1.0200E-02
1.3120E-01	2.0400E-01	1.3437E-01	2.1420E-03	1.3770E-01	1.5300E-03
187					
1.3600E-02	1.1363E+00	4.3480E-02	1.2240E-03	6.3000E-02	3.2640E-02
6.9900E-02	2.3460E-03	7.9690E-02	1.2240E-03	9.4665E-02	1.5697E-01
9.8439E-02	2.5442E-01	9.9860E-02	4.8960E-02	1.0341E-01	1.2240E-03
1.1100E-01	1.1848E-01	1.2540E-01	1.0200E-02	1.3120E-01	2.0400E-01
1.3437E-01	2.1420E-03	1.3770E-01	1.5300E-03	1.4030E-01	9.1800E-03
1.4400E-01	3.5700E-03	1.5020E-01	2.0400E-03	1.5270E-01	6.8340E-02
1.5910E-01	7.1400E-03	1.7070E-01	5.1000E-03	1.7460E-01	2.0400E-03
1.8600E-01	2.0400E-02	1.9360E-01	6.1200E-03	1.9970E-01	4.8960E-03
2.0098E-01	1.1220E-02	2.0300E-01	1.2240E-02	2.1980E-01	2.0400E-03
2.2640E-01	6.0180E-02	2.2720E-01	5.6100E-02	2.4520E-01	9.1800E-03
2.4890E-01	2.8560E-02	2.6710E-01	1.7340E-03	2.7210E-01	1.0200E-02
2.7550E-01	2.6520E-03	2.8610E-01	1.4280E-03	2.8960E-01	1.1220E-03
2.9370E-01	3.9780E-02	3.0960E-01	1.0200E-03	3.1250E-01	3.0600E-03
3.1630E-01	1.2240E-03	3.2070E-01	1.2240E-03	3.2800E-01	3.0600E-03
3.3060E-01	6.1200E-03	3.5190E-01	6.1200E-03	3.6980E-01	2.9580E-02
3.7240E-01	1.3260E-02	4.0980E-01	4.0800E-03	4.1630E-01	1.0200E-03
4.2680E-01	6.1200E-03	4.4650E-01	1.2240E-03	4.5880E-01	1.5300E-02
4.6180E-01	1.6320E-03	4.6750E-01	4.0800E-03	4.7210E-01	2.4480E-03
4.7350E-01	1.8360E-03	4.7870E-01	3.0600E-03	4.8040E-01	4.0800E-03
4.8250E-01	3.0600E-03	4.9890E-01	1.0200E-03	5.0680E-01	1.6320E-02
5.1370E-01	1.3260E-02	5.2020E-01	6.1200E-03	5.2100E-01	9.1800E-03
5.2800E-01	6.1200E-03	5.3320E-01	2.0400E-03	5.3710E-01	1.6320E-03
5.5700E-01	2.6520E-03	5.6590E-01	1.4280E-02	5.6870E-01	3.0600E-02
5.6950E-01	1.0914E-01	5.7400E-01	2.0400E-02	5.8580E-01	1.5300E-03

ENERGY.DAT

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5.9660E-01 5.1000E-03 6.0280E-01 9.1800E-03 6.1150E-01 8.1600E-03
6.1620E-01 2.0400E-03 6.2360E-01 8.1600E-03 6.2750E-01 8.1600E-03
6.3060E-01 4.0800E-03 6.3450E-01 3.0600E-03 6.3970E-01 2.0400E-03
6.4320E-01 2.0400E-03 6.4600E-01 3.0600E-03 6.5370E-01 9.1800E-03
6.5500E-01 6.1200E-03 6.5800E-01 9.1800E-03 6.6060E-01 3.0600E-03
6.6480E-01 1.3260E-02 6.6670E-01 1.6320E-02 6.6990E-01 1.4280E-02
6.8330E-01 2.4480E-03 6.8700E-01 2.8560E-03 6.9270E-01 1.5300E-02
6.9900E-01 4.6920E-02 7.0610E-01 3.1620E-02 7.1120E-01 2.0400E-03
7.1380E-01 1.6320E-03 7.3300E-01 8.7720E-02 7.3800E-01 1.0200E-02
7.4281E-01 2.4480E-02 7.4650E-01 1.3260E-03 7.5560E-01 1.4280E-02
7.6000E-01 1.6320E-03 7.6636E-01 3.0600E-03 7.6870E-01 5.7120E-03
7.7790E-01 2.0400E-03 7.8070E-01 1.1220E-02 7.8310E-01 5.1000E-03
7.8627E-01 1.4280E-02 7.9360E-01 1.5300E-02 7.9630E-01 3.8760E-02
8.0430E-01 4.0800E-03 8.0560E-01 3.3660E-02 8.1250E-01 5.1000E-03
8.1960E-01 2.6520E-02 8.2630E-01 4.0800E-02 8.3160E-01 5.6100E-02
8.4190E-01 1.4280E-03 8.4400E-01 5.1000E-03 8.5170E-01 1.2240E-03
8.7290E-01 1.2240E-03 8.7640E-01 4.0800E-02 8.8050E-01 1.0200E-02
8.8051E-01 1.2240E-01 8.8324E-01 1.2240E-01 8.9900E-01 4.1820E-02
9.0437E-01 5.1000E-03 9.2000E-01 4.0800E-03 9.2500E-01 2.9580E-02
9.2600E-01 1.1220E-01 9.2672E-01 9.1800E-02 9.4600E-01 1.2240E-01
9.4900E-01 8.1600E-02 9.6000E-01 1.0200E-03 9.6600E-01 6.1200E-03
9.7880E-01 1.4280E-02 9.8050E-01 3.0600E-02 9.8050E-01 2.0400E-02
9.8400E-01 1.9380E-02 1.0226E+00 6.1200E-03 1.0283E+00 8.1600E-03
1.0449E+00 5.1000E-03 1.0746E+00 2.5500E-03 1.0832E+00 7.6500E-03
1.1085E+00 3.0600E-03 1.1223E+00 5.1000E-03 1.1260E+00 8.1600E-03
1.1531E+00 3.0600E-03 1.1713E+00 2.4480E-03 1.2080E+00 3.0600E-03
1.2175E+00 3.7740E-03 1.2290E+00 3.0600E-03 1.2405E+00 5.1000E-03
1.2510E+00 3.0600E-03 1.2774E+00 2.0400E-03 1.2927E+00 6.1200E-03
1.3533E+00 1.7340E-02 1.3585E+00 1.2240E-03 1.3941E+00 3.0600E-02
1.3997E+00 2.3460E-03 1.4275E+00 2.0400E-03 1.4460E+00 4.0800E-03
1.4527E+00 1.0200E-02 1.4600E+00 3.0600E-03 1.4937E+00 2.0400E-03
1.5160E+00 4.0800E-03 1.5494E+00 1.0200E-03 1.5797E+00 1.7340E-03
1.5854E+00 2.5500E-03 1.5938E+00 6.1200E-03 1.6279E+00 1.5300E-03
1.6380E+00 4.0800E-03 1.6560E+00 1.5300E-03 1.6685E+00 1.2240E-02
1.6862E+00 5.1000E-03 1.6946E+00 1.2240E-02 1.6998E+00 1.5300E-03
1.7376E+00 1.0200E-03 1.7417E+00 1.0200E-03 1.7560E+00 2.5500E-03
1.7723E+00 1.0200E-03 1.7973E+00 3.0600E-03 1.8901E+00 1.9380E-03
1.8971E+00 1.5300E-03 1.9050E+00 2.8560E-03 1.9260E+00 5.1000E-03
9.5559E-01 1.0099E-02
PU-236      2.851 Y      94.
  4
5.6140E+00 1.8000E-03 5.7219E+00 3.1800E-01 5.7701E+00 6.8100E-01
5.3411E+00 2.5700E-05
  0
  0
  3
9.8900E-03 1.0246E-01 2.5893E-02 2.3287E-01 4.2102E-02 8.5492E-02
  2

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ENERGY.DAT

1.3600E-02 1.3041E-01 6.0886E-02 8.2170E-04
PU-237 45.3 D 94.
0
0
0
9
3.9182E-03 1.6079E-02 1.0100E-02 3.8043E-01 1.0778E-02 1.1692E-01
2.0622E-02 5.5197E-03 2.7482E-02 3.9169E-02 3.7110E-02 2.8234E-02
5.3814E-02 6.9929E-03 5.8036E-02 2.4623E-03 7.4300E-02 9.2416E-03
7
1.3900E-02 5.2536E-01 2.6345E-02 2.3999E-03 5.9537E-02 3.2830E-02
9.7080E-02 1.2779E-01 1.0107E-01 2.0645E-01 1.1400E-01 9.6595E-02
3.3205E-02 8.3516E-04
AM-242M 152 Y 95.
2
5.2050E+00 4.2364E-03 5.2275E+00 5.4835E-04
0
0
7
1.0500E-02 1.8342E-01 2.4824E-02 4.8269E-01 4.2505E-02 5.1255E-01
1.0100E-02 2.7866E-03 2.6943E-02 1.2198E-03 4.5473E-02 3.0464E-03
6.4273E-02 2.3686E-03
5
1.4600E-02 2.9927E-01 4.8630E-02 1.4630E-06 1.3900E-02 3.8481E-03
4.9370E-02 1.9516E-03 1.0831E-01 1.6487E-03
AM-242 16.02 H 95.
0
2
6.1900E-01 1.8480E-01 4.2000E-01 6.6120E-01 1.9900E-01 4.1000E-01
0
7
1.0300E-02 8.4410E-02 2.1448E-02 7.7057E-02 3.8612E-02 2.8434E-02
7.6000E-02 2.5146E-03 1.0700E-02 1.1054E-01 1.7668E-02 3.0705E-01
3.5864E-02 1.1430E-01
7
1.4300E-02 1.2662E-01 9.9550E-02 3.6628E-02 1.0376E-01 5.8888E-02
1.1700E-01 2.7700E-02 4.4545E-02 1.3840E-04 1.5000E-02 1.9651E-01
4.2200E-02 3.6388E-04
CM-242 163.2 D 96.
3
6.0696E+00 2.5900E-01 6.1129E+00 7.4100E-01 5.9485E+00 3.9945E-04
0
0
3
1.0300E-02 7.6956E-02 2.0983E-02 1.9239E-01 3.8147E-02 7.1280E-02
2
1.4300E-02 1.1543E-01 5.9249E-02 3.8605E-04
PU-242 3.758E5 Y 94.

ENERGY.DAT

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3
4.8563E+00 2.2400E-01 4.9006E+00 7.8000E-01 4.7525E+00 9.8300E-04
0
0
3
9.8900E-03 7.1755E-02 2.3158E-02 1.6308E-01 3.9367E-02 5.9760E-02
2
1.3600E-02 9.1325E-02 5.6454E-02 4.4280E-04
NP-238      2.117 D      93.
0
8
8.9250E-02 2.3000E-02 4.8000E-03 2.2197E-01 6.0000E-02 1.0800E-01
2.6336E-01 7.2200E-02 4.2400E-01 3.0644E-01 8.5100E-02 5.1000E-03
3.0893E-01 8.5800E-02 1.7000E-03 3.2912E-01 9.1900E-02 1.2100E-02
1.2478E+00 4.1240E-01 4.5000E-01 6.7470E-01 2.0440E-01 1.1700E-03
0
10
1.0300E-02 2.4926E-01 2.0983E-02 5.9511E-01 3.8147E-02 2.1960E-01
7.6000E-02 7.6327E-05 7.8783E-02 2.2410E-02 9.5947E-02 6.2623E-03
9.7043E-02 2.6151E-03 1.0032E-01 2.4086E-03 8.6263E-01 2.2753E-03
9.0672E-01 1.5411E-03
17
1.4300E-02 3.7389E-01 4.4080E-02 1.0234E-03 9.9550E-02 1.1118E-03
1.0188E-01 2.0944E-03 1.0376E-01 1.7875E-03 1.1700E-01 8.4078E-04
5.6115E-01 1.0234E-03 8.8263E-01 7.5922E-03 9.1869E-01 5.1408E-03
9.2398E-01 2.4752E-02 9.3661E-01 3.3082E-03 9.4138E-01 4.5458E-03
9.6277E-01 6.0928E-03 9.8445E-01 2.3800E-01 1.0259E+00 8.2110E-02
1.0285E+00 1.7374E-01 5.0394E-01 5.4454E-03
PU-238      87.75 Y      94.
4
5.3577E+00 1.0000E-03 5.4565E+00 2.8300E-01 5.4992E+00 7.1600E-01
5.1875E+00 3.1080E-05
0
0
3
9.8900E-03 9.0948E-02 2.1723E-02 2.0670E-01 3.7932E-02 7.5660E-02
2
1.3600E-02 1.1575E-01 5.5303E-02 4.7308E-04
CM-244      18.11 Y      96.
3
5.7628E+00 2.3600E-01 5.8050E+00 7.6400E-01 5.6330E+00 2.5950E-04
0
0
3
1.0300E-02 6.8710E-02 1.9727E-02 1.7178E-01 3.6891E-02 6.3488E-02
2
1.4300E-02 1.0307E-01 5.6867E-02 2.8408E-04
PU-244      8.26E7 Y      94.

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ENERGY.DAT

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2
4.5460E+00 1.9736E-01 4.5890E+00 8.0499E-01
0
0
3
9.8900E-03 6.2320E-02 2.2243E-02 1.4164E-01 3.8452E-02 5.1927E-02
2
1.3600E-02 7.9317E-02 4.4000E-02 2.8265E-04
U -240      14.1 H      92. (Includes daughter, NP-240M)
0
16
4.3600E-01 1.2500E-01 1.0000E+00
4.7672E-01 1.3800E-01 2.3500E-03 5.5105E-01 1.6300E-01 3.4200E-03
5.7033E-01 1.6900E-01 2.2200E-02 5.8405E-01 1.7400E-01 2.0500E-03
6.2183E-01 1.8600E-01 5.7000E-03 6.7152E-01 2.0300E-01 3.7800E-03
6.9921E-01 2.1300E-01 2.1000E-03 1.0203E+00 3.2700E-01 6.2000E-03
1.1511E+00 3.7600E-01 1.1800E-02 1.1719E+00 3.8400E-01 1.4500E-02
1.2097E+00 3.9800E-01 3.5000E-02 1.2493E+00 4.1300E-01 2.6500E-02
1.5126E+00 5.1400E-01 3.1900E-01 2.0672E+00 7.3300E-01 5.2000E-01
6.9000E-01 2.1475E-01 3.3400E-03
0
15
1.0100E-02 3.1206E-01 2.1673E-02 7.4300E-01 3.8377E-02 2.4000E-01
1.4277E-02 1.1000E-03 1.0300E-02 2.2490E-01 1.9727E-02 5.3621E-01
3.6891E-02 1.9818E-01 7.5763E-02 2.0887E-02 7.6000E-02 8.8672E-05
9.2927E-02 5.8416E-03 9.7301E-02 2.2415E-03 1.6640E-01 1.6432E-03
4.3278E-01 2.1346E-03 4.7558E-01 1.0364E-03 7.3888E-01 1.2626E-03
36
1.3900E-02 4.3094E-01 4.4100E-02 1.6500E-02
2.0000E-02 6.1111E-13 1.4300E-02 3.3735E-01 6.6500E-02 2.6970E-03
9.8860E-02 1.6981E-03 9.9550E-02 1.2916E-03 1.0376E-01 2.0765E-03
1.1700E-01 9.7676E-04 1.8950E-01 2.4973E-03 2.5146E-01 9.5894E-03
2.6335E-01 1.1687E-02 3.0298E-01 1.1188E-02 5.0720E-01 7.8913E-03
5.5460E-01 2.2375E-01 5.9740E-01 1.2486E-01 6.0610E-01 7.3919E-03
7.5862E-01 1.1887E-02 7.8959E-01 2.0977E-03 8.1343E-01 2.1077E-03
8.1788E-01 1.2386E-02 8.4111E-01 1.6582E-03 8.5746E-01 4.6948E-03
9.0046E-01 1.2986E-03 9.1009E-01 1.6981E-03 9.1598E-01 1.0389E-02
9.2859E-01 1.6981E-03 9.3804E-01 1.2886E-02 9.4237E-01 1.0988E-03
9.6164E-01 1.4384E-03 1.4453E+00 3.5960E-03 1.4882E+00 2.0977E-03
1.4969E+00 1.3086E-02 1.5396E+00 7.8913E-03 1.6333E+00 1.4384E-03
1.0200E+00 1.2628E-02
PU-240      6537 Y      94.
3
5.1234E+00 2.6390E-01 5.1683E+00 7.3500E-01 5.0170E+00 7.3021E-04
0
0
3
9.8900E-03 8.6526E-02 2.3485E-02 1.9665E-01 3.9694E-02 7.2000E-02

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ENERGY.DAT

2
1.3600E-02 1.1012E-01 5.4327E-02 5.2466E-04
CM-245 8.5E3 Y 96.
6
5.2346E+00 3.2000E-03 5.3038E+00 4.9700E-02 5.3620E+00 9.3180E-01
5.4887E+00 8.3000E-03 5.5292E+00 5.8000E-03 5.3189E+00 1.1900E-03
0
0
12
1.0300E-02 4.2409E-01 1.1182E-02 3.1360E-01 1.8903E-02 4.6784E-01
3.6067E-02 1.7088E-01 5.2182E-02 1.5360E-01 7.6000E-02 9.3440E-03
1.0990E-01 1.6307E-01 1.2707E-01 4.2650E-02 1.3144E-01 1.6307E-02
1.5090E-01 6.0224E-02 1.6807E-01 1.5744E-02 1.7244E-01 5.9520E-03
7
1.4300E-02 6.3613E-01 4.2000E-02 1.1520E-03 9.9550E-02 1.3611E-01
1.0376E-01 2.1882E-01 1.1700E-01 1.0293E-01 1.3300E-01 6.2720E-02
1.7400E-01 6.4000E-02
PU-241 14.4 Y 94.
0
1
2.0811E-02 5.2300E-03 9.9998E-01
0
0
0
AM-241 432.2 Y 95.
6
5.3880E+00 1.4000E-02 5.4430E+00 1.2800E-01 5.4857E+00 8.5200E-01
5.5120E+00 2.0000E-03 5.5443E+00 3.4000E-03 5.3082E+00 3.3926E-04
0
0
16
3.9182E-03 1.6080E-01 1.0100E-02 3.0921E-01 1.0778E-02 1.4840E-01
2.0303E-02 1.6170E-02 2.0622E-02 5.5200E-02 2.0996E-02 9.0520E-02
2.7482E-02 4.9714E-02 3.3133E-02 8.8690E-03 3.7007E-02 5.8850E-03
3.7110E-02 3.0874E-01 3.7700E-02 3.1901E-02 4.9837E-02 3.2580E-03
5.3814E-02 7.6467E-02 5.8036E-02 2.6925E-02 7.6543E-02 2.7120E-03
9.3247E-02 1.0392E-03
5
1.3900E-02 4.2700E-01 2.6345E-02 2.4000E-02 3.3205E-02 1.0600E-03
5.9537E-02 3.5900E-01 6.9231E-02 1.7932E-03
CM-246 4.75E3 Y 96.
2
5.3430E+00 2.0995E-01 5.3860E+00 7.8979E-01
0
0
3
1.0300E-02 6.1220E-02 2.1448E-02 1.5305E-01 3.8612E-02 5.6475E-02
2

ENERGY.DAT

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1.4300E-02 9.1830E-02 4.4545E-02 2.7593E-04
CM-247      1.56E7 Y      96.
7
4.8180E+00 4.7000E-02 4.8680E+00 7.1000E-C1 4.9410E+00 1.6000E-02
4.9830E+00 2.0000E-02 5.1450E+00 1.2000E-02 5.2100E+00 5.7000E-02
5.2650E+00 1.3800E-01
0
0
14
1.0300E-02 3.9516E-02 3.4803E-02 5.8320E-02 5.1967E-02 1.5957E-02
5.6341E-02 6.0750E-03 7.6000E-02 8.2489E-04 1.5328E-01 3.6400E-03
1.5618E-01 1.3226E-03 1.6558E-01 2.2000E-02 2.1118E-01 1.3940E-03
2.5200E-01 1.0400E-03 2.6430E-01 4.4000E-03 2.8078E-01 1.2888E-02
2.8147E-01 1.4000E-03 3.7950E-01 2.4480E-03
11
1.4300E-02 5.9275E-02 9.9550E-02 1.2016E-02 1.0376E-01 1.9318E-02
1.1700E-01 9.0866E-03 2.7510E-01 5.2000E-03 2.7800E-01 3.4000E-02
2.8740E-01 2.0000E-02 3.3300E-01 3.4000E-03 3.4600E-01 1.3000E-02
4.0260E-01 7.2000E-01 1.1611E-01 1.0600E-03
CM-243      28.5 Y      96.
11
5.6390E+00 1.3966E-03 5.6820E+00 1.9952E-03 5.6860E+00 1.5962E-02
5.7416E+00 1.1472E-01 5.7845E+00 7.3324E-01 5.8760E+00 5.9856E-03
5.9930E+00 5.5866E-02 6.0100E+00 9.9760E-03 6.0570E+00 4.6887E-02
6.0670E+00 1.4964E-02 5.7001E+00 3.4107E-03
0
0
32
1.9271E-03 6.7837E-01 1.0300E-02 4.0539E-01 1.2467E-02 6.9832E-02
2.1566E-02 8.4996E-02 2.6315E-02 9.4772E-02 3.4176E-02 2.2905E-01
3.4203E-02 1.7957E-02 3.8730E-02 2.8851E-02 4.3479E-02 3.3918E-02
4.4744E-02 9.9860E-02 5.1340E-02 6.3826E-02 5.1367E-02 5.1875E-03
5.5714E-02 2.4302E-02 5.5741E-02 1.9952E-03 6.1908E-02 2.7933E-02
6.6282E-02 1.0587E-02 7.6000E-02 9.8077E-03 8.3403E-02 1.4755E-03
8.7932E-02 8.9874E-02 1.0637E-01 2.2735E-01 1.3259E-01 1.7229E-03
1.5102E-01 1.0455E-03 1.5579E-01 1.7039E-01 1.8665E-01 1.8041E-02
2.0382E-01 4.3785E-03 2.0509E-01 4.5576E-02 2.0819E-01 1.6329E-03
2.2225E-01 1.1103E-02 2.2663E-01 4.1347E-03 2.5451E-01 3.4357E-02
2.7167E-01 8.3938E-03 2.7605E-01 3.1285E-03
14
1.4300E-02 6.0809E-01 4.4663E-02 1.1971E-03 5.7273E-02 1.3966E-03
6.7841E-02 1.3966E-03 9.9550E-02 1.4286E-01 1.0376E-01 2.2968E-01
1.0613E-01 2.5938E-03 1.1700E-01 1.0804E-01 2.0975E-01 3.2921E-02
2.2818E-01 1.0575E-01 2.5441E-01 1.0974E-03 2.7760E-01 1.3966E-01
2.8541E-01 7.2825E-03 1.6697E-01 3.3417E-03
PU-243      4.956 H      94.
0
7

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ENERGY.DAT

1.1628E-01 3.0300E-02 1.2300E-02 4.7270E-01 1.3690E-01 2.5000E-03
4.8560E-01 1.4100E-01 4.4000E-02 4.9800E-01 1.4510E-01 2.9000E-01
5.3979E-01 1.5870E-01 6.0000E-02 5.8200E-01 1.7270E-01 5.9000E-01
5.4000E-02 1.3880E-02 2.3900E-04
0
16
1.0194E-02 2.1735E-02 1.0500E-02 7.2835E-02 1.7994E-02 7.6659E-03
1.8394E-02 9.0321E-02 2.7875E-02 8.0275E-03 3.0194E-02 2.9900E-02
3.5675E-02 2.5806E-03 3.6075E-02 3.1423E-02 4.7875E-02 8.5100E-03
5.2384E-02 3.2200E-03 6.0194E-02 3.7490E-02 7.2594E-02 2.0700E-03
7.7800E-02 6.3038E-05 7.7875E-02 9.2690E-03 8.2384E-02 3.3350E-03
2.5670E-01 3.1519E-03
11
1.4600E-02 1.1884E-01 4.1800E-02 7.5900E-03 6.7000E-02 2.3000E-03
8.4000E-02 2.3000E-01 1.0205E-01 9.1933E-04 1.0649E-01 1.4733E-03
1.0930E-01 1.6100E-03 1.2000E-01 6.9625E-04 3.5640E-01 1.3110E-03
3.8170E-01 5.5200E-03 1.3717E-01 1.7922E-03
AM-243 7.38E3 Y 95.
6
5.1810E+00 1.1000E-02 5.2335E+00 1.0600E-01 5.2754E+00 8.7900E-01
5.3210E+00 1.2000E-03 5.3500E+00 1.6000E-03 5.0320E+00 1.5505E-04
0
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13
8.6732E-03 3.9930E-01 1.0100E-02 2.8277E-01 2.0673E-02 7.7616E-02
2.1107E-02 4.8233E-02 2.5377E-02 1.4520E-01 3.2973E-02 8.4564E-03
3.7377E-02 2.7350E-02 3.7811E-02 1.6078E-02 4.9677E-02 3.1712E-03
5.2243E-02 1.3860E-01 6.8947E-02 3.4188E-02 7.3169E-02 1.2078E-02
7.6073E-02 1.0626E-03
7
1.3900E-02 3.9050E-01 4.3534E-02 5.5440E-02 7.4670E-02 6.6000E-01
8.6720E-02 3.3660E-03 1.1766E-01 5.5440E-03 1.4218E-01 1.2540E-03
4.8438E-02 1.6445E-03
NP-239 2.355 D 93.
0
6
2.0957E-01 5.6500E-02 1.9600E-02 3.2981E-01 9.2100E-02 3.5000E-01
3.9129E-01 1.1120E-01 7.1000E-02 4.3595E-01 1.2530E-01 5.2000E-01
7.1354E-01 2.1780E-01 4.0000E-02 2.1940E-01 5.9819E-02 3.4120E-04
0
40
1.9271E-03 6.2040E-01 2.5980E-03 1.1940E-03 1.0300E-02 4.1192E-01
1.2467E-02 7.3320E-02 2.1566E-02 6.4070E-02 2.6315E-02 9.5105E-02
3.4176E-02 2.4743E-01 3.4203E-02 1.0152E-03 3.8383E-02 3.4421E-03
3.8730E-02 2.1748E-02 4.3479E-02 3.4037E-02 4.4744E-02 6.5604E-02
5.1340E-02 6.8948E-02 5.5547E-02 1.1601E-03 5.5714E-02 2.6251E-02
5.9897E-02 4.4890E-03 6.1908E-02 1.8319E-02 6.6282E-02 6.9665E-03
7.6000E-02 1.0101E-02 8.3033E-02 4.9942E-02 8.3403E-02 4.1708E-03

ENERGY.DAT

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8.7932E-02 8.8534E-02 1.0020E-01 1.3621E-02 1.0057E-01 1.6156E-03
1.0457E-01 5.8205E-03 1.0457E-01 4.9942E-03 1.0637E-01 2.3039E-01
1.3259E-01 1.5717E-03 1.5102E-01 1.0159E-03 1.5579E-01 1.7202E-01
1.8665E-01 1.7772E-02 2.0329E-01 1.3908E-03 2.0382E-01 4.3132E-03
2.0509E-01 4.6186E-02 2.0819E-01 1.6085E-03 2.2225E-01 1.1252E-02
2.2663E-01 4.1900E-03 2.5451E-01 3.4686E-02 2.7167E-01 8.4741E-03
2.7605E-01 3.1584E-03
18
1.4300E-02 6.1788E-01 4.9412E-02 1.0011E-03 5.7273E-02 1.5087E-03
6.1480E-02 9.5880E-03 9.9550E-02 1.4713E-01 1.0376E-01 2.3654E-01
1.0613E-01 2.2701E-01 1.1700E-01 1.1127E-01 1.8172E-01 1.1139E-03
2.0975E-01 3.2430E-02 2.2638E-01 3.3840E-03 2.2818E-01 1.0716E-01
2.5441E-01 1.0011E-03 2.7760E-01 1.4100E-01 2.8541E-01 7.7550E-03
3.1588E-01 1.5933E-02 3.3430E-01 2.0304E-02 1.5151E-01 3.9326E-03
PU-239      24131 Y      94.
4
5.1046E+00 1.1500E-01 5.1429E+00 1.5100E-01 5.1554E+00 7.3300E-01
5.0075E+00 1.0940E-03
0
0
9
7.3920E-03 1.9000E-01 8.3326E-03 1.7850E-03 9.8900E-03 3.4683E-02
1.6933E-02 2.8128E-02 2.4463E-02 1.0710E-03 2.9863E-02 4.7840E-02
3.3142E-02 9.9620E-03 4.6072E-02 1.3208E-02 5.0179E-02 4.9296E-03
2
1.3600E-02 4.4141E-02 1.1291E-01 4.7583E-04
CM-248      3.39E5 Y      96.
3
5.0351E+00 1.6541E-01 5.0786E+00 7.5135E-01 4.9311E+00 6.9722E-04
0
0
3
1.0300E-02 4.8447E-02 2.1103E-02 1.2112E-01 3.8267E-02 4.4858E-02
2
1.4300E-02 7.2670E-02 5.6242E-02 2.6238E-04
CF-252      2.639 Y      98.
4
5.9766E+00 2.3258E-03 6.0757E+00 1.5215E-01 6.1183E+00 8.1597E-01
5.8202E+00 1.9963E-05
0
0
4
1.0700E-02 4.0952E-02 1.8868E-02 1.1217E-01 3.7064E-02 4.1757E-02
7.6068E-02 1.5839E-03
2
1.5000E-02 7.2804E-02 6.8180E-02 2.6844E-04

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DITTY Internal Dose Factors - 30-Aug-88 (RAP)

H 3 Class: D F1: 1.00000 08/17/88 17:40:28.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.2E-09 6.9E-10 1.2E-09 1.2E-09 1.2E-09 5.8E-10 1.2E-09 1.2E-09 1.2E-09 1.2E-09 1.2E-09
 H 70 1.8E-09 1.0E-09 1.9E-09 1.9E-09 1.9E-09 8.9E-10 1.0E-09 1.8E-09 1.8E-09 1.8E-09 1.8E-09
 C 14 Class: D F1: 1.00000 08/17/88 17:43:58.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 4.0E-08 2.3E-08 4.3E-08 4.3E-08 4.3E-08 2.1E-08 4.0E-08 4.0E-08 4.0E-08 4.1E-08 4.0E-08
 H 70 4.1E-08 2.3E-08 4.3E-08 4.3E-08 4.3E-08 2.1E-08 4.0E-08 4.1E-08 4.1E-08 4.1E-08 4.1E-08
 NA24 Class: D F1: 1.00000 08/17/88 17:47:32.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.9E-08 0.1E-08 2.3E-08 2.3E-08 2.5E-08 3.5E-08 2.7E-08 2.1E-08 2.5E-08 2.0E-08 1.9E-08
 H 70 0.1E-08 1.9E-08 1.2E-08 1.2E-08 1.3E-08 1.9E-08 1.5E-08 1.0E-08 1.3E-08 1.1E-08 1.1E-08
 P 32 Class: D F1: 0.80000 08/17/88 17:50:32.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 4.7E-08 0.8E-08 5.1E-08 1.0E-07 4.9E-07 5.6E-07 5.9E-07 4.8E-08 4.7E-08 4.8E-08 4.8E-08
 H 70 1.3E-07 2.5E-08 2.1E-08 3.8E-08 0.6E-08 4.0E-07 4.2E-07 3.4E-08 3.4E-08 3.4E-08 3.4E-08
 CR51 Class: Y F1: 0.10000 08/17/88 17:54:37.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 3.1E-10 1.2E-09 3.2E-09 7.0E-09 1.7E-08 5.5E-10 0.8E-10 4.8E-10 2.7E-09 5.3E-10 2.7E-10
 H 70 3.6E-08 1.7E-09 1.0E-09 3.6E-09 7.9E-09 9.3E-10 1.2E-09 2.4E-10 1.3E-09 1.1E-09 7.4E-10
 C080 Class: Y F1: 0.05000 08/17/88 17:58:43.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 5.9E-08 1.0E-07 2.4E-07 3.9E-07 7.8E-07 5.7E-08 0.7E-08 7.9E-08 2.2E-07 7.7E-08 5.6E-08 1.0E-07
 H 70 2.2E-05 1.8E-06 4.5E-07 0.1E-07 5.2E-07 0.6E-07 1.1E-07 0.8E-07 1.1E-07 1.1E-07 1.0E-08 2.2E-08
 ZN85 Class: Y F1: 0.50000 08/17/88 18:03:24.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 2.1E-07 2.1E-07 2.7E-07 2.6E-07 3.3E-07 3.1E-07 3.1E-07 2.5E-07 2.3E-07 2.3E-07 2.2E-07
 H 70 1.4E-08 2.4E-07 1.0E-07 1.0E-07 1.7E-07 2.2E-07 2.4E-07 1.3E-07 1.3E-07 2.1E-07 2.0E-07
 SR89 Class: D F1: 0.30000 08/17/88 18:08:07.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 8.5E-09 5.3E-08 8.7E-08 4.0E-07 1.5E-08 3.4E-07 2.1E-07 0.7E-09 8.5E-09 0.6E-09 8.5E-09
 H 70 1.1E-07 1.4E-08 1.9E-08 7.6E-08 2.2E-07 5.0E-07 3.5E-07 1.5E-08 1.4E-08 1.4E-08 1.4E-08
 SR90 Class: D F1: 0.30000 08/17/88 18:12:49.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.5E-08 2.4E-08 4.0E-08 2.9E-07 1.3E-08 2.2E-05 1.0E-05 1.5E-08 1.5E-08 1.5E-08 1.5E-08
 H 70 7.2E-08 1.5E-08 1.7E-08 5.3E-08 2.0E-07 3.7E-05 1.7E-05 2.6E-08 2.5E-08 2.5E-08 2.5E-08
 Y 90 Class: Y F1: 0.00010 08/17/88 18:22:00.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 0.2E-13 7.6E-08 1.0E-07 9.2E-07 2.3E-08 2.0E-11 2.7E-11 9.2E-13 1.0E-12 9.1E-13 9.2E-13 2.7E-11
 H 70 0.4E-07 2.9E-08 7.1E-08 3.6E-07 0.8E-07 1.1E-09 1.1E-09 3.7E-11 3.7E-11 3.6E-11 3.7E-11 1.1E-09

DSFCT30.DAT

ZR95 Class: W F1: 0.00200 08/17/88 18:26:18.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.7E-09 2.5E-08 7.8E-08 2.1E-07 5.5E-07 3.5E-08 1.5E-08 5.7E-09 5.7E-08 7.4E-09 5.7E-10
 H 70 1.2E-08 7.2E-08 6.5E-08 1.3E-07 2.0E-07 1.5E-08 2.2E-07 2.0E-08 5.8E-08 6.3E-08 5.2E-08
 ND95M Class: Y F1: 0.01000 08/17/88 18:39:48.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Spleen
 G 70 1.9E-10 1.5E-08 3.0E-08 1.6E-07 4.6E-07 3.0E-09 2.3E-09 5.7E-10 6.5E-09 7.3E-10 1.1E-10 1.3E-09 1.1E-09
 H 70 2.0E-07 9.7E-09 1.6E-08 7.5E-08 1.9E-07 4.3E-09 3.3E-09 3.6E-10 3.3E-09 2.9E-09 2.4E-09 2.7E-09 4.7E-09
 ND95 Class: Y F1: 0.01000 08/17/88 18:47:38.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Spleen
 G 70 1.9E-09 2.0E-08 6.4E-08 1.3E-07 2.8E-07 2.1E-08 1.4E-08 5.7E-09 5.6E-08 7.5E-09 8.2E-10 9.7E-09 7.9E-09
 H 70 5.5E-07 4.3E-08 3.5E-08 6.5E-08 1.3E-07 3.4E-08 3.0E-08 3.5E-09 2.9E-08 2.7E-08 2.4E-08 2.3E-08 4.2E-08
 TC99 Class: W F1: 0.00000 08/17/88 18:52:17.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 22 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid S Wall Kidneys
 G 70 4.4E-09 2.4E-07 6.7E-09 2.0E-08 7.6E-08 2.1E-09 4.2E-09 4.4E-09 4.4E-09 5.1E-07 2.4E-07 9.8E-08
 H 70 1.1E-06 1.5E-07 3.7E-09 1.3E-08 3.8E-08 1.4E-09 2.7E-09 2.8E-09 2.8E-09 3.2E-07 1.5E-07 6.2E-08
 I 129 Class: D F1: 1.00000 08/17/88 18:56:58.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 G 70 1.1E-08 1.2E-08 9.9E-09 9.7E-09 1.0E-08 8.7E-08 4.5E-08 8.4E-09 9.7E-09 2.2E-08 1.5E-08 2.7E-08
 H 70 1.8E-08 4.6E-09 8.0E-09 6.0E-09 6.3E-09 5.3E-08 2.7E-08 5.1E-09 5.9E-09 1.3E-08 9.3E-09 1.7E-08
 I 131 Class: D F1: 1.00000 08/17/88 19:01:24.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 G 70 8.4E-09 2.2E-08 5.0E-09 4.7E-09 5.3E-09 2.6E-07 3.0E-08 4.3E-09 4.9E-09 9.8E-09 3.1E-08 4.5E-08
 H 70 4.3E-08 5.2E-09 3.0E-09 2.8E-09 3.1E-09 1.6E-07 1.8E-08 2.5E-09 2.9E-09 6.1E-09 1.0E-08 2.7E-08
 I 132 Class: D F1: 1.00000 08/17/88 19:06:59.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 G 70 2.6E-09 4.8E-08 3.2E-09 3.2E-09 3.2E-09 1.0E-08 1.0E-08 2.5E-09 2.7E-09 2.7E-09 2.0E-07 1.5E-08
 H 70 1.8E-08 6.9E-09 1.3E-09 1.2E-09 1.3E-09 4.7E-09 4.7E-09 1.1E-09 1.2E-09 1.4E-09 8.5E-08 6.5E-09
 I 133 Class: D F1: 1.00000 08/17/88 19:10:01.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 G 70 4.8E-09 3.9E-08 4.7E-09 4.6E-09 5.1E-09 3.7E-08 2.8E-08 4.3E-09 4.8E-09 4.9E-09 5.7E-08 6.1E-08
 H 70 5.5E-08 7.3E-09 2.4E-09 2.4E-09 2.6E-09 1.9E-08 1.5E-08 2.3E-09 2.4E-09 2.8E-09 2.9E-08 3.1E-08
 RJ103 Class: Y F1: 0.05000 08/17/88 19:18:01.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 5.3E-09 2.1E-08 5.8E-08 1.0E-07 4.6E-07 5.4E-09 1.1E-08 8.8E-09 3.9E-08 8.5E-09 4.5E-09
 H 70 1.0E-08 3.3E-08 3.1E-08 8.7E-08 2.1E-07 1.5E-08 2.1E-08 4.9E-09 2.0E-08 2.1E-08 1.7E-08
 PD103 Class: Y F1: 0.00500 08/17/88 19:27:49.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 G 70 8.9E-12 2.4E-09 1.1E-08 5.8E-08 1.6E-07 1.4E-10 4.7E-10 1.1E-11 2.9E-09 1.1E-10 3.1E-12 8.0E-10 1.5E-09
 H 70 1.8E-07 2.0E-09 5.3E-09 2.6E-08 7.2E-08 3.1E-10 4.7E-10 7.2E-12 1.3E-09 5.0E-10 9.7E-12 1.4E-09 1.9E-09

DSFCT30.DAT

RH103M Class: Y F1: 0.05000 08/17/88 19:35:01.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 3.7E-13 1.8E-09 1.2E-09 0.0E-10 1.1E-10 2.7E-13 7.4E-13 2.5E-13 3.0E-12 0.4E-13 2.5E-13
 H 70 6.0E-10 7.3E-11 4.0E-11 2.7E-11 4.5E-12 1.7E-13 2.5E-13 1.0E-13 2.1E-13 3.9E-13 1.1E-13
 RU100 Class: Y F1: 0.05000 08/17/88 19:37:22.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 9.9E-08 1.8E-07 3.5E-07 1.7E-06 5.0E-06 5.0E-08 1.0E-07 1.1E-07 1.1E-07 1.0E-07 9.8E-08
 H 70 6.7E-06 1.6E-07 2.0E-07 0.0E-07 2.5E-06 7.0E-08 1.2E-07 7.9E-08 8.7E-08 1.2E-07 1.1E-07
 CS134 Class: D F1: 1.00000 08/17/88 19:42:00.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.2E-08 1.2E-08 1.7E-08 1.5E-08 1.7E-08 9.1E-07 1.2E-08 1.5E-08 1.2E-08 1.2E-08 1.2E-08
 H 70 5.4E-07 0.9E-07 1.0E-06 9.2E-07 1.0E-06 5.5E-07 7.2E-07 9.4E-07 7.3E-07 7.3E-07 7.5E-07
 CS137 Class: D F1: 1.00000 08/17/88 19:46:54.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 9.0E-07 7.5E-07 1.1E-06 1.0E-06 1.1E-06 5.0E-07 7.0E-07 1.0E-06 9.0E-07 8.0E-07 8.9E-07
 H 70 2.7E-07 4.5E-07 6.5E-07 6.4E-07 6.5E-07 3.0E-07 4.6E-07 8.2E-07 5.5E-07 5.4E-07 5.4E-07
 CE144 Class: Y F1: 0.00030 08/17/88 19:52:32.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Spleen
 G 70 4.0E-10 7.7E-08 2.0E-07 1.5E-06 4.7E-06 9.1E-09 6.3E-09 7.1E-10 4.9E-09 0.5E-10 3.6E-10 4.0E-08 4.0E-08
 H 70 5.1E-06 7.3E-08 1.4E-07 7.6E-07 2.3E-06 3.1E-07 1.9E-07 1.3E-08 1.0E-08 2.3E-08 1.9E-06 1.7E-06 1.4E-06
 PR144M Class: Y F1: 0.00030 08/17/88 20:07:00.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 G 70 1.4E-12 1.1E-08 3.0E-09 0.3E-10 4.9E-11 8.2E-13 1.7E-12 2.4E-13 3.7E-12 1.7E-12 1.0E-13 1.9E-12 3.1E-12
 H 70 2.7E-09 2.1E-10 5.0E-11 1.2E-11 8.4E-13 1.0E-12 1.2E-12 3.2E-13 4.0E-13 8.0E-13 5.9E-13 1.0E-12 0.0E-13
 PR144 Class: Y F1: 0.00030 08/17/88 20:12:06.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 G 70 2.3E-12 2.9E-08 7.1E-09 1.3E-09 7.7E-11 1.1E-12 2.4E-12 5.0E-13 5.5E-12 2.5E-12 2.7E-13 3.4E-12 5.3E-12
 H 70 6.5E-09 3.9E-10 9.5E-11 1.6E-11 1.4E-12 1.4E-12 1.0E-12 8.1E-13 7.6E-13 1.3E-12 1.2E-12 2.5E-12 1.5E-12
 PM151 Class: Y F1: 0.00030 08/17/88 20:15:11.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 3.0E-10 2.9E-08 7.2E-08 2.7E-07 5.1E-07 1.1E-09 3.5E-09 1.2E-09 1.5E-08 1.7E-09 3.3E-11 1.8E-09
 H 70 1.1E-07 1.0E-08 2.4E-08 9.0E-08 1.7E-07 1.2E-09 1.9E-09 4.0E-10 5.0E-09 1.1E-09 4.3E-10 2.0E-09
 SM151 Class: W F1: 0.00030 08/17/88 20:22:24.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 8.8E-14 1.6E-09 4.0E-09 2.4E-08 7.1E-08 2.0E-08 1.0E-09 3.0E-14 1.5E-12 9.0E-14 3.2E-14 5.4E-09
 H 70 2.2E-07 8.0E-10 2.0E-09 1.2E-08 3.4E-08 7.8E-08 8.3E-07 1.2E-11 1.4E-11 2.0E-11 1.2E-11 2.1E-08
 EJ152 Class: W F1: 0.00100 08/17/88 20:27:25.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 G 70 1.5E-08 4.4E-08 1.2E-07 2.9E-07 7.0E-07 1.3E-07 0.0E-08 1.1E-08 9.3E-08 1.9E-08 4.2E-09 3.1E-08 1.8E-07
 H 70 3.7E-06 1.2E-06 1.1E-06 1.5E-06 9.4E-07 1.4E-05 4.0E-08 3.0E-07 7.9E-07 1.1E-06 5.0E-07 2.2E-06 2.0E-05

DSFCT30.DAT

EU154 Class: W F1: 0.00100 00/17/00 20:32:35.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 G 70 1.4E-08 5.0E-08 1.0E-07 4.0E-07 1.3E-06 2.8E-07 7.5E-08 1.1E-08 9.5E-08 1.0E-08 3.0E-09 3.0E-08 2.3E-07
 H 70 5.1E-08 1.1E-08 1.0E-08 1.6E-08 1.1E-08 3.2E-08 6.6E-08 3.8E-07 7.9E-07 9.6E-07 4.4E-07 2.1E-08 2.6E-05
 EU155 Class: W F1: 0.00100 00/17/00 20:37:49.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 G 70 8.4E-10 7.1E-09 2.0E-08 0.7E-08 2.4E-07 8.2E-08 1.1E-08 5.2E-10 0.9E-09 9.8E-10 1.2E-10 1.0E-09 2.7E-08
 H 70 7.8E-07 4.8E-08 4.0E-08 9.0E-08 1.4E-07 9.3E-08 9.1E-07 1.1E-08 2.3E-08 3.9E-08 1.6E-08 1.1E-07 3.0E-08
 TH230 Class: Y F1: 0.00020 00/17/00 20:44:34.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 4.0E-08 1.2E-07 2.4E-07 1.2E-08 3.4E-08 1.8E-04 1.5E-05 4.8E-08 4.0E-08 4.0E-08 4.0E-08 4.0E-07
 H 70 1.7E-02 1.1E-05 1.1E-05 1.1E-05 1.3E-05 4.0E-02 3.9E-03 1.1E-05 1.1E-05 1.1E-05 1.1E-05 9.0E-06
 RA226 Class: W F1: 0.20000 00/17/00 21:19:50.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 2.0E-07 2.0E-07 3.5E-07 1.1E-06 3.0E-06 3.8E-04 3.2E-05 1.9E-07 2.0E-07 2.0E-07 1.9E-07
 H 70 1.1E-03 2.4E-07 2.0E-07 6.4E-07 1.0E-06 3.8E-04 3.4E-05 2.1E-07 2.1E-07 2.2E-07 2.1E-07
 P0210 Class: D F1: 0.20000 00/17/00 21:40:05.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 G 70 7.0E-08 7.4E-08 7.4E-08 7.6E-08 7.7E-08 1.2E-03 8.3E-05 7.7E-08 7.7E-08 7.0E-08 7.7E-08 3.5E-04 1.6E-04
 H 70 3.1E-08 1.0E-05 1.0E-05 1.0E-05 1.0E-05 2.9E-03 2.0E-04 1.9E-05 1.9E-05 1.9E-05 1.9E-05 8.6E-04 4.0E-04
 BI210 Class: W F1: 0.05000 00/17/00 22:02:54.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 G 70 1.4E-09 3.3E-08 7.5E-08 4.0E-07 1.1E-06 7.1E-10 1.4E-09 1.4E-09 1.4E-09 1.4E-09 1.4E-09 4.1E-07
 H 70 2.9E-05 1.7E-08 3.2E-08 1.6E-07 4.0E-07 2.5E-09 4.5E-09 4.5E-09 4.4E-09 4.5E-09 4.5E-09 1.3E-06
 P0210 Class: W F1: 0.10000 00/17/00 22:09:50.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 G 70 8.0E-08 6.7E-08 8.8E-08 7.7E-08 9.9E-08 3.0E-08 5.9E-08 5.9E-08 5.8E-08 5.9E-08 5.9E-08 3.1E-05 1.8E-04 3.1E-04
 H 70 8.7E-04 9.9E-06 9.9E-06 1.0E-05 1.1E-05 4.4E-08 8.7E-08 8.8E-08 8.7E-08 8.0E-08 8.7E-08 4.5E-05 2.0E-04 4.5E-04
 U 234 Class: Y F1: 0.00200 00/17/00 22:14:33.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 G 70 7.2E-09 0.4E-08 2.0E-07 1.2E-06 3.5E-08 2.6E-08 1.0E-07 7.2E-09 7.3E-09 7.2E-09 7.2E-09 1.2E-08
 H 70 1.7E-02 2.1E-07 2.7E-07 0.0E-07 2.1E-08 5.0E-05 3.0E-06 1.8E-07 1.0E-07 1.7E-07 1.6E-07 2.8E-05
 U 236 Class: Y F1: 0.00200 00/17/00 22:19:09.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 G 70 6.7E-09 7.0E-08 1.0E-07 1.1E-08 3.3E-08 2.4E-08 1.5E-07 0.8E-09 0.8E-09 0.8E-09 0.7E-09 1.2E-08
 H 70 1.0E-02 1.9E-07 2.5E-07 7.3E-07 2.0E-08 5.3E-05 3.4E-06 1.5E-07 1.5E-07 1.6E-07 1.5E-07 2.7E-05
 U 236 Class: Y F1: 0.00200 00/17/00 22:27:17.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 G 70 7.0E-09 0.0E-08 2.2E-07 1.2E-08 3.0E-08 2.3E-08 1.0E-07 0.0E-09 2.3E-08 8.4E-09 0.8E-09 1.2E-08
 H 70 1.6E-02 4.0E-07 3.0E-07 0.0E-07 2.3E-08 5.2E-05 3.0E-06 1.0E-07 1.0E-07 3.2E-07 2.5E-07 2.0E-05

DSFCT30.DAT

TH231 Class: Y F1: 0.00020 08/18/88 01:59:34.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.0E-11 1.4E-08 3.2E-08 1.3E-07 2.4E-07 2.0E-10 3.7E-10 3.7E-11 1.6E-09 1.0E-10 6.1E-13 6.0E-11
 H 70 5.6E-08 4.3E-09 1.0E-08 4.2E-08 7.5E-08 1.3E-08 1.2E-09 2.0E-11 4.7E-10 9.5E-11 2.0E-11 1.2E-10
 PA231 Class: Y F1: 0.00100 08/18/88 02:31:52.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 3.0E-09 8.0E-08 2.2E-07 1.2E-06 3.0E-08 3.4E-03 2.7E-04 2.7E-09 7.0E-09 4.2E-09 3.4E-09 3.3E-07 4.8E-07
 H 70 3.0E-02 3.0E-07 2.9E-07 8.7E-07 2.4E-08 1.6E-01 1.2E-02 1.3E-07 1.7E-07 3.0E-07 2.4E-07 2.0E-05 3.7E-05
 AC227 Class: Y F1: 0.00100 08/18/88 03:01:33.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.2E-08 1.1E-08 1.0E-08 1.0E-07 5.4E-07 3.8E-03 2.9E-04 3.9E-05 5.3E-09 7.7E-09 4.1E-09 8.6E-04
 H 70 9.3E-02 8.7E-07 6.2E-07 1.4E-06 2.9E-08 1.4E-01 1.1E-02 1.5E-03 3.2E-07 6.9E-07 4.7E-07 3.3E-02
 TH227 Class: Y F1: 0.00020 08/18/88 03:23:32.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 8.9E-09 1.2E-07 2.9E-07 1.8E-06 6.4E-06 4.9E-06 4.0E-07 9.7E-09 2.1E-08 1.0E-08 8.0E-09 7.4E-08
 H 70 2.4E-03 2.7E-07 3.6E-07 1.1E-06 3.5E-08 1.1E-04 8.9E-08 2.0E-07 2.1E-07 2.1E-07 2.0E-07 1.6E-06
 FR223 Class: D F1: 1.00000 08/18/88 03:37:58.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.4E-07 1.7E-07 1.0E-07 1.0E-07 1.0E-07 6.0E-08 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07
 H 70 1.3E-07 9.5E-08 9.4E-08 9.4E-08 9.4E-08 4.1E-08 8.1E-08 8.2E-08 8.3E-08 8.2E-08 8.2E-08
 RA223 Class: W F1: 0.20000 08/18/88 03:46:07.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 8.2E-07 1.3E-06 1.0E-06 6.5E-06 1.7E-05 7.9E-05 5.4E-06 8.2E-07 8.5E-07 8.2E-07 8.1E-07
 H 70 1.1E-03 8.4E-07 1.0E-06 2.9E-06 7.1E-08 6.1E-05 4.2E-06 6.4E-07 6.0E-07 6.5E-07 6.4E-07
 U 237 Class: Y F1: 0.00200 08/18/88 03:53:54.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 Q 70 1.6E-10 1.9E-08 5.2E-08 2.4E-07 8.2E-07 2.6E-09 4.0E-09 8.5E-10 1.9E-08 1.3E-09 1.6E-11 2.1E-09
 H 70 3.2E-07 9.0E-09 2.2E-08 1.0E-07 2.7E-07 4.8E-09 3.6E-09 3.8E-10 5.7E-09 1.7E-09 8.9E-10 2.9E-09
 NP237 Class: W F1: 0.00100 08/18/88 04:38:31.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 9.5E-09 9.2E-08 2.2E-07 1.2E-06 3.7E-06 1.0E-03 1.3E-04 1.0E-05 1.1E-08 8.8E-09 6.5E-09 7.0E-05
 H 70 1.1E-03 7.7E-07 9.4E-07 1.5E-06 2.7E-06 1.0E-01 1.5E-02 1.2E-03 7.1E-07 9.9E-07 7.7E-07 8.2E-03
 PA233 Class: Y F1: 0.00100 08/18/88 05:18:53.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 2.0E-10 2.0E-08 5.0E-08 2.5E-07 7.2E-07 7.1E-09 4.9E-09 1.5E-09 1.0E-08 1.9E-09 3.5E-11 1.7E-09 2.4E-09
 H 70 1.1E-06 1.0E-08 2.0E-08 1.2E-07 3.3E-07 4.0E-08 1.2E-08 7.0E-10 8.0E-09 6.2E-09 3.0E-09 1.2E-08 6.1E-09
 U 233 Class: Y F1: 0.00200 08/18/88 05:45:10.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 Q 70 7.2E-09 8.4E-08 2.0E-07 1.2E-06 3.5E-06 2.0E-08 1.7E-07 7.2E-09 7.3E-09 7.2E-09 7.2E-09 1.3E-08
 H 70 1.0E-02 2.1E-07 2.7E-07 8.0E-07 2.1E-08 5.7E-05 3.7E-08 1.0E-07 1.0E-07 1.7E-07 1.7E-07 2.9E-05

DSFCT30.DAT

TH229 Class: Y F1: 0.00020 08/18/88 06:06:43.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 3.1E-07 4.0E-07 5.4E-07 1.6E-06 4.5E-06 1.2E-03 1.0E-04 3.1E-07 3.3E-07 3.1E-07 3.1E-07 2.7E-06
 H 70 1.1E-01 7.2E-05 7.2E-05 7.3E-05 7.6E-05 2.7E-01 2.2E-02 7.2E-05 7.3E-05 7.2E-05 7.2E-05 6.1E-04
 RA225 Class: W F1: 0.20000 08/18/88 06:22:16.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.3E-07 1.3E-07 1.6E-07 4.0E-07 2.2E-06 1.1E-04 8.6E-06 1.3E-07 1.3E-07 1.3E-07 1.3E-07
 H 70 1.1E-03 1.6E-07 2.1E-07 5.1E-07 1.6E-06 9.0E-05 5.5E-06 1.6E-07 1.7E-07 1.6E-07 1.6E-07
 AC225 Class: Y F1: 0.00100 08/18/88 06:32:37.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 3.0E-09 5.1E-07 1.3E-06 6.9E-06 2.0E-05 7.2E-06 5.9E-07 8.3E-08 2.0E-06 4.6E-09 2.7E-09 2.0E-08
 H 70 1.2E-03 2.4E-07 5.0E-07 3.0E-06 8.7E-06 3.2E-05 2.6E-06 3.6E-07 2.0E-08 1.5E-08 1.4E-08 8.6E-06
 U 230 Class: Y F1: 0.00200 08/18/88 06:37:49.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 G 70 8.3E-09 7.5E-08 1.0E-07 1.0E-06 3.3E-06 2.3E-06 1.5E-07 8.3E-09 7.0E-09 6.3E-09 6.3E-09 1.1E-08
 H 70 1.5E-02 2.2E-07 2.6E-07 8.1E-07 2.2E-06 5.1E-05 3.4E-06 1.4E-07 1.5E-07 1.7E-07 1.6E-07 2.6E-05
 TH234 Class: Y F1: 0.00020 08/18/88 06:51:48.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 4.7E-11 7.0E-08 1.7E-07 1.0E-06 3.0E-06 1.4E-09 1.2E-09 1.0E-10 2.0E-09 2.3E-10 2.0E-11 2.0E-10
 H 70 4.2E-06 3.2E-06 7.9E-06 4.7E-07 1.3E-06 2.7E-08 1.6E-08 4.4E-10 1.3E-09 1.0E-09 7.9E-10 3.0E-09
 PA234 Class: Y F1: 0.00100 08/18/88 06:58:48.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 G 70 1.1E-09 5.4E-08 1.1E-07 2.3E-07 1.8E-07 2.0E-09 5.7E-09 1.7E-09 2.4E-08 3.8E-09 1.3E-10 4.3E-09 6.0E-09
 H 70 6.1E-08 1.1E-08 1.9E-08 4.1E-08 3.3E-08 1.3E-09 1.9E-09 3.4E-10 4.5E-09 1.5E-09 8.5E-10 2.4E-09 1.8E-09
 PU238 Class: Y F1: 0.00010 08/18/88 16:15:31.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 5.9E-11 8.9E-08 2.3E-07 1.3E-06 4.0E-06 8.2E-05 8.8E-06 1.0E-06 2.0E-10 6.5E-11 5.6E-11 1.6E-05
 H 70 1.0E-02 7.4E-08 1.5E-07 7.4E-07 2.2E-06 3.4E-02 2.7E-03 4.1E-04 2.5E-06 2.7E-06 2.4E-06 6.0E-03
 PU240 Class: Y F1: 0.00010 08/18/88 16:28:02.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 5.6E-11 8.6E-08 2.1E-07 1.2E-06 3.8E-06 9.1E-05 7.0E-06 1.1E-06 2.0E-10 6.1E-11 5.3E-11 1.7E-05
 H 70 1.8E-02 7.1E-08 1.4E-07 6.9E-07 2.1E-06 3.8E-02 3.0E-03 4.7E-04 2.4E-06 2.7E-06 2.4E-06 7.1E-03
 PU239 Class: Y F1: 0.00010 08/18/88 16:24:29.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 5.4E-11 8.5E-08 2.1E-07 1.2E-06 3.7E-06 9.1E-05 7.0E-06 1.1E-06 1.4E-10 5.6E-11 5.3E-11 1.7E-05
 H 70 1.8E-02 7.1E-08 1.4E-07 6.9E-07 2.0E-06 3.8E-02 3.0E-03 4.7E-04 2.4E-06 2.5E-06 2.4E-06 7.1E-03
 PU241 Class: Y F1: 0.00010 08/18/88 16:28:59.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 2.1E-12 4.1E-10 1.1E-09 6.3E-09 1.8E-08 1.6E-06 1.3E-07 2.1E-08 0.4E-13 1.2E-12 4.0E-13 2.6E-07
 H 70 1.5E-04 1.2E-09 1.3E-09 4.7E-09 1.2E-08 7.7E-04 8.0E-05 9.8E-06 4.6E-10 1.0E-09 4.4E-10 1.3E-04

DSFCT30.DAT

AM241 Class: W F1: 0.00100 08/18/88 18:36:58.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.9E-09 9.5E-08 2.3E-07 1.3E-06 4.1E-06 9.2E-04 7.2E-05 1.1E-05 4.8E-09 1.6E-09 8.2E-10 1.7E-04
 H 70 1.2E-03 1.9E-07 2.8E-07 8.2E-07 2.1E-06 1.1E-01 8.4E-03 1.3E-03 1.1E-07 1.5E-07 9.7E-08 2.0E-02
 BE10 Class: Y F1: 0.00500 08/18/88 18:41:00.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.0E-09 2.1E-08 5.2E-08 3.0E-07 9.0E-07 1.4E-07 4.7E-08 1.0E-09 1.0E-09 1.0E-09 1.0E-09
 H 70 4.5E-05 1.9E-08 3.0E-08 1.7E-07 5.0E-07 1.3E-06 4.4E-07 1.5E-08 1.5E-08 1.5E-08 1.0E-08
 F 18 Class: D F1: 1.00000 08/18/88 18:45:12.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 5.0E-10 2.0E-08 6.2E-10 0.0E-10 5.0E-10 3.7E-09 3.7E-09 2.9E-10 4.5E-10 5.3E-10 4.1E-10
 H 70 7.4E-09 2.9E-09 2.1E-10 2.2E-10 1.9E-10 1.0E-09 1.7E-09 1.3E-10 1.9E-10 3.0E-10 2.8E-10
 MA22 Class: D F1: 1.00000 08/18/88 18:47:45.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 2.4E-07 2.3E-07 3.0E-07 2.8E-07 3.0E-07 4.4E-07 3.6E-07 2.6E-07 2.7E-07 2.4E-07 2.4E-07
 H 70 1.0E-07 1.3E-07 1.8E-07 1.7E-07 1.0E-07 2.6E-07 2.2E-07 1.0E-07 1.7E-07 1.5E-07 1.5E-07
 P 33 Class: D F1: 0.00000 08/18/88 18:51:58.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 0.7E-09 9.5E-09 0.5E-09 2.1E-08 5.5E-08 9.4E-08 3.7E-08 0.7E-09 0.7E-09 0.7E-09 0.7E-09
 H 70 1.5E-08 3.4E-09 2.9E-09 4.8E-09 1.0E-08 0.7E-08 2.6E-08 4.9E-09 4.9E-09 4.9E-09 4.9E-09
 S 35 Class: W F1: 0.00000 08/18/88 18:55:59.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 5.4E-09 7.1E-09 5.1E-09 1.4E-08 3.8E-08 2.7E-09 5.5E-09 5.4E-09 5.5E-09 5.5E-09 5.5E-09
 H 70 3.3E-07 3.6E-09 2.7E-09 0.0E-09 1.7E-08 1.5E-09 3.2E-09 3.2E-09 3.2E-09 3.2E-09 3.2E-09
 CL38 Class: D F1: 1.00000 08/18/88 17:00:01.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 5.0E-08 5.4E-08 0.0E-08 0.0E-08 0.0E-08 2.8E-08 5.5E-08 5.0E-08 5.0E-08 5.0E-08 5.0E-08
 H 70 5.4E-08 2.3E-08 3.7E-08 3.7E-08 3.7E-08 1.7E-08 3.4E-08 3.4E-08 3.5E-08 3.4E-08 3.5E-08
 K 40 Class: D F1: 1.00000 08/18/88 17:03:52.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 3.4E-07 2.4E-07 3.8E-07 3.7E-07 3.8E-07 1.7E-07 3.8E-07 3.5E-07 3.0E-07 3.5E-07 3.4E-07
 H 70 1.2E-07 1.3E-07 2.3E-07 2.3E-07 2.3E-07 1.1E-07 2.0E-07 2.1E-07 2.2E-07 2.1E-07 2.1E-07
 CA41 Class: W F1: 0.30000 08/18/88 17:07:30.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.1E-10 2.0E-10 4.1E-10 2.1E-09 6.0E-09 2.2E-07 9.9E-08 9.9E-11 1.1E-10 1.3E-10 1.1E-10
 H 70 2.9E-08 1.5E-10 2.2E-10 1.0E-09 3.0E-09 1.9E-07 0.0E-08 0.0E-11 9.4E-11 1.2E-10 9.0E-11
 CA45 Class: W F1: 0.30000 08/18/88 17:12:17.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.7E-09 0.9E-09 1.2E-08 0.7E-08 2.0E-07 3.6E-07 2.5E-07 1.7E-09 1.7E-09 1.7E-09 1.7E-09
 H 70 0.3E-07 3.5E-09 5.7E-09 3.1E-08 9.1E-08 2.9E-07 2.0E-07 1.4E-09 1.4E-09 1.4E-09 1.4E-09

DSFCT30.DAT

SC48 Class: Y F1: 0.00010 00/10/00 17:16:51.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Spleen
 G 70 3.5E-09 4.0E-08 1.0E-07 3.2E-07 7.3E-07 9.7E-09 2.8E-08 1.2E-08 1.4E-07 1.8E-08 5.4E-10 1.4E-08 1.7E-08
 H 70 3.0E-08 2.2E-07 1.1E-07 2.0E-07 3.5E-07 1.1E-07 1.4E-07 1.2E-08 8.0E-08 1.4E-07 1.3E-07 2.7E-07 3.0E-07
 MN54 Class: W F1: 0.10000 00/10/00 17:21:01.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.0E-08 2.0E-08 6.0E-08 9.5E-08 1.0E-07 4.0E-08 3.4E-08 1.5E-08 6.0E-08 1.0E-08 9.5E-09 7.1E-08
 H 70 4.4E-07 7.5E-08 5.5E-08 7.1E-08 9.0E-08 8.3E-08 7.3E-08 1.9E-08 4.7E-08 5.7E-08 4.9E-08 1.7E-07
 MN56 Class: W F1: 0.10000 00/10/00 17:25:13.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 6.4E-10 8.3E-08 7.0E-08 1.0E-07 4.0E-08 7.7E-10 1.0E-09 5.8E-10 6.2E-09 1.3E-09 1.8E-10 2.0E-09
 H 70 3.0E-08 5.2E-09 5.8E-09 7.0E-09 3.1E-09 5.9E-10 7.7E-10 2.3E-10 8.7E-10 5.4E-10 4.4E-10 1.3E-09
 FE55 Class: W F1: 0.10000 00/10/00 17:28:00.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Spleen
 G 70 7.0E-09 5.5E-09 5.7E-09 9.3E-09 1.9E-08 3.1E-09 6.4E-09 7.2E-09 7.6E-09 7.2E-09 7.7E-09 2.3E-08 3.8E-08
 H 70 5.9E-08 8.0E-09 8.4E-09 9.0E-09 1.5E-08 5.0E-09 1.0E-08 1.2E-08 1.2E-08 1.2E-08 1.3E-08 3.7E-08 6.2E-08
 FE59 Class: W F1: 0.10000 00/10/00 17:32:23.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Spleen
 G 70 4.5E-08 7.1E-08 1.4E-07 2.7E-07 5.8E-07 3.7E-08 5.4E-08 5.5E-08 1.1E-07 5.3E-08 4.5E-08 1.1E-07 1.3E-07
 H 70 9.0E-07 1.0E-07 1.1E-07 1.0E-07 3.0E-07 6.3E-08 8.2E-08 6.9E-08 9.3E-08 8.7E-08 8.3E-08 1.0E-07 2.0E-07
 CO57 Class: Y F1: 0.05000 00/10/00 17:36:43.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 2.0E-09 6.2E-09 1.8E-08 3.7E-08 8.8E-08 3.0E-09 6.0E-09 2.3E-09 1.3E-08 2.9E-09 1.4E-09 6.3E-09
 H 70 1.1E-08 3.8E-08 1.1E-08 2.2E-08 4.5E-08 2.9E-08 3.8E-08 1.0E-09 8.3E-09 2.5E-08 1.0E-08 4.6E-08
 CO58 Class: Y F1: 0.05000 00/10/00 17:41:08.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 6.0E-09 2.7E-08 7.0E-08 1.4E-07 2.8E-07 8.2E-09 1.0E-08 1.2E-08 7.3E-08 1.3E-08 4.7E-09 1.7E-08
 H 70 1.1E-08 9.3E-08 5.0E-08 8.1E-08 1.3E-07 4.5E-08 6.2E-08 7.4E-09 4.1E-08 6.2E-08 5.8E-08 1.1E-07
 NI59 Class: W F1: 0.05000 00/10/00 17:45:28.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 16
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 G 70 2.4E-09 2.2E-09 2.7E-09 7.2E-09 1.8E-08 1.0E-09 2.0E-09 2.4E-09 2.6E-09 2.4E-09 2.7E-09 3.1E-11
 H 70 7.3E-08 6.3E-09 6.3E-09 7.1E-09 1.3E-08 3.0E-09 5.8E-09 6.9E-09 7.3E-09 7.0E-09 7.0E-09 8.0E-11
 NI63 Class: W F1: 0.05000 00/10/00 17:49:44.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 16
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 G 70 5.0E-09 4.5E-09 8.4E-09 2.2E-08 6.1E-08 2.0E-09 5.5E-09 5.7E-09 5.8E-09 5.7E-09 5.7E-09 2.0E-11
 H 70 1.0E-07 9.7E-09 1.1E-08 1.7E-08 3.7E-08 8.1E-09 1.0E-08 1.0E-08 1.7E-08 1.0E-08 1.0E-08 5.5E-11
 NI65 Class: W F1: 0.05000 00/10/00 17:54:03.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 16
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 G 70 2.0E-10 4.5E-08 5.2E-08 6.9E-08 2.7E-08 2.1E-10 5.4E-10 1.0E-10 1.7E-09 4.0E-10 4.9E-11 7.0E-10
 H 70 2.6E-08 3.5E-09 3.9E-09 5.1E-09 2.1E-09 1.0E-10 2.5E-10 1.1E-10 2.3E-10 2.1E-10 1.0E-10 3.0E-10

DSFCT30.DAT

C054 Class: D F1: 0.50000 08/18/88 17:58:49.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 21 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Brain Pancreas
 Q 70 9.8E-10 1.2E-08 1.5E-08 4.4E-08 5.5E-08 1.8E-09 1.4E-09 1.1E-09 3.4E-09 1.2E-09 8.4E-10 2.7E-09 2.7E-09 3.1E-09
 H 70 1.3E-08 2.4E-09 2.7E-09 8.8E-09 8.4E-09 1.0E-09 9.0E-10 8.7E-10 1.1E-09 8.8E-10 8.3E-10 2.3E-09 2.5E-09 2.4E-09
 ZN69M Class: Y F1: 0.50000 08/18/88 18:00:28.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 2.6E-09 1.0E-08 3.3E-08 1.2E-07 1.7E-07 5.5E-09 7.3E-09 2.9E-09 8.0E-09 3.2E-09 2.3E-09
 H 70 8.0E-08 8.4E-09 1.0E-08 3.2E-08 4.3E-08 1.7E-09 2.3E-09 7.0E-10 2.2E-09 1.2E-09 9.2E-10
 ZN89 Class: Y F1: 0.50000 08/18/88 18:00:17.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 3.0E-11 1.5E-08 7.7E-09 4.4E-09 7.4E-10 4.7E-11 6.2E-11 3.0E-11 3.0E-11 3.1E-11 3.0E-11
 H 70 5.4E-09 8.0E-10 3.1E-10 1.7E-10 3.0E-11 3.1E-12 4.0E-12 2.0E-12 2.0E-12 2.0E-12 2.0E-12
 AS70 Class: W F1: 0.50000 08/18/88 18:00:53.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 7.0E-09 9.3E-08 1.2E-07 4.7E-07 8.5E-07 5.8E-09 1.0E-08 7.9E-09 1.8E-08 7.9E-09 8.7E-09 2.6E-08 3.0E-08 2.0E-08
 H 70 3.4E-07 2.7E-08 3.2E-08 1.3E-07 2.3E-07 2.8E-09 4.5E-09 3.3E-09 5.4E-09 3.8E-09 3.4E-09 1.2E-08 1.3E-08 9.1E-09
 SE75 Class: W F1: 0.00000 08/18/88 18:12:23.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 1.2E-07 1.4E-07 1.4E-07 1.4E-07 1.3E-07 1.0E-07 1.3E-07 8.3E-08 1.2E-07 1.0E-07 8.2E-08 4.0E-07 5.0E-07 2.5E-07
 H 70 3.5E-07 1.0E-07 8.2E-08 8.4E-08 7.3E-08 7.4E-08 9.5E-08 4.9E-08 7.2E-08 7.3E-08 5.8E-08 2.0E-07 3.0E-07 1.7E-07
 SE79 Class: W F1: 0.80000 08/18/88 18:17:03.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 8.4E-08 4.2E-08 3.9E-08 4.5E-08 7.7E-08 3.3E-08 8.3E-08 8.4E-08 8.4E-08 8.4E-08 8.4E-08 4.5E-07 8.7E-07 3.0E-07
 H 70 8.1E-07 2.8E-08 2.5E-08 2.7E-08 4.3E-08 2.1E-08 4.1E-08 4.1E-08 4.1E-08 4.1E-08 4.1E-08 2.9E-07 5.5E-07 1.9E-07
 BR82 Class: D F1: 1.00000 08/17/88 18:16:17.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 2.9E-08 5.7E-08 3.8E-08 3.0E-08 3.7E-08 1.1E-08 2.6E-08 3.5E-08 3.0E-08 2.9E-08 2.9E-08
 H 70 4.9E-08 2.2E-08 2.1E-08 2.0E-08 2.0E-08 8.9E-09 1.8E-08 1.9E-08 1.0E-08 1.7E-08 1.7E-08
 BR83 Class: D F1: 1.00000 08/17/88 18:20:54.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 5.9E-10 2.1E-08 8.3E-10 8.2E-10 8.3E-10 3.0E-10 5.7E-10 5.9E-10 5.9E-10 6.1E-10 5.9E-10
 H 70 1.1E-08 2.9E-09 2.8E-10 2.7E-10 2.8E-10 1.3E-10 2.5E-10 2.6E-10 2.6E-10 2.7E-10 2.6E-10
 BR84 Class: D F1: 1.00000 08/17/88 18:28:03.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 5.1E-10 4.0E-08 6.5E-10 6.8E-10 5.4E-10 2.2E-10 3.9E-10 3.9E-10 5.0E-10 4.8E-10 3.9E-10
 H 70 1.1E-08 5.0E-09 2.4E-10 2.4E-10 2.1E-10 1.2E-10 2.0E-10 1.8E-10 2.0E-10 2.3E-10 2.2E-10
 RB07 Class: D F1: 1.00000 08/17/88 18:31:50.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 8.0E-08 5.0E-08 8.0E-08 8.0E-08 8.0E-08 2.8E-07 1.8E-07 8.0E-08 8.0E-08 8.0E-08 8.0E-08
 H 70 2.3E-08 2.6E-08 4.9E-08 4.9E-08 4.9E-08 1.7E-07 9.7E-08 4.9E-08 4.9E-08 4.9E-08 4.9E-08

DSFCT30.DAT

RB88 Class: D Fl: 1.00000 08/17/88 18:37:38.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 2.1E-10 5.2E-08 2.4E-10 2.5E-10 2.2E-10 2.3E-10 2.4E-10 1.0E-10 2.0E-10 2.1E-10 1.0E-10
 H 70 1.0E-08 4.3E-09 9.8E-11 1.0E-10 9.6E-11 1.2E-10 1.2E-10 9.1E-11 9.4E-11 1.0E-10 9.7E-11
 RB89 Class: D Fl: 1.00000 08/17/88 18:41:19.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 2.7E-10 2.0E-08 3.4E-10 3.0E-10 2.0E-10 3.2E-10 2.7E-10 1.7E-10 2.5E-10 2.5E-10 1.0E-10
 H 70 4.7E-09 2.1E-09 1.1E-10 1.1E-10 9.9E-11 1.8E-10 1.5E-10 8.0E-11 9.7E-11 1.2E-10 1.1E-10
 RB86 Class: D Fl: 1.00000 08/17/88 18:48:42.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.5E-07 1.3E-07 1.5E-07 1.5E-07 1.5E-07 5.2E-07 3.0E-07 1.5E-07 1.5E-07 1.5E-07 1.5E-07
 H 70 1.3E-07 5.5E-08 9.3E-08 9.3E-08 9.3E-08 3.1E-07 1.0E-07 9.2E-08 9.3E-08 9.3E-08 9.2E-08
 SR85 Class: D Fl: 0.30000 08/17/88 18:54:28.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.1E-08 1.7E-08 3.9E-08 5.5E-08 1.0E-07 4.1E-08 4.0E-08 1.1E-08 4.0E-08 1.5E-08 1.1E-08
 H 70 2.5E-08 1.4E-08 2.0E-08 2.1E-08 3.1E-08 8.6E-08 5.0E-08 1.4E-08 2.4E-08 2.0E-08 1.9E-08
 SR91 Class: D Fl: 0.30000 08/17/88 19:01:29.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.9E-09 5.0E-08 9.4E-08 2.0E-07 2.7E-07 5.3E-09 7.0E-09 2.5E-09 1.4E-08 3.3E-09 1.5E-09
 H 70 5.9E-08 1.0E-08 1.5E-08 3.0E-08 4.0E-08 7.2E-09 7.3E-09 2.3E-09 4.0E-09 2.7E-09 2.4E-09
 Y 91M Class: Y Fl: 0.00010 08/17/88 19:18:34.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 9.3E-11 3.5E-09 2.2E-09 2.3E-09 1.7E-09 8.3E-11 1.0E-10 2.4E-11 5.1E-10 1.3E-10 8.4E-12 1.0E-10
 H 70 4.6E-09 1.9E-10 1.2E-10 2.0E-10 5.9E-10 4.3E-11 5.4E-11 2.3E-12 2.3E-11 4.2E-11 3.4E-11 8.4E-11
 Y 91 Class: Y Fl: 0.00010 08/17/88 19:26:18.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.4E-11 4.0E-08 1.2E-07 7.3E-07 2.1E-08 4.4E-10 4.0E-10 2.0E-11 2.5E-10 3.0E-11 9.1E-12 4.3E-10
 H 70 0.5E-08 2.3E-08 5.0E-08 3.4E-07 9.7E-07 2.2E-08 2.1E-08 4.4E-10 5.7E-10 6.2E-10 5.8E-10 2.1E-08
 SR92 Class: D Fl: 0.30000 08/17/88 19:32:04.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.2E-09 3.0E-08 7.3E-08 2.1E-07 1.0E-07 1.7E-09 2.5E-09 1.2E-09 5.7E-09 1.0E-09 8.4E-10
 H 70 4.7E-08 8.0E-09 1.2E-08 3.0E-08 2.3E-08 2.1E-09 2.0E-09 1.2E-09 1.0E-09 1.5E-09 1.3E-09
 Y 92 Class: Y Fl: 0.00010 08/17/88 19:39:39.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.0E-10 9.9E-08 1.4E-07 2.4E-07 1.3E-07 1.3E-10 3.0E-10 1.0E-10 1.5E-09 2.0E-10 1.3E-11 3.3E-10
 H 70 0.0E-08 1.2E-08 1.7E-08 2.9E-08 1.0E-08 1.1E-10 1.5E-10 2.5E-11 1.9E-10 1.1E-10 7.1E-11 2.0E-10
 Y 93 Class: Y Fl: 0.00010 08/17/88 19:44:30.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 0.1E-11 9.1E-08 1.8E-07 5.7E-07 0.6E-07 1.3E-10 3.0E-10 1.3E-10 1.6E-09 2.3E-10 9.0E-12 2.5E-10
 H 70 1.0E-07 2.0E-08 4.0E-08 1.3E-07 1.5E-07 2.3E-10 3.0E-10 4.7E-11 3.8E-10 1.2E-10 6.4E-11 3.1E-10

DSFCT30.DAT

M093 Class: D F1: 0.00000 08/17/88 20:03:15.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 7.0E-09 5.6E-09 5.0E-09 6.3E-09 1.1E-08 1.0E-07 2.0E-08 5.9E-09 8.0E-09 7.0E-09 6.7E-09 1.3E-07 1.1E-07
 H 70 4.3E-09 3.8E-09 3.3E-09 3.2E-09 4.2E-09 7.2E-08 1.6E-08 4.3E-09 6.3E-09 5.1E-09 4.0E-09 9.0E-08 8.2E-08
 ZR93 Class: W F1: 0.00200 08/17/88 20:19:53.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 0.3E-12 1.0E-09 3.9E-09 2.4E-08 7.1E-08 4.5E-07 3.0E-08 3.2E-12 5.4E-12 1.0E-11 4.5E-12
 H 70 2.2E-07 9.6E-10 2.1E-09 1.2E-08 8.5E-08 2.6E-06 2.1E-06 1.9E-10 3.2E-10 6.0E-10 2.7E-10
 NB93M Class: Y F1: 0.01000 08/17/88 20:30:53.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Spleen
 Q 70 1.7E-10 2.4E-09 6.2E-09 3.5E-08 1.1E-07 4.1E-09 1.0E-09 1.7E-10 4.1E-10 1.0E-10 1.7E-10 2.4E-09 2.3E-09
 H 70 4.1E-08 2.1E-09 3.7E-09 1.9E-08 5.0E-08 1.0E-08 7.3E-09 7.3E-10 8.9E-10 2.0E-09 7.5E-10 1.0E-08 1.1E-08
 ZR97 Class: W F1: 0.00200 08/17/88 20:38:09.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.2E-09 8.4E-09 2.4E-07 8.0E-07 1.3E-06 3.2E-09 9.1E-09 3.6E-09 4.4E-08 5.7E-09 1.9E-10
 H 70 2.6E-07 2.7E-08 6.0E-08 2.0E-07 2.9E-07 8.7E-09 1.0E-08 2.1E-09 1.1E-08 3.9E-09 2.6E-09
 NB97M Class: Y F1: 0.01000 08/17/88 20:52:20.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Spleen
 Q 70 8.2E-12 5.1E-10 3.0E-10 2.3E-10 5.2E-11 3.1E-12 8.7E-12 1.0E-12 1.7E-11 6.0E-12 8.0E-13 1.5E-11 3.2E-11
 H 70 1.0E-10 2.1E-11 1.5E-11 1.1E-11 2.6E-12 1.5E-12 2.1E-12 1.1E-13 9.4E-13 2.1E-12 1.9E-12 1.9E-12 3.0E-12
 NB97 Class: Y F1: 0.01000 08/17/88 20:58:59.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Spleen
 Q 70 1.4E-10 2.6E-08 2.1E-08 1.7E-08 3.7E-09 1.2E-10 3.1E-10 5.7E-11 1.1E-09 2.4E-10 1.5E-11 5.0E-10 7.0E-10
 H 70 1.1E-08 1.4E-09 1.1E-09 8.7E-10 1.9E-10 5.8E-11 8.1E-11 6.5E-12 6.2E-11 7.9E-11 6.3E-11 7.9E-11 1.4E-10
 NB94 Class: Y F1: 0.01000 08/17/88 21:03:01.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Spleen
 Q 70 1.2E-08 5.3E-08 1.6E-07 3.7E-07 8.0E-07 5.3E-08 5.1E-08 1.9E-08 1.3E-07 2.4E-08 8.4E-09 4.0E-08 4.4E-08
 H 70 4.3E-06 1.8E-06 4.1E-07 6.1E-07 8.1E-07 1.2E-08 1.3E-06 7.7E-08 2.7E-07 1.3E-06 1.3E-06 1.1E-06 2.1E-06
 M099 Class: D F1: 0.00000 08/17/88 21:10:25.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 1.4E-08 4.2E-08 2.8E-08 9.5E-08 2.2E-07 6.5E-08 4.1E-08 1.2E-08 1.6E-08 1.3E-08 1.2E-08 1.9E-07 1.6E-07
 H 70 7.1E-08 1.1E-08 8.9E-09 1.9E-08 3.0E-08 4.4E-08 2.8E-08 8.2E-09 9.0E-09 8.0E-09 8.2E-09 1.3E-07 1.2E-07
 TC99M Class: W F1: 0.00000 08/17/88 21:27:42.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 22 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid S Wall Kidneys
 Q 70 2.4E-10 5.1E-09 1.6E-09 2.6E-09 1.9E-09 2.0E-10 4.5E-10 1.7E-10 7.1E-10 2.7E-10 6.1E-09 5.1E-09 1.6E-09
 H 70 2.1E-09 1.1E-09 2.5E-10 3.9E-10 2.6E-10 1.0E-10 1.7E-10 3.9E-11 1.2E-10 1.1E-10 1.5E-09 1.1E-09 3.9E-10
 TC101 Class: W F1: 0.00000 08/17/88 21:35:49.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 22 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid S Wall Kidneys
 Q 70 3.1E-11 1.1E-09 1.7E-09 3.0E-10 5.4E-11 1.9E-11 3.5E-11 9.4E-12 4.5E-11 3.0E-11 3.1E-10 1.1E-08 1.0E-10
 H 70 2.1E-09 1.0E-10 1.8E-11 7.3E-12 3.0E-12 9.6E-12 1.3E-11 4.3E-12 5.3E-12 1.1E-11 1.7E-10 1.6E-10 3.4E-11

DSFCT30.DAT

RU105 Class: Y F1: 0.05000 08/17/88 21:40:15.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 4.7E-10 4.2E-08 0.0E-00 1.4E-07 1.1E-07 0.3E-10 1.0E-09 5.0E-10 7.5E-09 1.2E-09 1.5E-10
 H 70 4.7E-08 6.7E-09 1.0E-08 2.3E-08 2.9E-08 3.3E-10 5.7E-10 1.1E-10 1.2E-09 4.0E-10 3.0E-10
 RH105 Class: Y F1: 0.05000 08/17/88 21:47:43.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 2.8E-10 1.4E-08 3.1E-08 1.3E-07 2.7E-07 3.8E-10 1.0E-09 5.3E-10 4.1E-09 6.4E-10 2.2E-10
 H 70 6.0E-08 4.9E-09 1.1E-08 4.0E-08 9.4E-08 2.8E-10 5.3E-10 2.0E-10 1.5E-09 3.9E-10 2.1E-10
 PD107 Class: Y F1: 0.05000 08/17/88 21:51:53.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 7.0E-13 7.7E-10 1.9E-09 1.1E-08 3.3E-08 1.0E-11 4.0E-12 7.2E-13 7.0E-13 7.0E-13 7.0E-13 2.5E-10 4.7E-10
 H 70 1.7E-08 4.3E-10 1.1E-09 6.0E-09 1.0E-08 9.7E-11 3.0E-11 0.8E-12 6.7E-12 6.7E-12 6.7E-12 2.3E-09 4.4E-09
 PD109 Class: Y F1: 0.05000 08/17/88 21:57:29.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 1.5E-11 4.0E-08 8.4E-08 3.0E-07 4.0E-07 8.0E-11 2.7E-10 2.5E-11 1.1E-09 8.9E-11 8.1E-12 3.4E-10 6.0E-10
 H 70 9.7E-08 1.0E-08 2.1E-08 7.0E-08 1.0E-07 0.7E-11 1.1E-10 1.4E-11 2.9E-10 6.4E-11 1.5E-11 4.0E-10 0.6E-10
 AG110M Class: D F1: 0.05000 08/17/88 22:02:44.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 0.8E-08 2.1E-07 4.7E-07 1.7E-06 4.7E-06 3.6E-08 7.2E-08 4.1E-08 2.2E-07 8.2E-08 2.3E-08 2.0E-08
 H 70 7.7E-07 5.0E-07 4.8E-07 8.1E-07 8.9E-07 2.2E-07 3.3E-07 2.2E-07 3.0E-07 3.7E-07 2.1E-07 1.0E-05
 AG111 Class: D F1: 0.05000 08/17/88 22:08:10.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 8.4E-10 2.9E-08 7.0E-08 3.0E-07 1.0E-06 5.1E-10 1.1E-09 7.2E-10 2.5E-09 7.9E-10 5.5E-10 6.7E-08
 H 70 6.0E-08 7.8E-09 1.4E-08 5.9E-08 1.5E-07 3.4E-09 6.0E-09 5.0E-09 5.3E-09 5.3E-09 5.0E-09 6.1E-07
 CD109 Class: D F1: 0.05000 08/17/88 22:13:22.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 2.2E-08 2.1E-08 3.4E-08 1.2E-07 3.2E-07 1.0E-08 2.2E-08 1.8E-08 2.4E-08 2.2E-08 1.9E-08 5.1E-07 2.8E-08
 H 70 6.7E-08 1.3E-07 1.2E-07 1.3E-07 1.0E-07 9.3E-08 2.0E-07 1.7E-07 1.8E-07 2.1E-07 1.8E-07 4.7E-06 2.6E-06
 CD113M Class: D F1: 0.05000 08/17/88 22:19:00.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 2.0E-07 1.3E-07 1.5E-07 3.1E-07 7.5E-07 1.0E-07 2.0E-07 2.0E-07 2.1E-07 2.0E-07 2.0E-07 5.5E-06 3.3E-06
 H 70 6.0E-08 1.1E-06 1.1E-06 9.0E-07 1.2E-06 9.0E-07 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 5.1E-05 3.1E-04
 CD115M Class: D F1: 0.05000 08/17/88 22:24:20.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 G 70 1.2E-08 5.8E-08 1.2E-07 7.0E-07 2.0E-06 5.9E-09 1.2E-08 1.2E-08 1.3E-08 1.2E-08 1.2E-08 3.1E-07 1.8E-08
 H 70 1.2E-07 7.4E-08 0.3E-08 1.0E-07 3.0E-07 5.5E-08 1.1E-07 1.1E-07 1.1E-07 1.1E-07 1.1E-07 2.9E-06 1.7E-05
 CD115 Class: D F1: 0.05000 08/17/88 22:39:43.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 1.2E-09 3.2E-08 9.0E-08 4.4E-07 1.1E-06 2.1E-09 5.3E-09 2.5E-09 2.2E-08 3.2E-09 6.8E-10 1.4E-08 6.9E-08
 H 70 7.5E-08 1.2E-08 1.9E-08 7.1E-08 1.6E-07 6.0E-09 0.3E-09 0.1E-09 9.5E-09 7.3E-09 5.8E-09 1.1E-07 5.8E-07

DSFCT30.DAT

IN115M Class: D F1: 0.02000 08/17/88 22:48:57.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 7.1E-11 1.4E-08 2.2E-08 4.1E-08 2.6E-08 1.4E-10 4.0E-10 8.4E-11 1.0E-09 2.2E-10 1.2E-11 2.9E-10 4.3E-10 3.7E-10
 H 70 6.9E-09 2.1E-09 3.1E-09 5.7E-09 3.0E-09 4.4E-10 3.4E-10 1.6E-10 3.7E-10 2.1E-10 1.7E-10 9.2E-10 1.6E-09 5.7E-10
 IN111 Class: D F1: 0.02000 08/18/88 16:59:35.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 5.1E-10 1.1E-08 3.4E-08 7.6E-08 1.4E-07 2.4E-09 6.9E-09 2.1E-09 2.9E-08 3.0E-09 8.3E-11 8.3E-09 4.7E-09 2.9E-09
 H 70 1.2E-08 4.4E-09 7.2E-09 1.4E-08 2.2E-08 7.1E-09 6.0E-09 1.1E-09 5.7E-09 2.6E-09 1.3E-09 2.1E-08 3.0E-08 1.0E-08
 IN114M Class: D F1: 0.02000 08/18/88 17:00:12.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 6.2E-10 7.2E-08 1.0E-07 1.1E-08 3.1E-08 5.3E-08 2.0E-08 8.4E-10 9.2E-09 1.3E-09 2.6E-10 1.4E-07 2.0E-07 7.0E-08
 H 70 1.8E-07 2.1E-08 3.0E-08 1.7E-07 4.0E-07 1.2E-06 4.1E-07 4.4E-09 8.0E-09 9.3E-09 5.4E-09 3.2E-08 6.4E-08 1.0E-08
 SN117M Class: W F1: 0.02000 08/18/88 17:12:02.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 4.0E-10 1.7E-08 4.8E-08 2.0E-07 5.6E-07 3.6E-08 7.5E-09 1.2E-09 1.5E-08 1.7E-09 2.2E-10
 H 70 4.1E-07 1.0E-08 1.9E-08 8.2E-08 2.2E-07 1.5E-07 1.6E-08 1.3E-09 7.1E-09 3.6E-09 2.1E-09
 SN119M Class: W F1: 0.02000 08/18/88 17:17:23.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 6.7E-10 7.0E-09 1.0E-08 9.4E-08 2.0E-07 1.3E-08 5.7E-09 0.2E-10 2.9E-09 7.2E-10 0.2E-10
 H 70 7.6E-07 5.9E-09 1.0E-08 4.8E-08 1.4E-07 7.6E-08 3.2E-08 3.6E-09 5.0E-09 4.7E-09 3.7E-09
 SN121M Class: W F1: 0.02000 08/18/88 17:23:45.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 2.0E-09 4.2E-09 1.1E-08 7.8E-08 3.0E-07 4.2E-08 1.6E-08 2.0E-09 3.0E-09 2.1E-09 2.0E-09
 H 70 1.3E-06 9.7E-09 1.6E-08 5.8E-08 1.8E-07 2.8E-07 1.0E-07 1.3E-08 1.3E-08 1.3E-08 1.3E-08
 SN121 Class: W F1: 0.02000 08/18/88 17:34:50.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.4E-11 9.1E-09 2.0E-08 9.0E-08 1.7E-07 1.4E-10 5.9E-11 1.6E-11 1.4E-11 1.4E-11 1.4E-11
 H 70 3.5E-08 2.6E-09 5.4E-09 2.6E-08 4.6E-08 5.8E-10 2.5E-10 0.2E-11 8.0E-11 6.1E-11 0.1E-11
 SN123 Class: W F1: 0.02000 08/18/88 17:39:19.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 2.2E-09 4.2E-08 1.0E-07 6.2E-07 1.0E-06 4.7E-08 1.7E-08 2.3E-09 2.7E-09 2.3E-09 2.2E-09
 H 70 4.0E-06 2.6E-08 5.4E-08 2.9E-07 8.3E-07 2.6E-07 9.4E-08 1.2E-08 1.3E-08 1.3E-08 1.3E-08
 I 125 Class: D F1: 1.00000 08/18/88 17:45:33.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 3.1E-09 4.4E-09 2.4E-09 2.4E-09 2.6E-09 1.0E-08 1.3E-08 1.0E-09 2.5E-09 9.0E-09 2.2E-05 9.7E-09
 H 70 7.3E-09 1.4E-09 1.5E-09 1.6E-09 1.6E-09 1.1E-08 8.0E-09 1.1E-09 1.5E-09 6.0E-09 1.3E-05 5.0E-09
 SN125 Class: W F1: 0.02000 08/18/88 17:51:21.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.1E-09 7.2E-08 1.7E-07 9.4E-07 2.6E-06 1.7E-08 1.5E-08 2.4E-09 2.1E-08 3.1E-09 7.0E-10
 H 70 1.6E-06 9.3E-08 6.9E-08 3.7E-07 9.9E-07 7.0E-08 5.1E-08 3.6E-09 1.1E-08 6.4E-09 5.3E-09

DSFCT30.DAT

SB125 Class: W F1: 0.01000 08/18/88 18:00:35.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 9.5E-10 1.8E-08 5.4E-08 1.7E-07 4.6E-07 6.9E-09 8.4E-09 3.8E-09 3.7E-08 4.3E-09 3.8E-10 4.4E-09
 H 70 1.6E-08 4.1E-08 3.4E-08 9.2E-08 2.2E-07 7.3E-08 3.6E-08 5.9E-09 2.4E-08 2.7E-08 2.1E-08 5.7E-08
 TE125M Class: W F1: 0.20000 08/18/88 18:19:35.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 3.1E-09 1.2E-08 2.5E-08 1.2E-07 3.3E-07 9.2E-07 8.6E-08 2.7E-09 8.9E-09 3.2E-09 2.8E-09
 H 70 6.9E-07 7.4E-09 1.2E-08 5.2E-08 1.6E-07 8.2E-07 7.9E-08 2.6E-09 6.4E-09 4.7E-09 2.7E-09
 SN126 Class: W F1: 0.02000 08/18/88 18:25:57.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 4.1E-08 1.0E-07 3.0E-07 1.1E-06 3.1E-06 3.5E-07 1.8E-07 4.7E-08 1.7E-07 5.5E-08 3.8E-08
 H 70 9.9E-06 3.5E-07 3.6E-07 7.5E-07 1.7E-06 2.2E-06 1.1E-06 2.3E-07 3.3E-07 3.6E-07 3.3E-07
 SB126M Class: W F1: 0.01000 08/18/88 18:44:25.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.4E-10 1.8E-08 5.2E-09 2.0E-09 5.5E-10 7.8E-11 1.8E-10 2.2E-11 3.9E-10 1.5E-10 1.2E-11 2.1E-10
 H 70 3.9E-09 2.8E-10 9.2E-11 7.7E-11 9.8E-11 5.2E-11 8.5E-11 1.0E-11 3.3E-11 5.8E-11 5.2E-11 1.1E-10
 SB126 Class: W F1: 0.01000 08/18/88 18:51:07.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 4.8E-09 8.1E-08 2.5E-07 5.7E-07 1.3E-06 1.0E-08 4.2E-08 2.0E-08 2.1E-07 2.5E-08 1.2E-09 2.1E-08
 H 70 9.3E-07 7.7E-08 1.1E-07 2.4E-07 5.4E-07 4.7E-08 5.4E-08 1.4E-08 9.0E-08 4.4E-08 3.2E-08 7.9E-08
 SB124 Class: W F1: 0.01000 08/18/88 18:56:23.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 3.0E-09 6.8E-08 2.0E-07 8.1E-07 1.6E-06 1.4E-08 2.7E-08 1.3E-08 1.3E-07 1.0E-08 1.2E-09 1.5E-08
 H 70 2.7E-06 1.0E-07 1.1E-07 2.9E-07 7.2E-07 8.8E-08 7.3E-08 1.5E-08 6.9E-08 5.9E-08 4.5E-08 1.2E-07
 SB127 Class: W F1: 0.01000 08/18/88 19:02:47.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.1E-09 3.9E-08 1.2E-07 5.1E-07 1.4E-06 3.8E-09 9.3E-09 4.1E-09 4.3E-08 5.4E-09 3.1E-10 5.2E-09
 H 70 4.6E-07 2.1E-08 4.7E-08 2.0E-07 5.0E-07 9.5E-09 1.1E-08 3.0E-09 1.7E-08 6.0E-09 4.0E-09 1.4E-08
 TE127M Class: W F1: 0.20000 08/18/88 19:19:09.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 6.6E-09 1.2E-08 2.8E-08 2.1E-07 7.8E-07 1.5E-06 3.8E-07 6.7E-09 8.8E-09 6.9E-09 6.7E-09
 H 70 2.2E-08 1.3E-08 2.2E-08 1.2E-07 3.8E-07 1.4E-08 3.6E-07 6.5E-09 7.6E-09 7.6E-09 6.7E-09
 TE127 Class: W F1: 0.20000 08/18/88 19:30:10.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 2.1E-10 1.7E-08 2.8E-08 8.4E-08 9.3E-08 5.8E-10 6.5E-10 2.1E-10 2.9E-10 2.2E-10 2.1E-10
 H 70 2.9E-08 3.0E-09 4.9E-09 1.5E-08 1.8E-08 3.5E-10 4.0E-10 1.3E-10 1.5E-10 1.4E-10 1.3E-10
 TE123M Class: W F1: 0.20000 08/18/88 19:34:28.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 7.7E-09 1.0E-08 3.2E-08 1.1E-07 3.2E-07 1.7E-08 1.6E-07 6.7E-09 2.0E-08 8.9E-09 6.7E-09
 H 70 8.4E-07 1.7E-08 1.0E-08 5.6E-08 1.6E-07 1.0E-08 1.6E-07 6.0E-09 1.3E-08 1.4E-08 9.9E-09

DSFCT30.DAT

TE129M Class: W F1: 0.20000 08/18/88 19:41:20.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 1.1E-08 3.8E-08 9.0E-08 5.0E-07 1.7E-06 5.7E-07 2.4E-07 4.0E-05 1.7E-08 1.2E-08 8.7E-07 1.0E-08
 H 70 2.6E-08 2.8E-08 4.9E-08 2.4E-07 7.2E-07 4.8E-07 2.1E-07 3.4E-05 1.2E-08 1.2E-08 8.7E-07 8.2E-09
 TE129 Class: W F1: 0.20000 08/18/88 20:01:09.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 3.6E-11 2.8E-08 2.0E-08 1.3E-08 2.8E-09 5.7E-11 7.0E-11 4.2E-09 1.2E-10 4.6E-11 1.1E-05 1.6E-09
 H 70 1.1E-08 1.1E-09 7.7E-10 5.2E-10 1.2E-10 8.7E-11 7.0E-11 5.6E-09 3.7E-11 3.9E-11 1.1E-05 1.6E-09
 TE131M Class: W F1: 0.20000 08/18/88 20:12:54.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 3.7E-09 4.0E-08 1.1E-07 3.3E-07 5.7E-07 2.0E-08 1.7E-08 7.1E-07 5.1E-08 9.0E-09 2.8E-08 2.2E-08
 H 70 1.6E-07 1.8E-08 3.3E-08 9.3E-08 1.0E-07 1.7E-08 9.6E-09 4.0E-07 1.6E-08 5.8E-09 2.3E-08 9.7E-09
 TE131 Class: W F1: 0.20000 08/18/88 20:35:17.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 4.8E-11 2.3E-08 7.7E-09 2.4E-09 2.7E-10 3.3E-11 7.2E-11 5.2E-10 1.0E-10 5.6E-11 5.0E-07 8.6E-10
 H 70 5.3E-09 3.7E-10 1.2E-10 4.0E-11 1.4E-11 3.3E-11 4.0E-11 1.8E-09 1.8E-11 2.8E-11 5.3E-07 7.7E-10
 TE132 Class: W F1: 0.20000 08/18/88 20:47:26.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 1.3E-09 1.4E-08 3.2E-08 1.1E-07 2.4E-07 4.1E-08 8.6E-09 8.3E-07 1.0E-08 2.8E-09 2.9E-08 2.0E-07
 H 70 8.9E-08 6.1E-09 1.1E-08 3.7E-08 8.3E-08 3.0E-08 5.0E-09 4.4E-07 6.1E-09 2.3E-09 2.9E-08 2.0E-07
 TE133M Class: W F1: 0.20000 08/18/88 20:58:20.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 4.4E-10 4.7E-08 2.9E-08 1.9E-08 3.9E-09 3.4E-10 8.1E-10 4.0E-09 2.6E-09 8.7E-10 2.8E-07 3.7E-09
 H 70 1.4E-08 1.0E-09 9.8E-10 6.9E-10 1.9E-10 2.1E-10 2.7E-10 8.3E-09 1.6E-10 2.6E-10 1.8E-07 2.0E-09
 TE133 Class: W F1: 0.20000 08/18/88 21:21:43.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 5.6E-11 1.7E-08 3.1E-09 6.9E-10 1.1E-10 2.6E-11 5.6E-11 1.0E-10 1.1E-10 5.0E-11 7.7E-08 8.0E-10
 H 70 3.2E-09 1.6E-10 3.1E-11 1.3E-11 8.0E-12 1.9E-11 2.6E-11 7.4E-10 9.4E-12 2.2E-11 5.5E-08 5.9E-10
 TE134 Class: W F1: 0.20000 08/18/88 21:34:47.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 1.4E-10 1.0E-08 8.0E-09 4.6E-09 8.6E-10 1.1E-10 2.6E-10 8.4E-10 8.7E-10 1.9E-10 4.1E-08 4.4E-09
 H 70 4.1E-09 4.0E-10 2.1E-10 1.3E-10 4.0E-11 7.9E-11 8.0E-11 1.7E-09 4.0E-11 7.2E-11 2.5E-08 2.6E-09
 I 134 Class: D F1: 1.00000 08/18/88 21:42:19.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 1.1E-09 4.0E-08 1.6E-09 1.6E-09 1.3E-09 4.1E-09 4.1E-09 9.0E-10 1.1E-09 1.1E-09 3.1E-08 3.9E-09
 H 70 9.7E-09 4.9E-09 5.2E-10 5.2E-10 5.1E-10 1.9E-09 1.9E-09 4.0E-10 4.4E-10 5.5E-10 1.4E-08 1.7E-09
 CS134M Class: D F1: 1.00000 08/18/88 21:48:27.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 2.0E-10 7.7E-09 3.0E-10 2.0E-10 2.7E-10 1.2E-10 2.0E-10 2.0E-10 2.0E-10 2.0E-10 2.0E-10
 H 70 4.3E-09 1.1E-09 1.3E-10 1.2E-10 1.2E-10 6.1E-11 1.2E-10 1.1E-10 1.1E-10 1.2E-10 1.1E-10

DSFCT30.DAT

I 134 Class: D F1: 1.00000 08/18/88 21:58:35.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 7.8E-09 4.3E-08 8.4E-09 8.3E-09 9.9E-09 7.3E-08 2.5E-08 7.6E-09 8.4E-09 8.7E-09 2.3E-08 5.5E-08
 H 70 4.1E-08 9.4E-09 4.1E-09 4.1E-09 4.8E-09 3.6E-08 1.3E-08 3.8E-09 4.2E-09 5.0E-09 1.1E-08 2.7E-08
 I 135 Class: D F1: 1.00000 08/18/88 21:55:13.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 15
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Bladder
 Q 70 4.0E-09 3.9E-08 4.7E-09 4.5E-09 5.2E-09 2.6E-08 1.0E-08 4.3E-09 4.7E-09 4.3E-09 1.0E-08 3.5E-08
 H 70 3.8E-08 7.0E-09 2.1E-09 2.0E-09 2.3E-09 1.2E-08 8.6E-09 2.0E-09 2.1E-09 2.3E-09 4.8E-07 1.6E-08
 CS135 Class: D F1: 1.00000 08/18/88 22:05:22.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.3E-07 8.4E-08 1.4E-07 1.4E-07 1.4E-07 8.5E-08 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07
 H 70 1.4E-08 4.9E-08 8.6E-08 8.7E-08 8.8E-08 4.0E-08 8.2E-08 8.2E-08 8.2E-08 8.2E-08 8.2E-08
 CS138 Class: D F1: 1.00000 08/18/88 22:12:09.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 6.2E-10 5.1E-09 7.9E-10 8.8E-10 8.8E-10 2.8E-10 4.5E-10 4.4E-10 5.8E-10 5.8E-10 4.3E-10
 H 70 1.1E-08 5.3E-09 2.7E-10 2.8E-10 2.5E-10 1.6E-10 2.4E-10 2.0E-10 2.4E-10 2.9E-10 2.6E-10
 BA139 Class: D F1: 0.10000 08/18/88 22:19:28.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 2.2E-11 4.9E-08 3.9E-08 3.4E-08 7.8E-09 3.3E-11 5.9E-11 1.6E-11 1.1E-10 3.1E-11 1.3E-11
 H 70 1.7E-08 8.2E-09 5.0E-09 4.2E-09 1.0E-09 1.0E-10 2.0E-10 1.1E-10 1.2E-10 1.2E-10 1.1E-10
 BA140 Class: D F1: 0.10000 08/18/88 22:23:41.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 2.7E-09 3.8E-08 1.1E-07 5.2E-07 1.8E-08 3.7E-08 2.7E-08 7.9E-09 8.6E-08 8.9E-09 1.7E-09
 H 70 9.7E-08 1.1E-08 2.3E-08 8.3E-08 2.8E-07 1.5E-07 7.0E-08 8.2E-09 1.8E-08 9.8E-09 8.0E-09
 LA140 Class: D F1: 0.00100 08/18/88 22:34:33.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 2.9E-09 7.5E-08 2.1E-07 6.4E-07 1.2E-08 8.9E-09 2.0E-08 8.9E-09 9.6E-08 1.3E-08 4.5E-10 1.2E-08
 H 70 1.1E-07 2.5E-08 4.3E-08 1.1E-07 1.9E-07 2.9E-08 3.2E-08 9.1E-09 2.5E-08 1.4E-08 8.6E-09 2.5E-07
 CS136 Class: D F1: 1.00000 08/18/88 22:39:48.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 1.9E-07 2.2E-07 2.6E-07 2.4E-07 2.6E-07 7.5E-08 1.9E-07 2.3E-07 2.0E-07 1.9E-07 2.1E-07
 H 70 1.3E-07 1.2E-07 1.6E-07 1.5E-07 1.8E-07 4.6E-08 1.2E-07 1.4E-07 1.2E-07 1.1E-07 1.3E-07
 BA141 Class: D F1: 0.10000 08/18/88 22:45:47.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 7.6E-11 2.8E-08 1.3E-08 1.6E-08 8.2E-09 8.1E-11 1.0E-10 1.0E-11 2.1E-10 8.5E-11 1.3E-11
 H 70 7.8E-09 2.6E-09 1.6E-09 2.1E-09 1.2E-09 2.5E-10 1.2E-10 5.5E-11 7.5E-11 7.9E-11 7.0E-11
 LA141 Class: D F1: 0.00100 08/18/88 22:58:48.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 2.0E-11 6.6E-08 9.9E-08 1.0E-07 1.1E-07 4.5E-11 7.8E-11 2.3E-11 2.7E-10 5.2E-11 3.8E-12 9.1E-11
 H 70 4.3E-08 9.4E-09 1.4E-08 2.0E-08 1.5E-08 8.9E-09 2.5E-09 8.7E-10 7.2E-10 7.1E-10 8.8E-10 1.5E-08

DSFCT30.DAT

CE141 Class: Y F1: 0.00030 08/18/88 23:08:02.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Spleen
 G 70 1.0E-10 1.0E-08 4.1E-08 2.1E-07 6.1E-07 1.7E-09 2.4E-09 5.4E-10 7.5E-09 7.8E-10 1.3E-11 1.4E-09 1.3E-09
 H 70 1.1E-08 1.1E-08 1.9E-08 9.8E-08 2.8E-07 1.0E-08 6.0E-09 3.7E-10 3.7E-09 9.0E-09 1.7E-09 1.7E-08 1.5E-08
 BA142 Class: D F1: 0.10000 08/18/88 23:14:32.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.2E-10 1.4E-08 8.0E-09 8.0E-09 1.8E-09 8.7E-11 2.1E-10 5.7E-11 7.1E-10 1.8E-10 1.7E-11
 H 70 3.7E-09 1.4E-09 9.0E-10 8.8E-10 2.0E-10 8.0E-11 1.0E-10 4.6E-11 1.3E-10 9.3E-11 7.0E-11
 LA142 Class: D F1: 0.00100 08/18/88 23:21:49.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 8.2E-10 6.2E-08 5.0E-08 5.5E-08 1.0E-08 5.6E-10 1.5E-09 4.1E-10 5.3E-09 1.1E-09 8.5E-11 1.0E-09
 H 70 2.1E-08 8.5E-09 7.9E-09 7.4E-09 2.4E-09 8.4E-10 1.1E-09 5.1E-10 1.2E-09 8.3E-10 6.3E-10 2.0E-09
 CE143 Class: Y F1: 0.00030 08/18/88 23:28:16.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Spleen
 G 70 2.7E-10 3.9E-08 9.7E-08 9.9E-07 8.0E-07 1.2E-09 3.6E-09 1.1E-09 1.5E-08 1.7E-09 3.1E-11 1.0E-09 1.0E-09
 H 70 2.6E-07 1.4E-08 3.4E-08 1.4E-07 3.0E-07 1.1E-09 2.1E-09 4.1E-10 5.3E-09 1.1E-09 4.3E-10 3.3E-09 3.0E-09
 PR143 Class: Y F1: 0.00030 08/18/88 23:36:08.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 G 70 4.6E-13 2.5E-08 8.2E-08 3.6E-07 1.1E-08 7.4E-11 7.2E-11 4.0E-13 4.0E-13 4.0E-13 4.7E-13 5.0E-10 1.2E-10
 H 70 8.9E-07 1.1E-08 2.0E-08 1.0E-07 4.7E-07 1.0E-09 1.0E-09 6.5E-12 6.0E-12 6.5E-12 6.0E-12 8.1E-09 1.7E-09
 ND147 Class: Y F1: 0.00030 08/18/88 23:42:14.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.7E-10 2.5E-08 6.7E-08 3.3E-07 8.7E-07 1.0E-09 3.5E-09 9.0E-10 1.3E-08 1.3E-09 1.9E-11 1.4E-09
 H 70 7.2E-07 1.3E-08 3.0E-08 1.4E-07 3.9E-07 2.1E-08 6.2E-09 4.0E-10 5.7E-09 2.3E-09 1.2E-09 1.2E-08
 PM147 Class: Y F1: 0.00030 08/18/88 23:59:17.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.1E-13 4.0E-09 1.3E-08 7.3E-08 2.2E-07 1.8E-08 1.4E-09 1.3E-13 5.0E-13 1.5E-13 9.5E-14 4.0E-09
 H 70 5.0E-08 2.5E-09 6.5E-09 3.0E-08 1.2E-07 1.2E-08 1.0E-07 6.0E-12 7.2E-12 9.0E-12 7.0E-12 3.3E-07
 SM147 Class: W F1: 0.00030 08/19/88 00:10:11.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 6.9E-11 3.0E-08 9.1E-08 5.3E-07 1.0E-08 5.0E-05 4.0E-08 6.0E-11 6.0E-11 6.0E-11 6.0E-11 1.4E-05
 H 70 5.0E-04 4.5E-08 7.1E-08 2.0E-07 8.3E-07 1.9E-02 1.5E-03 2.7E-08 2.7E-08 2.7E-08 2.7E-08 5.3E-03
 PM148M Class: Y F1: 0.00030 08/19/88 00:18:10.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 3.1E-09 5.5E-08 1.0E-07 4.1E-07 9.5E-07 1.2E-08 3.1E-08 1.5E-08 1.5E-07 1.9E-08 4.5E-10 1.0E-08
 H 70 2.4E-08 1.3E-07 1.0E-07 2.1E-07 4.5E-07 9.1E-08 9.0E-08 8.0E-09 8.0E-08 8.2E-08 6.9E-08 1.7E-07
 PM148 Class: Y F1: 0.00030 08/19/88 00:29:00.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 8.4E-10 6.7E-08 1.0E-07 8.3E-07 2.2E-06 2.4E-09 6.0E-09 3.0E-09 3.3E-08 4.3E-09 1.3E-10 4.0E-09
 H 70 9.3E-07 3.3E-08 7.5E-08 3.5E-07 9.3E-07 4.9E-09 7.4E-09 1.4E-09 1.5E-08 4.9E-09 2.0E-09 1.3E-08

DSFCT30.DAT

PM149 Class: Y F1: 0.00030 08/19/88 00:34:53.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 1.2E-11 2.9E-08 7.0E-08 3.5E-07 8.4E-07 8.9E-11 1.6E-10 5.4E-11 8.5E-10 7.3E-11 1.7E-12 1.3E-10
 H 70 2.1E-07 1.1E-08 2.6E-08 1.3E-07 3.2E-07 3.6E-10 3.9E-10 2.7E-11 2.0E-10 8.2E-11 2.9E-11 1.1E-09
 SM153 Class: W F1: 0.00030 08/19/88 00:40:18.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 5.1E-11 2.3E-08 5.7E-08 2.7E-07 6.7E-07 5.9E-10 1.9E-09 2.6E-10 5.1E-09 4.9E-10 2.0E-12 4.1E-10
 H 70 1.4E-07 7.6E-09 1.8E-08 8.3E-08 1.0E-07 1.1E-08 4.9E-09 1.9E-10 1.7E-09 4.8E-10 2.0E-10 1.3E-08
 EU156 Class: W F1: 0.00100 08/19/88 00:45:48.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 G 70 2.3E-09 5.6E-08 1.7E-07 5.9E-07 1.6E-06 8.2E-09 1.8E-08 8.2E-09 8.0E-08 1.1E-08 3.7E-10 1.3E-08 1.1E-08
 H 70 1.2E-08 5.2E-08 7.9E-08 2.5E-07 8.8E-07 1.9E-07 7.0E-08 7.1E-09 4.2E-08 2.5E-08 1.5E-08 9.1E-08 2.6E-07
 GD153 Class: D F1: 0.00030 08/19/88 00:52:14.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 G 70 1.5E-10 6.0E-09 2.2E-08 7.3E-08 1.9E-07 5.5E-09 5.7E-09 7.3E-10 1.4E-08 1.3E-09 1.5E-11 1.2E-09 1.9E-09
 H 70 9.2E-08 4.6E-08 4.7E-08 7.3E-08 5.8E-08 8.1E-08 7.2E-07 1.4E-08 2.9E-08 4.6E-08 1.9E-08 1.3E-07 1.8E-08
 TB160 Class: W F1: 0.00030 08/19/88 00:59:05.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 G 70 1.9E-09 4.3E-08 1.3E-07 4.1E-07 1.1E-06 1.1E-08 1.8E-08 7.1E-09 8.2E-08 1.0E-08 3.0E-10 1.1E-08 9.4E-09
 H 70 2.0E-06 9.2E-08 9.5E-08 2.3E-07 5.0E-07 1.7E-06 3.0E-07 1.8E-08 6.3E-08 6.5E-08 4.4E-08 1.4E-07 6.3E-07
 HO160M Class: W F1: 0.00030 08/17/88 17:55:37.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Pancreas
 G 70 1.3E-08 6.1E-08 1.7E-07 3.4E-07 7.9E-07 1.4E-07 5.3E-08 1.5E-08 1.4E-07 2.3E-08 3.3E-09 1.2E-07 1.8E-07
 H 70 6.5E-06 5.2E-06 2.9E-06 4.0E-06 1.9E-06 5.0E-05 9.0E-06 8.7E-07 1.7E-06 2.7E-06 1.2E-06 4.1E-05 8.5E-05
 W 181 Class: D F1: 0.30000 08/17/88 18:02:31.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 16 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver Spleen
 G 70 3.0E-10 2.2E-09 5.4E-09 1.4E-08 3.6E-08 3.3E-09 3.5E-09 3.3E-10 3.6E-09 5.7E-10 1.4E-10 5.2E-09 1.4E-09 4.6E-09
 H 70 3.6E-09 7.9E-10 1.1E-09 2.4E-09 5.6E-09 4.9E-09 3.6E-09 2.1E-10 8.3E-10 4.8E-10 2.6E-10 8.2E-09 2.2E-09 7.3E-09
 W 185 Class: D F1: 0.30000 08/17/88 18:09:28.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 16 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver Spleen
 G 70 1.9E-10 1.0E-08 1.8E-08 1.1E-07 3.1E-07 1.1E-08 3.7E-09 1.9E-10 2.0E-10 1.9E-10 1.9E-10 2.0E-08 5.1E-09 2.4E-08
 H 70 2.6E-08 1.7E-09 2.6E-09 1.0E-08 4.7E-08 1.0E-08 6.2E-09 3.2E-10 3.3E-10 3.2E-10 3.2E-10 4.7E-08 8.5E-09 4.0E-08
 W 187 Class: D F1: 0.30000 08/17/88 18:18:23.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 16 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver Spleen
 G 70 9.1E-10 3.0E-08 5.4E-08 1.8E-07 3.2E-07 5.7E-09 4.2E-09 1.7E-09 1.4E-08 2.2E-09 5.8E-10 6.2E-09 3.1E-09 5.3E-09
 H 70 4.1E-08 5.3E-09 8.5E-09 2.7E-08 4.8E-08 7.4E-09 2.5E-09 1.0E-09 2.6E-09 1.3E-09 1.0E-09 6.5E-09 3.1E-09 5.9E-09
 RE187 Class: W F1: 0.00000 08/17/88 18:25:27.6 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 22 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid S Wall Liver
 G 70 2.8E-11 1.5E-09 4.3E-11 1.7E-10 5.0E-10 1.4E-11 2.0E-11 2.0E-11 2.0E-11 2.0E-11 7.4E-10 1.5E-09 3.0E-11
 H 70 7.2E-09 9.7E-10 2.3E-11 8.8E-11 2.5E-10 9.0E-12 1.0E-11 1.8E-11 1.0E-11 1.0E-11 4.7E-10 9.7E-10 2.4E-11

DSFCT30.DAT

OS185 Class: D F1: 0.01000 08/17/88 18:32:07.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 3.8E-09 2.0E-08 8.1E-08 1.0E-07 2.0E-07 6.1E-09 1.5E-08 7.3E-09 5.9E-08 8.8E-09 2.0E-09 1.7E-08 1.8E-08 1.4E-08
 H 70 1.2E-07 1.4E-07 1.4E-07 1.6E-07 1.3E-07 9.0E-08 1.1E-07 1.0E-07 9.5E-08 1.0E-07 8.4E-08 6.8E-07 4.8E-07 4.1E-07
 OS191 Class: D F1: 0.01000 08/17/88 18:39:02.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 3.6E-10 1.3E-08 3.5E-08 1.6E-07 4.0E-07 1.1E-09 3.4E-09 7.7E-10 8.2E-09 1.1E-09 2.5E-10 3.6E-09 4.2E-09 3.5E-09
 H 70 3.1E-08 1.1E-08 1.4E-08 3.3E-08 7.7E-08 9.6E-09 1.3E-08 1.1E-08 1.3E-08 1.2E-08 1.1E-08 1.3E-07 1.5E-07 1.3E-07
 IR192 Class: Y F1: 0.01000 08/17/88 18:45:39.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 Q 70 4.7E-09 3.9E-08 1.1E-07 3.6E-07 9.1E-07 6.9E-09 1.7E-08 9.1E-09 7.3E-08 1.1E-08 2.8E-09 3.1E-08 3.5E-08 2.8E-08
 H 70 3.5E-06 9.1E-06 6.3E-06 1.0E-07 4.3E-07 4.8E-08 6.2E-08 8.7E-09 4.1E-08 6.7E-08 4.3E-08 1.2E-07 8.8E-08 1.1E-07
 HG203 Class: D F1: 1.00000 08/17/88 18:52:35.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 21 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Brain Kidneys
 Q 70 8.6E-08 9.3E-08 1.1E-07 1.1E-07 9.8E-08 6.8E-08 1.0E-07 8.0E-08 9.5E-08 8.8E-08 9.1E-08 8.1E-07 1.3E-06
 H 70 4.4E-08 5.2E-08 6.8E-08 6.5E-08 6.0E-08 4.1E-08 6.2E-08 4.9E-08 5.8E-08 6.3E-08 6.5E-08 4.9E-07 8.0E-07
 U 232 Class: Y F1: 0.00200 08/17/88 19:02:30.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 16
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 Q 70 2.2E-08 1.1E-07 2.6E-07 1.3E-08 3.9E-08 1.4E-05 9.1E-07 2.2E-08 2.2E-08 2.1E-08 2.1E-08 4.0E-08
 H 70 8.3E-02 1.9E-05 1.2E-06 2.1E-06 4.0E-06 3.5E-04 2.3E-05 9.4E-07 1.0E-08 1.5E-08 1.4E-08 1.0E-04
 TH232 Class: Y F1: 0.00020 08/17/88 20:28:00.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 8.4E-08 1.6E-07 2.4E-07 1.0E-08 3.0E-08 9.0E-04 7.2E-05 8.2E-08 8.4E-08 8.4E-08 8.1E-08 6.7E-07
 H 70 4.8E-02 3.6E-05 3.5E-05 3.5E-05 3.7E-05 2.2E-01 1.8E-02 3.6E-05 3.8E-05 3.8E-05 3.5E-05 2.9E-04
 RA228 Class: W F1: 0.20000 08/17/88 21:35:30.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 4.6E-08 4.3E-08 1.1E-07 4.3E-07 1.5E-08 3.4E-04 3.4E-05 4.3E-08 9.1E-08 5.4E-08 3.3E-08
 H 70 4.7E-04 1.0E-07 1.4E-07 3.7E-07 9.4E-07 3.6E-04 3.7E-05 7.4E-08 1.1E-07 1.3E-07 1.1E-07
 AC228 Class: Y F1: 0.00100 08/17/88 22:31:14.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 6.2E-10 4.3E-08 7.9E-08 1.7E-07 1.3E-07 2.0E-07 1.9E-08 3.0E-09 1.0E-08 1.8E-09 8.8E-11 5.6E-08
 H 70 1.7E-05 8.0E-09 1.3E-08 2.9E-08 2.4E-08 3.7E-08 3.0E-07 4.0E-08 1.8E-09 8.7E-10 5.4E-10 9.8E-07
 TH228 Class: Y F1: 0.00020 08/17/88 23:03:50.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.0E-07 2.6E-07 4.3E-07 2.2E-08 9.4E-08 1.6E-04 1.3E-05 1.8E-07 1.8E-07 1.6E-07 1.6E-07 1.4E-06
 H 70 4.5E-02 1.6E-05 1.6E-05 1.7E-05 2.1E-05 1.4E-02 1.2E-03 1.6E-05 1.5E-05 1.6E-05 1.5E-05 1.3E-04
 RA224 Class: W F1: 0.20000 08/17/88 23:31:40.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 Q 70 6.1E-07 9.1E-07 1.3E-08 4.8E-08 1.3E-05 2.2E-05 1.9E-08 8.1E-07 8.8E-07 8.0E-07 8.0E-07
 H 70 4.4E-04 5.9E-07 7.4E-07 2.1E-08 5.0E-08 1.8E-05 1.4E-08 4.6E-07 4.8E-07 4.5E-07 4.5E-07

DSFCT30.DAT

PB212 Class: D F1: 0.20000 00/17/80 23:40:40.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 Q 70 1.2E-07 2.0E-07 4.0E-07 1.2E-06 1.4E-06 1.8E-06 1.2E-06 1.2E-07 1.4E-07 1.2E-07 1.1E-07 1.7E-06 9.8E-07
 H 70 1.3E-06 2.6E-07 2.8E-07 3.9E-07 4.2E-07 2.8E-06 2.5E-06 2.4E-07 2.4E-07 2.4E-07 2.4E-07 3.7E-06 2.0E-06
 BI212 Class: W F1: 0.05000 00/17/80 23:55:31.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 16
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 Q 70 7.4E-10 1.1E-07 7.9E-08 5.0E-08 9.8E-09 2.7E-09 1.1E-09 6.2E-10 2.0E-09 8.0E-10 5.4E-10 8.4E-08
 H 70 2.7E-06 7.0E-09 6.5E-09 5.0E-09 4.2E-09 1.7E-08 4.7E-09 3.4E-09 3.5E-09 3.5E-09 3.5E-09 5.5E-07
 PU236 Class: Y F1: 0.00010 00/17/80 23:59:20.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 8.1E-11 9.3E-08 2.4E-07 1.4E-06 4.2E-06 1.4E-05 1.1E-05 1.6E-07 3.1E-10 8.0E-11 5.9E-11 3.5E-06
 H 70 1.0E-02 6.2E-08 1.4E-07 7.2E-07 2.2E-06 3.1E-03 2.4E-04 3.4E-05 1.4E-06 1.5E-06 1.3E-06 7.7E-04
 PU237 Class: Y F1: 0.00010 00/18/80 00:05:41.3 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 5.4E-11 2.7E-09 8.0E-09 2.8E-08 7.2E-08 6.3E-10 1.7E-09 3.1E-10 5.0E-09 4.9E-10 2.7E-12 4.0E-10
 H 70 2.4E-07 4.2E-09 4.3E-09 1.3E-08 3.3E-08 9.2E-09 5.0E-09 2.6E-10 2.5E-09 2.7E-09 1.5E-09 6.9E-09
 AM242M Class: W F1: 0.00100 00/18/80 00:14:01.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 8.0E-10 5.2E-09 1.9E-08 1.7E-07 6.0E-07 8.7E-04 7.1E-05 1.1E-05 2.2E-09 6.1E-10 1.7E-10 1.0E-04
 H 70 2.7E-04 6.3E-06 7.0E-08 2.1E-07 5.0E-07 1.0E-01 8.3E-03 1.3E-03 3.5E-08 6.5E-08 2.8E-08 1.9E-02
 AM242 Class: W F1: 0.00100 00/18/80 01:02:51.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.1E-11 1.4E-06 3.1E-08 1.2E-07 1.8E-07 9.9E-08 8.3E-09 1.1E-09 7.2E-10 6.7E-11 1.8E-12 2.0E-08
 H 70 3.3E-08 3.5E-09 7.4E-09 2.8E-08 4.5E-08 1.0E-05 8.5E-07 1.2E-07 3.3E-10 2.0E-10 1.7E-10 2.7E-06
 CM242 Class: W F1: 0.00100 00/18/80 01:35:31.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 6.3E-10 1.0E-07 2.4E-07 1.4E-06 4.4E-06 2.9E-05 2.4E-05 3.8E-07 8.7E-10 6.4E-10 6.3E-10 7.0E-06
 H 70 9.9E-04 1.1E-07 1.0E-07 7.2E-07 2.1E-06 3.1E-03 2.5E-04 3.4E-05 6.0E-08 6.0E-08 6.0E-08 8.0E-04
 PU242 Class: Y F1: 0.00010 00/18/80 02:00:07.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 5.5E-11 8.1E-08 1.9E-07 1.2E-06 3.0E-06 8.3E-05 6.0E-06 1.0E-06 2.7E-10 6.0E-11 5.1E-11 1.0E-05
 H 70 1.8E-02 6.9E-08 1.3E-07 6.0E-07 2.0E-06 3.5E-02 2.9E-03 4.4E-04 2.3E-08 2.7E-08 2.3E-08 6.0E-03
 NP230 Class: W F1: 0.00100 00/18/80 02:15:22.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 7.2E-10 8.0E-08 8.0E-08 3.0E-07 6.5E-07 1.1E-07 1.4E-08 2.9E-09 2.7E-08 3.4E-09 1.1E-10 7.0E-09
 H 70 2.3E-07 1.2E-08 2.0E-08 9.5E-08 2.1E-07 1.2E-05 9.7E-07 7.9E-08 9.1E-09 2.9E-09 1.7E-09 5.5E-07
 CM244 Class: W F1: 0.00100 00/18/80 02:26:54.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 6.2E-10 9.4E-08 2.4E-07 1.4E-06 4.2E-06 5.4E-04 4.4E-05 6.5E-05 8.5E-10 6.2E-10 6.0E-10 1.1E-04
 H 70 1.3E-03 1.2E-07 1.9E-07 7.3E-07 2.1E-06 6.2E-02 5.1E-03 7.5E-04 7.2E-08 7.2E-08 7.0E-08 1.3E-02

DSFCT30.DAT

PU244 Class: Y F1: 0.00010 00/10/00 02:51:27.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 2.1E-09 9.0E-08 2.5E-07 1.7E-06 5.9E-06 8.3E-05 0.7E-06 1.1E-06 3.3E-08 4.9E-09 0.3E-10 1.0E-05
 H 70 1.7E-02 1.3E-06 8.3E-07 1.9E-06 3.8E-06 3.5E-02 2.0E-03 4.4E-04 4.2E-07 1.0E-08 6.5E-07 6.7E-03
 U 240 Class: Y F1: 0.00200 00/10/00 03:07:59.1 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 16
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 Q 70 2.7E-10 6.7E-08 1.4E-07 5.0E-07 7.0E-07 7.0E-10 1.9E-09 7.0E-10 9.0E-09 1.1E-09 4.1E-11 1.9E-09
 H 70 1.7E-07 1.0E-08 3.7E-08 1.3E-07 1.8E-07 9.7E-10 8.8E-10 2.0E-10 2.4E-09 8.2E-10 2.8E-10 1.4E-09
 CM245 Class: W F1: 0.00100 00/10/00 03:17:29.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 4.5E-09 9.7E-08 2.4E-07 1.4E-06 4.1E-06 9.2E-04 7.5E-05 1.2E-05 1.1E-08 3.0E-09 1.7E-09 1.0E-04
 H 70 1.2E-03 4.1E-07 4.0E-07 1.1E-06 2.2E-06 1.1E-01 8.7E-03 1.4E-03 2.8E-07 3.5E-07 2.0E-07 2.0E-02
 CM246 Class: W F1: 0.00100 00/10/00 03:34:45.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.6E-09 9.1E-08 2.3E-07 1.3E-06 4.0E-06 9.5E-04 7.4E-05 1.2E-05 4.6E-09 2.3E-09 1.1E-09 1.7E-04
 H 70 1.2E-03 2.4E-07 2.9E-07 0.2E-07 2.1E-06 1.1E-01 8.6E-03 1.4E-03 1.3E-07 2.2E-07 1.3E-07 2.0E-02
 CM247 Class: W F1: 0.00100 00/10/00 03:43:44.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.4E-08 1.0E-07 2.6E-07 1.4E-06 4.3E-06 8.7E-04 6.9E-05 1.1E-05 3.0E-08 1.3E-08 6.5E-09 1.6E-04
 H 70 1.1E-03 1.2E-06 1.3E-06 2.2E-06 2.8E-06 1.0E-01 8.0E-03 1.3E-03 7.1E-07 1.1E-06 7.0E-07 1.9E-02
 CM243 Class: W F1: 0.00100 00/10/00 07:10:49.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 4.4E-09 1.1E-07 2.7E-07 1.5E-06 4.7E-06 6.5E-04 5.3E-05 8.0E-06 1.5E-08 4.3E-09 1.9E-09 1.4E-04
 H 70 1.3E-03 4.2E-07 4.9E-07 1.2E-06 2.5E-06 7.0E-02 6.1E-03 9.3E-04 2.4E-07 3.5E-07 2.2E-07 1.0E-02
 PU243 Class: Y F1: 0.00010 00/10/00 16:38:14.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.0E-11 1.2E-08 2.0E-08 4.0E-08 2.7E-08 4.6E-11 1.2E-10 1.1E-11 3.1E-10 4.0E-11 4.0E-13 4.0E-11
 H 70 1.4E-08 1.0E-09 2.8E-09 5.7E-09 3.0E-09 2.9E-09 2.0E-10 3.0E-11 4.0E-11 1.8E-11 7.4E-12 5.7E-10
 AM243 Class: W F1: 0.00100 00/10/00 16:57:39.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.0E-08 9.8E-08 2.4E-07 1.3E-06 4.2E-06 9.1E-04 7.2E-05 1.2E-05 1.0E-08 7.7E-09 3.6E-09 1.7E-04
 H 70 1.2E-03 8.8E-07 9.3E-07 1.7E-06 2.7E-06 1.1E-01 8.4E-03 1.3E-03 4.0E-07 7.0E-07 4.2E-07 2.0E-02
 NP239 Class: W F1: 0.00100 00/10/00 17:14:39.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 1.7E-10 2.4E-08 6.2E-08 2.7E-07 6.2E-07 2.5E-09 3.3E-09 0.0E-10 1.2E-08 1.2E-09 1.4E-11 1.1E-09
 H 70 1.0E-07 0.7E-09 2.0E-08 0.0E-08 2.0E-07 1.3E-07 1.4E-08 1.4E-09 4.0E-09 1.1E-09 5.3E-10 9.0E-09
 CM240 Class: W F1: 0.00100 00/10/00 17:24:16.0 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 3.4E-07 1.1E-06 2.0E-06 7.1E-06 2.0E-05 3.4E-03 2.7E-04 4.1E-05 1.4E-06 6.1E-07 2.0E-07 6.3E-04
 H 70 4.4E-03 4.8E-05 4.2E-05 5.3E-05 3.3E-05 3.9E-01 3.1E-02 4.0E-03 2.2E-05 5.3E-05 2.3E-05 7.3E-02

DSFCT30.DAT

CF262 Class: W F1: 0.00100 08/18/88 17:30:49.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 3.1E-08 3.8E-07 1.1E-06 3.7E-06 1.1E-05 8.9E-04 3.1E-05 3.1E-06 5.7E-07 1.0E-07 1.8E-08 3.7E-06
 H 70 2.6E-03 3.2E-06 2.9E-06 4.5E-06 7.1E-06 4.4E-02 3.5E-03 3.4E-04 1.7E-06 4.3E-06 2.2E-06 4.2E-03
 SI31 Class: W F1: 0.01000 08/29/88 17:30:24.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 5.0E-12 3.9E-06 4.7E-08 6.7E-08 2.7E-08 3.0E-12 8.2E-12 5.6E-12 8.4E-12 8.0E-12 5.4E-12
 H 70 2.4E-08 2.9E-09 3.6E-09 5.0E-09 2.1E-09 4.4E-11 8.0E-11 8.7E-11 8.7E-11 8.7E-11 8.8E-11
 QA72 Class: W F1: 0.00100 08/29/88 17:34:35.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Spleen
 G 70 2.3E-09 6.9E-06 1.0E-07 4.2E-07 5.1E-07 4.5E-09 1.3E-08 5.3E-09 5.0E-08 8.4E-09 3.6E-10 8.9E-09 9.6E-09
 H 70 1.1E-07 1.9E-08 3.6E-08 9.2E-08 1.1E-07 4.3E-09 6.0E-09 2.2E-09 1.4E-08 4.7E-09 2.8E-09 7.0E-09 7.6E-09
 SR07M Class: D F1: 0.00000 08/29/88 17:39:23.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.5E-10 6.7E-09 7.6E-09 1.0E-08 4.4E-09 1.8E-10 4.3E-10 1.2E-10 1.5E-09 2.9E-10 5.8E-11
 H 70 3.0E-09 1.0E-09 1.1E-09 1.5E-09 6.7E-10 1.5E-10 2.1E-10 1.1E-10 2.9E-10 1.7E-10 1.3E-10
 SN113 Class: W F1: 0.02000 08/29/88 17:45:33.2 ChronicSv per 70 yr/Bq/yr for 70 yr
 11 1 3 4 5 6 7 8 11 12 13 14
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid
 G 70 1.8E-09 9.8E-09 4.5E-08 1.9E-07 5.0E-07 1.0E-08 1.3E-08 3.3E-09 2.7E-08 3.9E-09 1.5E-09
 H 70 1.2E-08 2.6E-08 3.2E-08 1.0E-07 2.6E-07 8.8E-08 5.2E-08 8.2E-09 2.1E-08 2.0E-08 1.5E-08
 IN113M Class: D F1: 0.02000 08/29/88 17:57:32.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys Spleen
 G 70 8.6E-11 9.4E-09 9.2E-09 9.0E-09 2.5E-09 7.3E-11 2.0E-10 3.2E-11 7.0E-10 1.4E-10 7.0E-12 1.8E-10 2.7E-10 3.4E-10
 H 70 3.4E-09 1.3E-09 1.2E-09 1.2E-09 3.7E-10 1.2E-10 1.3E-10 6.5E-11 1.5E-10 1.0E-10 7.9E-11 2.3E-10 2.0E-10 1.9E-10
 SB122 Class: W F1: 0.01000 08/29/88 18:02:15.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 G 70 8.8E-10 5.3E-08 1.3E-07 8.2E-07 1.4E-06 2.3E-09 5.7E-09 2.5E-09 2.8E-08 3.2E-09 2.2E-10 3.4E-09
 H 70 3.9E-07 2.0E-06 4.5E-06 2.1E-07 4.7E-07 5.8E-09 7.0E-09 2.1E-09 9.8E-09 3.5E-09 2.4E-09 1.0E-08
 PR142 Class: Y F1: 0.00030 08/29/88 18:07:57.7 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Kidneys
 G 70 5.8E-11 6.3E-08 1.4E-07 5.5E-07 9.2E-07 1.2E-10 3.4E-10 1.3E-10 1.4E-09 2.2E-10 9.0E-12 2.8E-10 3.3E-10
 H 70 2.0E-07 1.8E-08 4.0E-08 1.6E-07 2.7E-07 2.2E-10 2.8E-10 5.2E-11 4.4E-10 1.3E-10 5.5E-11 1.1E-09 5.5E-10
 EJ152M Class: W F1: 0.00100 08/29/88 18:13:15.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 G 70 2.0E-10 4.3E-08 8.3E-08 2.4E-07 2.5E-07 4.2E-10 1.2E-09 3.8E-10 5.2E-09 7.5E-10 2.6E-11 1.2E-09 8.3E-10
 H 70 6.8E-08 7.8E-09 1.5E-08 4.2E-08 4.6E-08 1.4E-09 1.4E-09 2.1E-10 1.1E-09 4.5E-10 3.1E-10 2.8E-09 3.5E-09
 QD150 Class: D F1: 0.00030 08/29/88 18:18:26.8 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 G 70 3.8E-11 2.5E-08 5.5E-08 2.1E-07 3.3E-07 1.8E-10 5.7E-10 1.3E-10 2.1E-09 2.3E-10 3.8E-12 3.0E-10 2.2E-10
 H 70 3.6E-08 3.9E-09 8.2E-09 3.1E-08 4.8E-08 1.4E-08 7.7E-09 4.7E-10 7.0E-10 5.5E-10 4.8E-10 8.9E-09 1.6E-08

DSFCT30.DAT

TB181 Class: W F1: 0.00030 08/29/88 18:23:56.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys Liver
 Q 70 2.7E-11 1.7E-08 4.3E-08 2.3E-07 0.2E-07 1.1E-09 1.7E-09 2.1E-10 4.6E-09 3.7E-10 8.6E-13 3.7E-10 3.1E-10
 H 70 2.8E-07 7.0E-09 1.6E-08 8.5E-08 2.3E-07 1.5E-07 1.4E-08 1.8E-10 1.8E-09 6.5E-10 2.1E-10 1.4E-08 2.2E-08
 HD186 Class: W F1: 0.00030 08/29/88 18:30:04.9 ChronicSv per 70 yr/Bq/yr for 70 yr
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver Pancreas
 Q 70 2.9E-11 5.5E-08 1.3E-07 5.6E-07 1.1E-08 1.5E-10 4.3E-10 8.8E-11 1.3E-09 1.5E-10 4.2E-12 1.9E-10 3.2E-10
 H 70 2.2E-07 1.5E-08 3.4E-08 1.5E-07 2.9E-07 6.9E-09 4.8E-09 2.3E-10 5.5E-10 3.0E-10 2.3E-10 1.5E-08 3.3E-08
 ER189 Class: W F1: 0.00030 08/29/88 18:35:35.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 8.1E-13 8.5E-09 2.1E-08 1.2E-07 3.3E-07 5.2E-10 4.2E-11 8.1E-13 1.2E-12 8.1E-13 8.1E-13 1.1E-11
 H 70 1.8E-07 3.4E-09 8.1E-09 4.6E-08 1.3E-07 1.3E-07 1.1E-08 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.9E-09
 ER171 Class: W F1: 0.00030 08/29/88 18:41:52.4 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 17
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Liver
 Q 70 2.8E-10 3.5E-08 8.8E-08 1.7E-07 1.6E-07 5.9E-10 1.8E-09 4.0E-10 6.7E-09 6.5E-10 1.8E-11 9.9E-10
 H 70 4.7E-08 5.9E-09 1.1E-08 2.6E-08 2.4E-08 2.5E-09 1.5E-09 1.9E-10 1.2E-09 4.8E-10 2.8E-10 8.7E-10
 YA182 Class: Y F1: 0.00100 08/29/88 18:46:58.5 ChronicSv per 70 yr/Bq/yr for 70 yr
 12 1 3 4 5 6 7 8 11 12 13 14 16
 Lung Stomach S Int. UL Int. LL Int. Bone SurR MarrowTestes Ovaries Muscle Thyroid Kidneys
 Q 70 2.4E-09 4.3E-08 1.4E-07 3.8E-07 9.7E-07 8.1E-09 2.1E-08 8.2E-09 9.2E-08 1.2E-08 8.4E-10 1.5E-08
 H 70 5.5E-06 1.8E-07 9.2E-08 2.2E-07 4.7E-07 1.8E-07 1.3E-07 9.1E-09 6.0E-08 1.2E-07 1.0E-07 1.1E-07

DSFCT30.DAT

ISOLIB.DAT

100	20	PHOTON ATTENUATION LIBRARY 20 SHIELD MATERIALS								12-Jul-88 RAP		
H2O	11	3.5694	.5280	.2900	.2280	.2040	.1910	.1828	.1723	.1698	4	6 1
	12	.1500	.1275	.1130	.1015	.0832	.0775	.0705	.0635	.0508		2
	13	.0537	.0505	.0480	.0457	.0436	.0418	.0395				3
TISSUE	21	2.5497	.4690	.2920	.2320	.2060	.1910	.1800	.1720	.1660	4	6 4
	22	.1455	.1225	.1080	.0995	.0835	.0750	.0685	.0615	.0555		5
	23	.0520	.0493	.0465	.0443	.0425	.0418	.0395				6
AIR	31	3.4220	.5060	.2710	.2100	.1860	.1738	.1653	.1585	.1535	7	14 7
	32	.1334	.1140	.1015	.0915	.0865	.0695	.0635	.0573	.0515		8
	33	.0478	.0450	.0425	.0407	.0387	.0370	.0339				9
H	41	.3770	.3630	.3510	.3400	.3305	.3223	.3128	.3053	.2978	1	110
	42	.2650	.2440	.1975	.1750	.1570	.1385	.1260	.1125	.1025		11
	43	.0950	.0892	.0835	.0800	.0765	.0730	.0688				12
LITHIUM	51	.2680	.1720	.1580	.1510	.1455	.1410	.1370	.1333	.1298	3	713
	52	.1150	.0990	.0880	.0775	.0685	.0605	.0550	.0505	.0447		14
	53	.0420	.0390	.0375	.0360	.0350	.0335	.0304				15
CARBON	61	1.4520	.3055	.2110	.1855	.1735	.1660	.1600	.1550	.1510	6	1216
	62	.1350	.1150	.1015	.0915	.0865	.0695	.0635	.0573	.0515		17
	63	.0478	.0450	.0425	.0407	.0387	.0370	.0339				18
AL	71	17.907	2.1100	.7610	.4055	.3555	.2308	.2003	.1788	.1663	13	2719
	72	.1340	.1280	.0990	.0868	.0755	.0676	.0615	.0553	.0498		20
	73	.0467	.0438	.0414	.0390	.0375	.0365	.0357				21
TI	81	37.000	10.617	3.6200	1.7050	.9800	.6698	.4893	.3673	.3038	22	4822
	82	.1630	.1200	.0970	.0840	.0730	.0640	.0585	.0530	.0478		23
	83	.0455	.0435	.0410	.0400	.0390	.0375	.0350				24
IRON	91	44.165	12.277	5.685	2.635	1.455	.9710	.6930	.5023	.3988	26	5625
	92	.2040	.1370	.0998	.0875	.0720	.0637	.0588	.0513	.0470		26
	93	.0446	.0415	.0402	.0381	.0378	.0366	.0355				27
NICKEL	101	47.543	13.170	7.535	3.500	1.970	1.316	.9265	.6603	.5168	28	5928
	102	.2210	.1400	.1100	.0880	.0780	.0680	.0614	.0610	.0500		29
	103	.0485	.0445	.0430	.0420	.0410	.0380	.0372				30
ZR	111	47.267	12.190	10.71	7.342	4.559	2.999	2.082	1.510	1.1354	0	9131
	112	.3780	.1950	.1200	.0905	.0750	.0640	.0579	.0540	.0468		32
	113	.0440	.0425	.0405	.0400	.0395	.0380	.0363				33
SN	121	87.223	13.670	8.748	8.166	6.125	4.607	3.273	2.399	1.8155	01	1934
	122	.6400	.2200	.1300	.0935	.0720	.0620	.0550	.0490	.0445		35
	123	.0415	.0405	.0390	.0380	.0365	.0365	.0360				36
W	131	94.667	36.000	12.890	6.230	3.485	3.016	3.313	3.241	3.1347	41	8437
	132	1.477	.4399	.2750	.1450	.0950	.0775	.0655	.0600	.0498		38
	133	.0480	.0450	.0440	.0435	.0430	.0420	.0408				39
LEAD	141	72.317	47.750	17.000	8.115	4.640	3.077	2.133	2.211	2.5168	22	0740
	142	1.379	.5590	.3065	.1775	.1280	.0875	.0726	.0618	.0534		41
	143	.0488	.0463	.0443	.0428	.0419	.0413	.0411				42
URANIUM	151	95.850	51.550	23.100	11.050	6.260	4.105	2.850	1.988	1.5039	22	3843
	152	2.116	.7174	.3880	.2275	.1370	.0995	.0815	.0670	.0560		44
	153	.0515	.0483	.0462	.0450	.0441	.0436	.0432				45
ORDCONC	161	21.533	3.506	.9744	.6748	.4345	.3315	.2703	.2280	.2046	10	1946

ISOLIB.DAT

CONCRET	162	.1780	.1280	.0990	.0890	.0860	.0750	.0637	.0610	.0550	47
	163	.0520	.0460	.0440	.0430	.0410	.0395	.0336			48
HVYCONC	171	28.073	7.901	2.994	1.364	.7915	.5368	.3891	.2877	.232512	2449
CONCRET	172	.1800	.1220	.0945	.0870	.0830	.0750	.0618	.0600	.0550	50
	173	.0520	.0470	.0430	.0420	.0410	.0395	.0364			51
STRONT	181	24.755	16.026	11.080	6.017	3.575	2.311	1.593	1.154	.871038	8852
	182	.3360	.1600	.1109	.0875	.0724	.0623	.0569	.0547	.0466	53
	183	.0439	.0417	.0401	.0391	.0381	.0370	.0355			54
PROMETH	191	71.000	21.000	7.430	6.296	5.705	5.367	4.738	3.839	2.992611	4555
	192	.9418	.3550	.1815	.1153	.0849	.0682	.0605	.0546	.0481	56
	193	.0454	.0433	.0419	.0412	.0404	.0396	.0385			57
CURIUM	201	48.000	39.800	20.450	7.430	12.800	7.210	3.270	2.270	1.710962	4558
	202	1.477	.7998	.4250	.2330	.1440	.1020	.0848	.0735	.0610	59
	203	.0566	.0535	.0516	.0507	.0499	.0491	.0478			60
DOSE	11	24.	24.	24.	24.	19.	14.9	11.0	8.9	4	
BUILD-UP	12	7.8	8.2	7.8	7.4	7.0	6.7	6.5	6.2		
FACTOR	13	-0.14	-0.14	-0.14	-0.14	-0.122	-0.114	-0.104	-0.095		
DATA,	14	-0.088	-0.082	-0.078	-0.074	-0.070	-0.068	-0.065	-0.062		
WATER	15	0.0	0.0	0.0	0.0	0.0	0.0	0.03	0.06		
	16	0.074	0.083	0.088	0.094	0.097	0.102	0.104	0.108		
DOSE	21	9.0	9.0	9.0	9.0	9.0	8.2	8.0	7.3	13	
BUILD-UP	22	6.4	5.95	5.65	5.3	5.15	4.95	4.75	4.5		
FACTOR	23	-0.15	-0.15	-0.15	-0.15	-0.15	-0.12	-0.11	-0.10		
DATA,	24	-0.091	-0.087	-0.084	-0.081	-0.079	-0.077	-0.076	-0.074		
ALUMINUM	25	0.00	0.00	0.00	0.00	0.00	0.025	0.044	0.055		
	26	0.075	0.084	0.09	0.096	0.101	0.106	0.11	0.115		
DOSE	31	11.2	10.8	10.7	10.2	9.5	9.1	8.6	8.0	26	
BUILD-UP	32	7.5	7.1	6.7	6.5	6.1	5.8	5.5	5.0		
FACTOR	33	-0.099	-0.097	-0.097	-0.095	-0.092	-0.09	-0.088	-0.081		
DATA,	34	-0.080	-0.077	-0.075	-0.073	-0.072	-0.072	-0.072	-0.072		
IRON	35	0.0	0.001	0.004	0.009	0.016	0.022	0.028	0.034		
	36	0.039	0.044	0.048	0.05	0.054	0.056	0.059	0.062		
DOSE	41	4.8	4.7	4.7	4.65	4.6	4.55	4.5	4.4	50	
BUILD-UP	42	4.3	4.1	4.05	3.95	3.8	3.65	3.5	3.3		
FACTOR	43	-0.088	-0.086	-0.085	-0.084	-0.082	-0.081	-0.08	-0.079		
DATA,	44	-0.078	-0.078	-0.079	-0.08	-0.082	-0.084	-0.086	-0.09		
TIN	45	0.1	0.105	0.11	0.114	0.12	0.125	0.13	0.134		
	46	0.139	0.141	0.142	0.141	0.14	0.137	0.135	0.13		
DOSE	51	3.6	3.6	3.5	3.5	3.44	3.4	3.3	3.18	74	
BUILD-UP	52	3.05	2.95	2.93	2.88	2.84	2.8	2.78	2.70		
FACTOR	53	-0.00	-0.008	-0.01	-0.02	-0.028	-0.035	-0.042	-0.05		
DATA,	54	-0.058	-0.063	-0.068	-0.07	-0.074	-0.076	-0.08	-0.086		
TUNGSTEN	55	0.06	0.07	0.08	0.10	0.12	0.13	0.146	0.164		
	56	0.18	0.184	0.187	0.187	0.184	0.176	0.166	0.135		
DOSE	61	1.0	1.2	1.3	1.5	1.7	2.5	2.9	2.6	82	
BUILD-UP	62	2.65	2.65	2.6	2.55	2.5	2.35	2.3	2.1		
FACTOR	63	-0.01	-0.015	-0.02	-0.03	-0.03	-0.04	-0.04	-0.05		
DATA,	64	-0.055	-0.06	-0.07	-0.075	-0.08	-0.08	-0.085	-0.095		

ISOLIB.DAT

LEAD	65	0.37	0.37	0.35	0.29	0.25	0.20	0.17	0.15	
	66	0.13	0.12	0.11	0.10	0.09	0.08	0.075	0.07	
DOSE	71	1.141	1.096	1.146	1.394	1.775	1.842	1.830	2.215	92
BUILD-UP	72	2.501	2.896	2.763	2.598	3.086	4.099	3.022	2.297	
FACTOR	73	-0.008	-0.012	-0.022	-0.024	-0.025	-0.036	-0.047	-0.043	
DATA,	74	-0.042	-0.039	-0.046	-0.053	-0.049	-0.043	-0.059	-0.077	
URANIUM	75	0.030	0.610	0.710	0.385	0.272	0.291	0.313	0.203	
	76	0.161	0.120	0.121	0.126	0.082	0.043	0.060	0.085	1
04 1 2	1.200	1.400	2.300	3.650	3.200	5.000	6.600	9.700	11.00	8.000
04 4 7	18.00	24.00	36.00	43.00	27.00	47.00	64.00	100.0	130.0	89.00
041015	86.00	140.0	360.0	700.0	280.0	160.0	310.0	1500.	4800.	1050.
0420	580.0	1000.	4300.	1.9E4	2700.					
13 1 2	1.007	1.058	2.060	2.820	2.710	1.014	1.110	3.190	5.640	5.350
13 4 7	1.027	1.210	4.870	12.90	13.20	1.043	1.340	9.390	40.60	45.30
131015	1.058	1.450	14.30	91.00	117.0	1.078	1.590	24.00	245.0	345.0
1320	1.095	1.720	34.80	457.	718.					
26 1 2	1.001	1.007	1.086	1.350	1.710	1.002	1.013	1.160	1.670	2.620
26 4 7	1.004	1.024	1.270	2.280	4.880	1.006	1.037	1.390	3.070	9.250
261015	1.008	1.047	1.480	3.830	14.80	1.011	1.060	1.600	5.040	24.20
2620	1.013	1.070	1.700	6.250	37.3					
50 1 2	1.002	1.009	1.013	1.054	1.200	1.003	1.017	1.023	1.093	1.350
50 4 7	1.006	1.031	1.038	1.150	1.580	1.009	1.048	1.054	1.200	1.870
501015	1.012	1.062	1.065	1.250	2.110	1.016	1.080	1.078	1.300	2.460
5020	1.021	1.094	1.089	1.350	2.76					
74 1 2	1.001	1.003	1.030	1.019	1.073	1.001	1.006	1.054	1.033	1.120
74 4 7	1.002	1.012	1.090	1.052	1.190	1.004	1.018	1.130	1.073	1.260
741015	1.005	1.023	1.160	1.090	1.320	1.006	1.030	1.190	1.120	1.390
7420	1.008	1.035	1.220	1.15	1.450					
82 1 2	1.000	1.002	1.022	1.018	1.055	1.001	1.005	1.039	1.033	1.091
82 4 7	1.002	1.009	1.066	1.062	1.140	1.003	1.013	1.093	1.100	1.200
821015	1.004	1.017	1.110	1.140	1.230	1.005	1.022	1.140	1.220	1.290
8220	1.006	1.026	1.160	1.300	1.330					
92 1 2	1.000	1.002	1.016	1.058	1.042	1.001	1.004	1.029	1.100	1.069
92 4 7	1.001	1.006	1.048	1.160	1.110	1.002	1.010	1.069	1.230	1.150
921015	1.003	1.013	1.083	1.280	1.180	1.004	1.017	1.100	1.340	1.230
9220	1.004	1.020	1.120	1.390	1.280					

Internal Yearly Dose Increments (Sv/Bq) 12-Jul-88 RAP
 ! H 3 Class: D Fl: 1.00000 03/17/88 12:51:12.5 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1

G 1.7E-11
 G 9.8E-12
 G 1.8E-11
 G 1.8E-11
 G 1.8E-11
 G 8.3E-12
 G 1.7E-11
 G 1.7E-11
 G 1.7E-11
 G 1.7E-11
 G 1.7E-11
 1 1 1 1 1 1 1 1 1 1

H 2.6E-11
 H 1.6E-11
 H 2.7E-11
 H 2.7E-11
 H 2.7E-11
 H 1.3E-11
 H 2.6E-11
 H 2.6E-11
 H 2.6E-11
 H 2.6E-11
 H 2.6E-11

! C 14 Class: D Fl: 1.00000 02/19/88 12:19:43.8 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
 2 1 2 2 2 1 2 2 2 2 2

G 5.7E-10 1.0E-12
 G 3.3E-10
 G 8.1E-10 1.1E-12
 G 6.1E-10 1.1E-12
 G 8.2E-10 1.1E-12
 G 2.9E-10
 G 5.7E-10 1.0E-12
 G 5.7E-10 1.0E-12
 G 5.7E-10 1.0E-12
 G 5.8E-10 1.0E-12
 G 5.8E-10 1.0E-12
 2 1 2 2 2 1 2 2 2 2 2

H 5.8E-10 1.0E-12
 H 3.3E-10
 H 8.2E-10 1.1E-12
 H 6.1E-10 1.1E-12
 H 8.2E-10 1.1E-12
 H 3.0E-10
 H 5.8E-10 1.0E-12
 H 5.8E-10 1.0E-12
 H 5.8E-10 1.0E-12

DOSINC.DAT

5.895

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H 5.9E-10 1.1E-12
 H 5.8E-10 1.0E-12
 ! NA24 Class: D Fl: 1.00000 12/05/87 13:20:15.3 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1 1
 G 2.7E-10
 G 1.2E-09
 G 3.3E-10
 G 3.3E-10
 G 3.6E-10
 G 5.0E-10
 G 3.9E-10
 G 2.0E-10
 G 3.6E-10
 G 2.0E-10
 G 2.7E-10
 1 1 1 1 1 1 1 1 1 1 1
 H 1.2E-09
 H 2.9E-10
 H 1.0E-10
 H 1.7E-10
 H 1.9E-10
 H 2.0E-10
 H 2.2E-10
 H 1.5E-10
 H 1.9E-10
 H 1.7E-10
 H 1.0E-10
 ! P 32 Class: D Fl: 0.00000 12/05/87 13:20:21.5 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1 1
 G 0.7E-10
 G 1.1E-09
 G 7.3E-10
 G 2.6E-09
 G 7.0E-09
 G 0.0E-09
 G 0.4E-09
 G 0.8E-10
 G 0.7E-10
 G 0.0E-10
 G 0.0E-10
 1 1 1 1 1 1 1 1 1 1 1
 H 2.0E-09
 H 3.7E-10
 H 3.1E-10
 H 5.7E-10
 H 1.3E-09
 H 5.9E-09
 H 0.2E-09
 H 5.1E-10

DOSINC.DAT

H 5.0E-10
H 5.1E-10
H 5.1E-10
! CR51 Class: Y F1: 0.10000 12/05/87 13:34:21.3 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1

G 4.4E-12
G 1.8E-11
G 4.6E-11
G 1.1E-10
G 2.5E-10
G 7.8E-12
G 1.3E-11
G 6.8E-12
G 3.9E-11
G 7.5E-12
G 3.8E-12
1 1 1 1 1 1 1 1 1 1

H 5.3E-10
H 2.5E-11
H 2.4E-11
H 5.4E-11
H 1.2E-10
H 1.4E-11
H 1.9E-11
H 3.6E-12
H 2.0E-11
H 1.6E-11
H 1.1E-11

! C069 Class: Y F1: 0.05000 12/05/87 13:42:07.1 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
8 7 8 8 8 7 8 8 8 8 8 10

G 4.2E-10 1.7E-10 1.1E-10 6.7E-11 4.3E-11 2.7E-11 1.0E-11 1.1E-11
G 1.1E-09 1.5E-10 9.7E-11 6.2E-11 4.0E-11 2.5E-11 1.6E-11
G 3.0E-09 2.0E-10 1.3E-10 8.1E-11 5.2E-11 3.3E-11 2.1E-11 1.4E-11
G 5.1E-09 1.0E-10 1.2E-10 7.5E-11 4.8E-11 3.1E-11 2.0E-11 1.2E-11
G 1.1E-08 2.0E-10 1.3E-10 8.0E-11 5.1E-11 3.3E-11 2.1E-11 1.3E-11
G 4.6E-10 1.4E-10 8.0E-11 5.8E-11 3.6E-11 2.3E-11 1.5E-11
G 0.1E-10 1.0E-10 1.0E-10 6.0E-11 4.2E-11 2.7E-11 1.7E-11 1.1E-11
G 0.2E-10 2.0E-10 1.2E-10 7.9E-11 5.1E-11 3.2E-11 2.1E-11 1.3E-11
G 2.8E-09 1.8E-10 1.2E-10 7.4E-11 4.8E-11 3.0E-11 1.9E-11 1.2E-11
G 0.6E-10 1.7E-10 1.1E-10 6.9E-11 4.4E-11 2.8E-11 1.8E-11 1.1E-11
G 3.7E-10 1.7E-10 1.1E-10 6.7E-11 4.3E-11 2.7E-11 1.8E-11 1.1E-11
G 1.2E-09 4.3E-10 2.7E-10 1.8E-10 1.1E-10 7.2E-11 4.6E-11 2.9E-11 1.9E-11 1.2E-11

26 12 8 8 8 10 10 5 8 11 10 13
H 1.3E-07 7.7E-08 4.6E-08 3.0E-08 2.0E-08 1.3E-08 9.0E-09 6.3E-09 4.4E-09 3.2E-09 2.4E-09 1.8E-09 1.4E-09 1.1E-09 8.7E-10
7.1E-10 5.0E-10 4.9E-10 4.1E-10 3.5E-10 3.0E-10 2.5E-10 2.2E-10 1.9E-10 1.6E-10 1.4E-10
H 1.0E-08 6.0E-09 3.8E-09 2.4E-09 1.6E-09 1.1E-09 7.3E-10 5.1E-10 3.8E-10 2.6E-10 1.9E-10 1.5E-10
H 3.2E-09 1.2E-09 8.0E-10 5.3E-10 3.6E-10 2.5E-10 1.8E-10 1.3E-10
H 4.8E-09 1.5E-09 9.9E-10 6.5E-10 4.4E-10 3.0E-10 2.1E-10 1.5E-10
H 5.9E-09 8.4E-10 4.2E-10 2.8E-10 1.9E-10 1.4E-10

DOSINC.DAT

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H 4.8E-09 2.9E-09 1.8E-09 1.2E-09 7.9E-10 5.3E-10 3.7E-10 2.8E-10 1.8E-10 1.3E-10
H 8.2E-09 3.7E-09 2.3E-09 1.5E-09 9.9E-10 6.7E-10 4.6E-10 3.2E-10 2.3E-10 1.7E-10
H 5.8E-10 3.1E-10 2.3E-10 1.8E-10 1.3E-10
H 2.3E-09 7.7E-10 5.1E-10 3.5E-10 2.4E-10 1.7E-10
H 8.4E-09 3.8E-09 2.4E-09 1.6E-09 1.0E-09 6.9E-10 4.8E-10 3.3E-10 2.4E-10 1.7E-10 1.3E-10
H 5.7E-09 3.6E-09 2.2E-09 1.4E-09 9.5E-10 6.4E-10 4.4E-10 3.1E-10 2.2E-10 1.6E-10
H 1.2E-09 7.3E-09 4.7E-09 3.0E-09 2.0E-09 1.4E-09 9.4E-10 6.6E-10 4.7E-10 3.4E-10 2.5E-10 1.9E-10 1.5E-10
! ZN65 Class: Y F1: 0.50000 12/05/87 13:50:31.5 Acute Sv/Bq
  11 1 3 4 5 8 7 8 11 12 13 14
    4 4 4 4 4 5 5 4 4 4 4
G 2.5E-09 4.5E-10 8.5E-11 1.6E-11
Q 2.5E-09 4.3E-10 8.1E-11 1.5E-11
Q 3.2E-09 5.2E-10 9.9E-11 1.9E-11
Q 3.1E-09 4.8E-10 9.8E-11 1.7E-11
Q 4.0E-09 5.7E-10 1.1E-10 2.0E-11
Q 3.7E-09 6.7E-10 1.3E-10 2.4E-11 4.5E-12
Q 3.7E-09 8.8E-10 1.3E-10 2.4E-11 4.5E-12
G 3.0E-09 5.3E-10 1.0E-10 1.9E-11
G 2.8E-09 4.5E-10 8.4E-11 1.6E-11
G 2.7E-09 4.8E-10 9.1E-11 1.7E-11
G 2.7E-09 4.7E-10 8.9E-11 1.7E-11
  6 4 4 4 4 4 4 4 4 4 4
H 1.6E-08 3.8E-09 9.6E-10 2.5E-10 6.5E-11 1.7E-11
H 2.8E-09 6.3E-10 1.5E-10 3.7E-11
H 1.9E-09 3.8E-10 8.6E-11 2.0E-11
H 1.9E-09 3.7E-10 8.5E-11 2.0E-11
H 2.1E-09 3.6E-10 8.1E-11 1.9E-11
H 2.6E-09 5.8E-10 1.3E-10 3.2E-11
H 2.8E-09 6.2E-10 1.5E-10 3.5E-11
H 1.8E-09 3.3E-10 7.3E-11 1.7E-11
H 1.8E-09 3.0E-10 6.8E-11 1.6E-11
H 2.4E-09 5.4E-10 1.3E-10 3.1E-11
H 2.4E-09 5.3E-10 1.3E-10 3.1E-11
! SR89 Class: D F1: 0.30000 12/05/87 13:59:25.3 Acute Sv/Bq
  11 1 3 4 5 6 7 8 11 12 13 14
    1 1 1 1 1 2 1 1 1 1 1
G 1.2E-10
G 7.5E-10
Q 1.2E-09
Q 6.8E-09
Q 2.1E-08
Q 4.6E-09 2.4E-11
Q 3.0E-09
Q 1.2E-10
Q 1.2E-10
Q 1.2E-10
Q 1.2E-10
  1 1 1 1 1 2 2 1 1 1 1
H 1.7E-09
H 2.1E-10
H 2.9E-10

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H 1.1E-09
 H 3.3E-09
 H 8.3E-09 4.2E-11
 H 5.2E-09 2.7E-11
 H 2.2E-10
 H 2.1E-10
 H 2.2E-10
 H 2.1E-10
 ! SR99 Class: D F1: 0.30000 12/05/87 14:00:12.4 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 50 49 1 1 1 1
 Q 1.9E-10
 Q 3.2E-10
 G 5.7E-10
 Q 4.1E-09
 G 1.8E-08
 Q 4.2E-08 3.2E-08 2.7E-08 2.4E-08 2.1E-08 1.9E-08 1.7E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08 9.6E-09 8.9E-09 8.1E-09
 7.5E-09 8.9E-09 8.4E-09 5.9E-09 5.5E-09 5.1E-09 4.8E-09 4.5E-09 4.2E-09 3.9E-09 3.6E-09 3.4E-09 3.2E-09 3.0E-09 2.8E-09
 2.6E-09 2.5E-09 2.3E-09 2.2E-09 2.1E-09 2.0E-09 1.8E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.2E-09
 1.1E-09 1.0E-09 9.8E-10 9.3E-10 8.8E-10
 G 2.5E-08 2.8E-08 1.7E-08 1.5E-08 1.3E-08 1.1E-08 9.2E-09 7.9E-09 6.7E-09 5.8E-09 4.9E-09 4.2E-09 3.6E-09 3.1E-09 2.7E-09
 2.3E-09 2.0E-09 1.7E-09 1.5E-09 1.3E-09 1.1E-09 9.5E-10 8.2E-10 7.1E-10 6.2E-10 5.4E-10 4.7E-10 4.1E-10 3.6E-10 3.2E-10
 2.8E-10 2.5E-10 2.2E-10 1.9E-10 1.7E-10 1.5E-10 1.4E-10 1.2E-10 1.1E-10 9.9E-11 8.9E-11 8.1E-11 7.3E-11 6.7E-11 6.1E-11
 5.6E-11 5.1E-11 4.7E-11 4.3E-11
 G 1.9E-10
 G 1.9E-10
 G 1.8E-10
 G 1.9E-10
 1 1 1 1 1 50 49 1 1 1 1
 H 1.1E-09
 H 2.0E-10
 H 2.3E-10
 H 7.7E-10
 H 2.9E-09
 H 7.3E-08 5.5E-08 4.7E-08 4.1E-08 3.7E-08 3.3E-08 3.0E-08 2.7E-08 2.4E-08 2.2E-08 2.0E-08 1.8E-08 1.7E-08 1.5E-08 1.4E-08
 1.3E-08 1.2E-08 1.1E-08 1.0E-08 9.6E-09 8.9E-09 8.3E-09 7.8E-09 7.2E-09 6.8E-09 6.3E-09 5.9E-09 5.6E-09 5.2E-09 4.9E-09
 4.6E-09 4.3E-09 4.1E-09 3.8E-09 3.6E-09 3.4E-09 3.2E-09 3.0E-09 2.9E-09 2.7E-09 2.6E-09 2.4E-09 2.3E-09 2.1E-09 2.0E-09
 1.9E-09 1.8E-09 1.7E-09 1.6E-09 1.5E-09
 H 4.3E-08 3.5E-08 3.0E-08 2.6E-08 2.2E-08 1.9E-08 1.6E-08 1.4E-08 1.2E-08 1.0E-08 8.8E-09 7.4E-09 6.3E-09 5.4E-09 4.7E-09
 4.0E-09 3.4E-09 3.0E-09 2.8E-09 2.2E-09 1.9E-09 1.7E-09 1.4E-09 1.2E-09 1.1E-09 9.4E-10 8.2E-10 7.2E-10 6.3E-10 5.5E-10
 4.8E-10 4.3E-10 3.8E-10 3.3E-10 3.0E-10 2.7E-10 2.4E-10 2.1E-10 1.9E-10 1.7E-10 1.6E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10
 9.7E-11 8.9E-11 8.2E-11 7.5E-11
 H 3.4E-10
 H 3.4E-10
 H 3.3E-10
 H 3.4E-10
 ! Y 99 Class: Y F1: 0.00010 12/05/87 14:25:37.6 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1 1
 G 1.3E-14
 Q 1.1E-09

DOSINC.DAT

5.900

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G 2.8E-09
 G 1.3E-08
 G 3.2E-08
 G 4.0E-13
 G 3.9E-13
 G 1.3E-14
 G 1.5E-14
 G 1.3E-14
 G 1.3E-14
 G 3.8E-13
 1 1 1 1 1 1 1 1 1 1
 H 9.7E-09
 H 4.4E-10
 H 1.1E-09
 H 5.3E-09
 H 1.3E-08
 H 1.8E-11
 H 1.8E-11
 H 5.5E-13
 H 5.4E-13
 H 5.4E-13
 H 5.5E-13
 H 1.8E-11
 ! ZR95 Class: W F1: 0.00200 12/05/87 14:33:32.3 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 2 1 1 1 1 1
 G 2.3E-11
 G 3.8E-10
 G 1.1E-09
 G 3.1E-09
 G 7.9E-09
 G 4.8E-10 1.1E-11
 G 2.1E-10
 G 0.1E-11
 G 0.1E-10
 G 1.1E-10
 G 0.1E-12
 1 1 1 1 1 2 2 1 1 1 1
 H 1.8E-08
 H 1.1E-09
 H 9.8E-10
 H 1.9E-09
 H 4.2E-09
 H 2.2E-08 8.8E-10
 H 3.2E-09 8.7E-11
 H 3.0E-10
 H 0.3E-10
 H 9.3E-10
 H 7.7E-10
 ! NB95M Class: Y F1: 0.01000 12/05/87 14:59:17.5 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 16 19

DOSINC.DAT

5.901

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1 1 1 1 1 1 1 1 1 1 1 1
 G 2.8E-12
 G 2.2E-10
 G 5.5E-10
 G 2.6E-09
 G 6.6E-09
 G 4.2E-11
 G 3.3E-11
 G 8.2E-12
 G 9.3E-11
 G 1.8E-11
 G 1.6E-12
 G 1.8E-11
 G 1.5E-11

1 1 1 1 1 1 1 1 1 1 1
 H 3.1E-09
 H 1.5E-10
 H 2.4E-10
 H 1.1E-09
 H 2.8E-09
 H 6.4E-11
 H 5.7E-11
 H 5.4E-12
 H 4.9E-11
 H 4.3E-11
 H 3.7E-11
 H 4.0E-11
 H 7.1E-11

! NB95 Class: Y F1: 0.01000 12/05/87 15:14:44.1 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 16 19
 1 1 1 1 1 1 1 1 1 1 1 1

G 2.8E-11
 G 2.8E-10
 G 9.2E-10
 G 1.8E-09
 G 4.0E-09
 G 3.0E-10
 G 2.0E-10
 G 0.2E-11
 G 0.1E-10
 G 1.1E-10
 G 1.2E-11
 G 1.4E-10
 G 1.1E-10

1 1 1 1 1 1 1 1 1 1 1
 H 8.4E-09
 H 6.4E-10
 H 5.2E-10
 H 9.7E-10
 H 1.9E-09
 H 5.2E-10

DOSINC.DAT

H 4.5E-10
H 5.2E-11
H 4.3E-10
H 4.1E-10
H 3.6E-10
H 3.5E-10
H 6.4E-10

! TC99 Class: W F1: 0.00000 12/05/87 15:23:09.9 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 22 16

1 1 1 1 1 1 1 1 1 1 3 1 1

G 6.3E-11
G 3.4E-09
G 9.0E-11
G 3.8E-10
G 1.1E-09
G 3.1E-11
G 6.0E-11
G 6.3E-11
G 6.3E-11
G 6.3E-11
G 6.9E-09 4.2E-10 3.3E-11
G 3.4E-09
G 1.4E-09

2 1 1 1 1 1 1 1 1 3 1 1

H 1.0E-08 1.4E-10
H 2.2E-09
H 5.5E-11
H 2.0E-10
H 5.6E-10
H 2.1E-11
H 4.0E-11
H 4.2E-11
H 4.2E-11
H 4.2E-11
H 4.5E-09 3.5E-10 2.9E-11
H 2.2E-09
H 9.2E-10

! I 129 Class: D F1: 1.00000 12/05/87 15:32:30.7 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15

1 1 1 1 1 1 1 1 1 1 4 1

G 1.4E-10
G 1.8E-10
G 1.3E-10
G 1.2E-10
G 1.3E-10
G 1.1E-09
G 5.7E-10
G 1.1E-10
G 1.2E-10
G 2.0E-10
G 2.0E-08 2.2E-07 2.4E-08 2.6E-09

5.902

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DOSINC.DAT

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G 3.7E-10
  1 1 1 1 1 1 1 1 1 4 1
H 2.4E-10
H 6.2E-11
H 8.1E-11
H 7.9E-11
H 8.4E-11
H 7.8E-10
H 3.6E-10
H 6.8E-11
H 7.9E-11
H 1.8E-10
H 1.2E-06 1.4E-07 1.5E-08 1.8E-09
H 2.3E-10
! I 131 Class: D F1: 1.00000 12/05/87 15:40:41.2 Acute Sv/Bq
  12 1 3 4 5 6 7 8 11 12 13 14 15
    1 1 1 1 1 1 1 1 1 1 1 1
G 1.2E-10
G 3.1E-10
G 7.1E-11
G 6.8E-11
G 7.8E-11
G 3.8E-09
G 4.3E-10
G 6.1E-11
G 7.8E-11
G 1.4E-10
G 4.4E-07
G 6.5E-10
  1 1 1 1 1 1 1 1 1 1 1
H 8.6E-10
H 7.8E-11
H 4.4E-11
H 4.2E-11
H 4.7E-11
H 2.3E-09
H 2.7E-10
H 3.8E-11
H 4.4E-11
H 9.8E-11
H 2.7E-07
H 4.8E-10
! I 132 Class: D F1: 1.00000 12/05/87 15:50:30.4 Acute Sv/Bq
  12 1 3 4 5 6 7 8 11 12 13 14 15
    1 1 1 1 1 1 1 1 1 1 1 1
G 3.8E-11
G 6.5E-10
G 4.5E-11
G 4.5E-11
G 4.8E-11
G 1.5E-10

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5.904

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G 1.5E-10
G 3.0E-11
G 3.9E-11
G 3.9E-11
G 2.8E-09
G 2.2E-10
  1 1 1 1 1 1 1 1 1 1
H 2.0E-10
H 1.0E-10
H 1.9E-11
H 1.0E-11
H 2.0E-11
H 6.9E-11
H 7.0E-11
H 1.0E-11
H 1.7E-11
H 2.0E-11
H 1.3E-09
H 9.0E-11
I I 133 Class: D F1: 1.00000 12/05/87 15:50:05.9 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 15
  1 1 1 1 1 1 1 1 1 1 1 1
G 6.5E-11
G 5.6E-10
G 6.7E-11
G 6.6E-11
G 7.3E-11
G 5.3E-10
G 4.1E-10
G 6.2E-11
G 6.6E-11
G 7.0E-11
G 0.1E-08
G 0.7E-10
  1 1 1 1 1 1 1 1 1 1
H 0.3E-10
H 1.1E-10
H 3.0E-11
H 3.0E-11
H 3.9E-11
H 2.9E-10
H 2.2E-10
H 3.4E-11
H 3.0E-11
H 4.2E-11
H 4.3E-08
H 4.7E-10
I RU103 Class: Y F1: 0.05000 12/05/87 18:07:26.7 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
  1 1 1 1 1 1 1 1 1 1
G 7.5E-11

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DOSINC.DAT

G 3.0E-10
 G 8.2E-10
 G 2.5E-09
 G 6.5E-09
 G 7.7E-11
 G 1.6E-10
 G 1.3E-10
 G 5.6E-10
 Q 1.2E-10
 G 6.4E-11

2 1 1 1 1 1 1 1 1 1
 H 1.6E-08 1.7E-11

H 5.0E-10
 H 4.6E-10
 H 1.3E-09
 H 3.1E-09
 H 2.2E-10
 H 3.1E-10
 H 7.3E-11
 H 3.0E-10
 H 3.2E-10
 H 2.5E-10

I PD103 Class: Y F1: 0.00500 12/05/87 16:30:41.1 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 18
 1 1 1 1 1 1 1 1 1 1 1 1 1 1

G 1.3E-13
 G 3.4E-11
 G 1.5E-10
 G 8.3E-10
 G 2.3E-09
 G 2.0E-12
 Q 8.6E-12
 G 1.6E-13
 Q 4.1E-11
 G 1.6E-12
 G 4.5E-14
 Q 1.1E-11
 G 2.1E-11

1 1 1 1 1 1 1 1 1 1 1 1

H 2.7E-09
 H 3.0E-11
 H 7.9E-11
 H 3.9E-10
 H 1.1E-09
 H 4.7E-12
 H 7.1E-12
 H 1.1E-13
 H 1.9E-11
 H 9.0E-12
 H 1.5E-13
 H 2.1E-11

5.905

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DOSINC.DAT

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H 2.8E-11
! RH103M Class: Y F1: 0.05000 12/05/87 16:44:51.7 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1 1
G 5.2E-15
Q 2.0E-11
Q 1.7E-11
Q 0.8E-12
Q 1.0E-12
G 3.0E-15
G 1.1E-14
Q 3.5E-15
Q 4.3E-14
Q 0.1E-15
Q 3.0E-15
1 1 1 1 1 1 1 1 1 1 1
H 0.9E-12
H 1.1E-12
H 0.8E-13
H 4.0E-13
H 0.6E-14
H 2.0E-15
H 3.0E-15
H 1.5E-15
H 3.2E-15
H 5.0E-15
H 1.0E-15
! RU106 Class: Y F1: 0.05000 12/05/87 16:49:22.4 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
3 2 2 2 2 2 3 3 3 3 3
G 9.0E-10 2.0E-10 1.1E-10
G 2.3E-09 1.6E-10
G 4.7E-09 1.7E-10
G 2.4E-08 1.0E-10
G 7.1E-08 1.7E-10
G 5.0E-10 1.4E-10
G 1.0E-09 2.7E-10 1.1E-10
G 1.0E-09 2.9E-10 1.1E-10
G 1.2E-09 2.0E-10 1.1E-10
Q 1.0E-09 2.0E-10 1.1E-10
Q 9.7E-10 2.7E-10 1.1E-10
8 1 1 1 2 1 1 1 1 1 1
H 0.6E-07 2.3E-07 8.3E-08 3.0E-08 1.1E-08 4.3E-09 1.7E-09 0.7E-10
H 1.0E-09
H 2.0E-09
H 1.2E-08
H 3.0E-08 8.0E-10
H 0.4E-10
H 1.1E-09
H 0.9E-10
H 7.9E-10

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DOSINC.DAT

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H 1.1E-09
H 1.0E-09
! CS134 Class: D F1: 1.00000 12/05/87 10:58:11.2 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
3 3 3 3 3 3 3 3 3 3 3
Q 1.0E-08 1.2E-09 0.3E-11
Q 1.0E-08 1.1E-09 7.8E-11
Q 2.2E-08 1.0E-09 1.1E-10
Q 2.0E-08 1.4E-09 1.0E-10
Q 2.2E-08 1.0E-09 1.1E-10
Q 1.2E-08 0.7E-10 6.2E-11
Q 1.0E-08 1.1E-09 8.1E-11
Q 2.0E-08 1.5E-09 1.0E-10
Q 1.0E-08 1.1E-09 8.1E-11
Q 1.0E-08 1.2E-09 0.3E-11
Q 1.0E-08 1.2E-09 0.4E-11
3 3 3 3 3 3 3 3 3 3 3
H 7.0E-09 4.0E-10 3.5E-11
H 9.7E-09 6.0E-10 4.9E-11
H 1.4E-08 1.0E-09 7.2E-11
H 1.3E-08 9.2E-10 6.6E-11
H 1.4E-08 1.0E-09 7.2E-11
H 7.7E-09 5.5E-10 4.0E-11
H 1.0E-08 7.1E-10 5.1E-11
H 1.3E-08 9.4E-10 6.7E-11
H 1.0E-08 7.3E-10 5.2E-11
H 1.0E-08 7.3E-10 5.2E-11
H 1.0E-08 7.5E-10 5.4E-11
! CS137 Class: D F1: 1.00000 12/05/87 17:06:46.3 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
3 3 3 3 3 3 3 3 3 3 3
G 1.2E-08 1.1E-09 1.1E-10
G 9.0E-09 9.2E-10 9.1E-11
G 1.4E-08 1.4E-09 1.3E-10
G 1.4E-08 1.3E-09 1.3E-10
G 1.4E-08 1.3E-09 1.3E-10
G 0.4E-09 0.3E-10 0.2E-11
G 9.9E-09 9.7E-10 9.5E-11
G 1.3E-08 1.3E-09 1.3E-10
Q 1.2E-08 1.1E-09 1.1E-10
Q 1.1E-08 1.1E-09 1.1E-10
G 1.2E-08 1.1E-09 1.1E-10
3 3 3 3 3 3 3 3 3 3 3
H 3.7E-09 2.0E-10 2.0E-11
H 0.0E-09 5.9E-10 5.7E-11
H 0.0E-09 8.7E-10 8.5E-11
H 0.7E-09 0.5E-10 0.3E-11
H 0.0E-09 0.0E-10 0.0E-11
H 4.1E-09 4.0E-10 3.9E-11
H 0.3E-09 0.1E-10 0.0E-11
H 0.4E-09 0.2E-10 0.1E-11

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DOSINC.DAT

5.908

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H 7.4E-09 7.3E-10 7.2E-11
H 7.3E-09 7.1E-10 7.0E-11
H 7.3E-09 7.2E-10 7.0E-11
! CE144 Class: Y F1: 0.00030 12/05/87 17:16:52.4 Acute Sv/Bq
13 1 3 4 5 6 7 8 11 12 13 14 17 19
1 1 1 1 1 1 1 1 1 1 1 2 2
Q 4.5E-12
G 1.1E-09
G 3.7E-09
G 2.2E-08
G 6.7E-08
Q 0.3E-11
Q 0.3E-11
G 0.2E-12
G 0.0E-11
G 1.0E-11
G 3.3E-12
G 4.3E-10 1.0E-10
G 3.6E-10 1.3E-10
6 1 1 1 1 3 2 1 1 1 1 5 5
H 5.6E-07 1.6E-07 4.6E-08 1.4E-08 4.2E-09 1.3E-09
H 9.5E-10
H 2.0E-09
H 1.1E-08
H 3.4E-08
H 1.9E-09 1.4E-09 8.2E-10
H 1.2E-09 8.4E-10
H 7.6E-11
H 1.2E-10
H 1.9E-10
H 1.5E-10
H 9.7E-09 7.6E-09 4.4E-09 2.2E-09 1.0E-09
H 8.1E-09 6.3E-09 3.7E-09 1.9E-09 8.7E-10
! PR144M Class: Y F1: 0.00030 12/05/87 17:45:48.4 Acute Sv/Bq
13 1 3 4 5 6 7 8 11 12 13 14 17 18
1 1 1 1 1 1 1 1 1 1 1 1 1
G 2.0E-14
G 1.5E-10
G 5.5E-11
Q 1.2E-11
G 7.0E-13
G 1.2E-14
G 2.5E-14
Q 3.4E-15
Q 5.2E-14
G 2.4E-14
G 1.5E-15
Q 2.7E-14
G 4.4E-14
1 1 1 1 1 1 1 1 1 1 1
H 4.0E-11

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DOSINC.DAT

H 3.1E-12
H 8.5E-13
H 1.7E-13
H 1.2E-14
H 1.5E-14
H 1.0E-14
H 4.7E-16
H 5.9E-16
H 1.3E-14
H 8.7E-15
H 2.3E-14
H 1.2E-14

I PR144 Class: Y F1: 0.00030 12/05/87 17:55:44.9 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 18
1 1 1 1 1 1 1 1 1 1 1 1 1

G 3.2E-14
Q 4.2E-10
G 1.0E-10
G 1.9E-11
G 1.1E-12
G 1.0E-14
G 3.4E-14
G 7.1E-15
G 7.0E-14
G 3.6E-14
G 3.8E-15
G 4.9E-14
G 7.5E-14

1 1 1 1 1 1 1 1 1 1 1 1

H 9.7E-11
H 5.7E-12
H 1.4E-12
H 2.7E-13
H 2.0E-14
H 2.1E-14
H 2.7E-14
H 9.1E-15
H 1.1E-14
H 2.0E-14
H 1.0E-14
H 3.7E-14
H 2.2E-14

I PM151 Class: Y F1: 0.00030 12/05/87 18:01:07.3 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 1 1 1 1 1 1 1

G 4.3E-12
G 4.2E-10
G 1.0E-09
G 3.9E-09
G 7.3E-09
G 1.6E-11

DOSINC.DAT

5.909

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G 5.0E-11
 G 1.7E-11
 Q 2.2E-10
 G 2.5E-11
 Q 4.7E-13
 G 2.2E-11
 1 1 1 1 1 1 1 1 1 1
 H 1.7E-09
 H 1.6E-10
 H 3.6E-10
 H 1.3E-09
 H 2.6E-09
 H 1.7E-11
 H 2.0E-11
 H 6.9E-12
 H 7.4E-11
 H 1.0E-11
 H 6.0E-12
 H 2.9E-11
 ! SM151 Class: W F1: 0.00030 12/05/87 18:14:12.0 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 42 10 1 1 1 1 25
 G 4.9E-10
 G 2.3E-11
 G 5.0E-11
 G 3.4E-10
 G 1.0E-09
 G 2.7E-11 2.5E-11 2.3E-11 2.1E-11 2.0E-11 1.0E-11 1.7E-11 1.5E-11 1.4E-11 1.3E-11 1.2E-11 1.1E-11 1.0E-11 9.5E-12 8.8E-12
 8.1E-12 7.5E-12 6.9E-12 6.4E-12 5.9E-12 5.4E-12 5.0E-12 4.0E-12 4.3E-12 3.9E-12 3.6E-12 3.4E-12 3.1E-12 2.9E-12 2.6E-12
 2.4E-12 2.3E-12 2.1E-12 1.9E-12 1.8E-12 1.0E-12 1.5E-12 1.4E-12 1.3E-12 1.2E-12 1.1E-12 1.0E-12
 G 2.2E-12 2.0E-12 1.0E-12 1.7E-12 1.0E-12 1.5E-12 1.3E-12 1.2E-12 1.1E-12 1.1E-12
 G 5.0E-10
 G 2.1E-14
 G 1.1E-15
 Q 4.3E-10
 G 7.2E-12 6.7E-12 6.1E-12 5.7E-12 5.2E-12 4.0E-12 4.5E-12 4.1E-12 3.8E-12 3.5E-12 3.2E-12 3.0E-12 2.8E-12 2.6E-12 2.4E-12
 2.2E-12 2.0E-12 1.9E-12 1.7E-12 1.6E-12 1.5E-12 1.3E-12 1.2E-12 1.1E-12 1.1E-12
 2 1 1 1 1 50 50 1 1 1 1 50
 H 3.3E-09 2.0E-11
 H 1.2E-11
 H 2.9E-11
 H 1.7E-10
 H 5.1E-10
 H 9.7E-09 1.0E-08 9.2E-09 8.5E-09 7.9E-09 7.3E-09 6.7E-09 6.2E-09 5.7E-09 5.3E-09 4.9E-09 4.5E-09 4.2E-09 3.8E-09 3.5E-09
 3.3E-09 3.0E-09 2.8E-09 2.6E-09 2.4E-09 2.2E-09 2.0E-09 1.9E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09
 9.9E-10 9.1E-10 8.4E-10 7.8E-10 7.2E-10 6.6E-10 6.1E-10 5.6E-10 5.2E-10 4.8E-10 4.4E-10 4.1E-10 3.8E-10 3.5E-10 3.2E-10
 3.0E-10 2.7E-10 2.5E-10 2.3E-10 2.2E-10
 H 7.8E-10 8.1E-10 7.4E-10 6.9E-10 6.3E-10 5.9E-10 5.4E-10 5.0E-10 4.0E-10 4.3E-10 3.9E-10 3.6E-10 3.3E-10 3.1E-10 2.9E-10
 2.6E-10 2.4E-10 2.2E-10 2.1E-10 1.9E-10 1.8E-10 1.6E-10 1.5E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.3E-11 8.6E-11
 7.9E-11 7.3E-11 6.8E-11 6.2E-11 5.8E-11 5.3E-11 4.9E-11 4.5E-11 4.2E-11 3.9E-11 3.6E-11 3.3E-11 3.0E-11 2.8E-11 2.6E-11
 2.4E-11 2.2E-11 2.0E-11 1.9E-11 1.7E-11

DOSINC.DAT

H 1.7E-13
 H 1.8E-13
 H 1.9E-13
 H 1.7E-13
 H 2.8E-09 2.7E-09 2.5E-09 2.3E-09 2.1E-09 2.0E-09 1.8E-09 1.7E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.6E-10
 8.8E-10 8.1E-10 7.5E-10 6.9E-10 6.4E-10 5.9E-10 5.4E-10 5.0E-10 4.6E-10 4.3E-10 3.9E-10 3.6E-10 3.4E-10 3.1E-10 2.9E-10
 2.8E-10 2.4E-10 2.3E-10 2.1E-10 1.9E-10 1.8E-10 1.6E-10 1.5E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.3E-11 8.8E-11
 8.0E-11 7.4E-11 6.8E-11 6.3E-11 5.8E-11
 I EU152 Class: W F1: 0.00100 12/05/87 16:22:49.8 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 8 5 5 7 1 26 17 1 2 4 1 11 29
 G 5.1E-11 2.2E-11 2.0E-11 1.7E-11 1.5E-11 1.4E-11 1.2E-11 1.1E-11
 G 5.1E-10 1.6E-11 1.4E-11 1.2E-11 1.1E-11
 G 1.0E-09 1.5E-11 1.4E-11 1.2E-11 1.1E-11
 G 4.1E-09 2.0E-11 1.8E-11 1.6E-11 1.4E-11 1.2E-11 1.1E-11
 G 1.0E-08
 Q 3.2E-10 2.1E-10 1.8E-10 1.6E-10 1.4E-10 1.3E-10 1.1E-10 9.9E-11 8.7E-11 7.7E-11 6.8E-11 6.0E-11 5.3E-11 4.7E-11 4.2E-11
 3.7E-11 3.3E-11 2.9E-11 2.5E-11 2.2E-11 2.0E-11 1.8E-11 1.6E-11 1.4E-11 1.2E-11 1.1E-11
 Q 3.5E-10 8.8E-11 6.0E-11 5.3E-11 4.7E-11 4.1E-11 3.7E-11 3.2E-11 2.9E-11 2.5E-11 2.2E-11 2.0E-11 1.7E-11 1.5E-11 1.4E-11
 1.2E-11 1.1E-11
 G 1.1E-10
 G 1.3E-09 1.1E-11
 G 1.0E-10 1.4E-11 1.3E-11 1.1E-11
 G 1.1E-11
 G 2.1E-10 3.0E-11 2.7E-11 2.4E-11 2.1E-11 1.9E-11 1.6E-11 1.5E-11 1.3E-11 1.1E-11 1.0E-11
 G 4.4E-10 2.9E-10 2.6E-10 2.3E-10 2.0E-10 1.8E-10 1.6E-10 1.4E-10 1.2E-10 1.1E-10 9.6E-11 8.6E-11 7.5E-11 6.6E-11 5.8E-11
 5.2E-11 4.6E-11 4.0E-11 3.6E-11 3.2E-11 2.8E-11 2.5E-11 2.2E-11 1.9E-11 1.7E-11 1.5E-11 1.3E-11 1.2E-11 1.0E-11
 36 34 33 35 29 50 45 25 30 33 26 39 50
 H 3.5E-08 3.0E-09 2.4E-09 2.1E-09 1.9E-09 1.7E-09 1.6E-09 1.3E-09 1.1E-09 1.0E-09 9.0E-10 7.9E-10 7.0E-10 6.2E-10 5.5E-10
 4.8E-10 4.3E-10 3.8E-10 3.3E-10 3.0E-10 2.6E-10 2.3E-10 2.0E-10 1.8E-10 1.6E-10 1.4E-10 1.2E-10 1.1E-10 9.7E-11 8.8E-11
 7.8E-11 6.7E-11 5.9E-11 5.3E-11 4.6E-11 4.1E-11
 H 3.4E-09 1.9E-09 1.7E-09 1.5E-09 1.3E-09 1.2E-09 1.0E-09 9.3E-10 8.2E-10 7.2E-10 6.4E-10 5.7E-10 5.0E-10 4.4E-10 3.9E-10
 3.5E-10 3.1E-10 2.7E-10 2.4E-10 2.1E-10 1.9E-10 1.6E-10 1.5E-10 1.3E-10 1.1E-10 1.0E-10 8.9E-11 7.9E-11 7.0E-11 6.1E-11
 5.4E-11 4.6E-11 4.2E-11 3.8E-11
 H 2.9E-09 1.9E-09 1.7E-09 1.5E-09 1.3E-09 1.1E-09 1.0E-09 9.0E-10 7.9E-10 7.0E-10 6.2E-10 5.5E-10 4.8E-10 4.3E-10 3.8E-10
 3.3E-10 3.0E-10 2.6E-10 2.3E-10 2.0E-10 1.8E-10 1.6E-10 1.4E-10 1.2E-10 1.1E-10 9.7E-11 8.6E-11 7.6E-11 6.7E-11 6.0E-11
 5.3E-11 4.7E-11 4.1E-11
 H 4.7E-09 2.4E-09 2.1E-09 1.9E-09 1.7E-09 1.5E-09 1.3E-09 1.2E-09 1.0E-09 9.0E-10 7.9E-10 7.0E-10 6.2E-10 5.5E-10 4.9E-10
 4.3E-10 3.8E-10 3.4E-10 3.0E-10 2.6E-10 2.3E-10 2.0E-10 1.8E-10 1.6E-10 1.4E-10 1.3E-10 1.1E-10 9.8E-11 8.8E-11 7.8E-11
 6.8E-11 6.0E-11 5.3E-11 4.7E-11 4.1E-11
 H 8.2E-09 1.0E-09 9.2E-10 8.1E-10 7.2E-10 6.4E-10 5.6E-10 5.0E-10 4.4E-10 3.9E-10 3.4E-10 3.0E-10 2.7E-10 2.4E-10 2.1E-10
 1.9E-10 1.6E-10 1.4E-10 1.3E-10 1.1E-10 1.0E-10 8.8E-11 7.8E-11 6.9E-11 6.1E-11 5.4E-11 4.6E-11 4.2E-11 3.7E-11
 H 2.0E-08 2.5E-08 2.2E-08 2.0E-08 1.7E-08 1.5E-08 1.4E-08 1.2E-08 1.1E-08 9.4E-09 8.3E-09 7.3E-09 6.5E-09 5.7E-09 5.1E-09
 4.5E-09 4.0E-09 3.5E-09 3.1E-09 2.7E-09 2.4E-09 2.1E-09 1.9E-09 1.7E-09 1.5E-09 1.3E-09 1.2E-09 1.0E-09 9.0E-10 8.0E-10
 7.0E-10 6.2E-10 5.5E-10 4.9E-10 4.3E-10 3.8E-10 3.4E-10 3.0E-10 2.6E-10 2.3E-10 2.1E-10 1.8E-10 1.6E-10 1.4E-10 1.3E-10
 1.1E-10 9.8E-11 8.7E-11 7.7E-11 6.8E-11
 H 9.3E-09 8.2E-09 7.3E-09 6.4E-09 5.7E-09 5.0E-09 4.4E-09 3.9E-09 3.5E-09 3.1E-09 2.7E-09 2.4E-09 2.1E-09 1.9E-09 1.7E-09
 1.5E-09 1.3E-09 1.1E-09 1.0E-09 8.9E-10 7.9E-10 7.0E-10 6.2E-10 5.5E-10 4.8E-10 4.3E-10 3.8E-10 3.3E-10 2.9E-10 2.6E-10
 2.3E-10 2.0E-10 1.8E-10 1.6E-10 1.4E-10 1.2E-10 1.1E-10 9.7E-11 8.6E-11 7.6E-11 6.7E-11 5.9E-11 5.2E-11 4.6E-11 4.1E-11
 H 7.6E-10 6.8E-10 6.0E-10 5.3E-10 4.7E-10 4.1E-10 3.6E-10 3.2E-10 2.9E-10 2.5E-10 2.2E-10 2.0E-10 1.7E-10 1.5E-10 1.4E-10

DOSINC.DAT

1.2E-10 1.1E-10 9.4E-11 8.3E-11 7.3E-11 6.5E-11 6.7E-11 5.1E-11 4.5E-11 4.0E-11
 H 2.0E-09 1.3E-09 1.1E-09 1.0E-09 6.9E-10 7.9E-10 6.9E-10 6.1E-10 5.4E-10 4.8E-10 4.2E-10 3.8E-10 3.3E-10 2.9E-10 2.6E-10
 2.3E-10 2.0E-10 1.8E-10 1.6E-10 1.4E-10 1.2E-10 1.1E-10 9.7E-11 8.5E-11 7.6E-11 6.7E-11 5.9E-11 5.2E-11 4.6E-11 4.1E-11

 H 2.7E-09 1.7E-09 1.5E-09 1.4E-09 1.2E-09 1.1E-09 9.4E-10 8.3E-10 7.3E-10 6.5E-10 5.7E-10 5.1E-10 4.5E-10 4.0E-10 3.5E-10
 3.1E-10 2.7E-10 2.4E-10 2.1E-10 1.9E-10 1.7E-10 1.5E-10 1.3E-10 1.2E-10 1.0E-10 9.0E-11 8.0E-11 7.0E-11 6.2E-11 5.5E-11
 4.9E-11 4.3E-11 3.8E-11
 H 1.6E-09 7.9E-10 7.0E-10 6.2E-10 5.4E-10 4.8E-10 4.3E-10 3.8E-10 3.3E-10 2.9E-10 2.6E-10 2.3E-10 2.0E-10 1.8E-10 1.6E-10
 1.4E-10 1.2E-10 1.1E-10 9.7E-11 8.5E-11 7.6E-11 6.7E-11 5.9E-11 5.2E-11 4.6E-11 4.1E-11
 H 5.6E-09 3.7E-09 3.3E-09 2.9E-09 2.8E-09 2.3E-09 2.0E-09 1.8E-09 1.6E-09 1.4E-09 1.2E-09 1.1E-09 9.5E-10 8.4E-10 7.4E-10
 6.8E-10 5.8E-10 5.1E-10 4.5E-10 4.0E-10 3.8E-10 3.1E-10 2.8E-10 2.6E-10 2.2E-10 1.9E-10 1.7E-10 1.5E-10 1.3E-10 1.2E-10
 1.0E-10 9.2E-11 8.1E-11 7.2E-11 6.3E-11 5.6E-11 4.9E-11 4.4E-11 3.9E-11
 H 3.7E-08 3.5E-08 3.1E-08 2.8E-08 2.4E-08 2.2E-08 1.9E-08 1.7E-08 1.5E-08 1.3E-08 1.2E-08 1.0E-08 9.1E-09 8.0E-09 7.1E-09
 6.3E-09 5.6E-09 4.9E-09 4.3E-09 3.8E-09 3.4E-09 3.0E-09 2.8E-09 2.3E-09 2.1E-09 1.8E-09 1.6E-09 1.4E-09 1.3E-09 1.1E-09
 9.9E-10 8.7E-10 7.7E-10 6.8E-10 6.0E-10 5.3E-10 4.7E-10 4.2E-10 3.7E-10 3.3E-10 2.9E-10 2.6E-10 2.3E-10 2.0E-10 1.8E-10
 1.6E-10 1.4E-10 1.2E-10 1.1E-10 9.5E-11
 I BU154 Class: W F1: 0.00100 12/06/87 18:31:52.1 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 3 1 1 2 1 24 13 1 1 1 5 22
 G 5.5E-11 2.3E-11 1.9E-11
 G 7.0E-10
 G 2.1E-09
 G 8.8E-09 2.0E-11
 G 1.8E-08
 G 7.1E-10 5.3E-10 4.8E-10 3.9E-10 3.4E-10 2.9E-10 2.6E-10 2.1E-10 1.8E-10 1.6E-10 1.4E-10 1.2E-10 1.0E-10 8.6E-11 7.4E-11
 6.4E-11 5.5E-11 4.7E-11 4.1E-11 3.5E-11 3.0E-11 2.6E-11 2.2E-11 1.9E-11
 G 3.9E-10 1.1E-10 9.1E-11 7.8E-11 6.7E-11 5.8E-11 5.0E-11 4.3E-11 3.7E-11 3.2E-11 2.7E-11 2.3E-11 2.0E-11
 G 1.2E-10
 G 1.3E-09
 G 1.7E-10
 G 1.2E-11
 G 2.3E-10 3.1E-11 2.7E-11 2.3E-11 2.0E-11
 G 6.1E-10 4.2E-10 3.6E-10 3.1E-10 2.7E-10 2.3E-10 2.0E-10 1.7E-10 1.5E-10 1.3E-10 1.1E-10 9.4E-11 8.1E-11 6.9E-11 6.0E-11
 5.1E-11 4.4E-11 3.8E-11 3.3E-11 2.8E-11 2.4E-11 2.1E-11
 26 24 24 25 28 47 38 17 21 23 18 28 45
 H 5.9E-08 3.2E-09 2.4E-09 2.0E-09 1.7E-09 1.5E-09 1.3E-09 1.1E-09 9.5E-10 8.2E-10 7.0E-10 6.1E-10 5.2E-10 4.5E-10 3.8E-10
 3.3E-10 2.8E-10 2.4E-10 2.1E-10 1.8E-10 1.6E-10 1.3E-10 1.1E-10 9.9E-11 8.5E-11 7.3E-11
 H 3.7E-09 2.8E-09 1.7E-09 1.6E-09 1.3E-09 1.1E-09 9.4E-10 8.1E-10 6.9E-10 6.0E-10 5.1E-10 4.4E-10 3.8E-10 3.3E-10 2.8E-10
 2.4E-10 2.1E-10 1.8E-10 1.6E-10 1.3E-10 1.1E-10 9.7E-11 8.4E-11 7.2E-11
 H 3.3E-09 1.9E-09 1.7E-09 1.4E-09 1.2E-09 1.0E-09 9.0E-10 7.8E-10 6.7E-10 5.7E-10 4.9E-10 4.2E-10 3.6E-10 3.1E-10 2.7E-10
 2.3E-10 2.0E-10 1.7E-10 1.5E-10 1.3E-10 1.1E-10 9.4E-11 8.0E-11 6.9E-11
 H 8.3E-09 2.6E-09 2.1E-09 1.8E-09 1.6E-09 1.3E-09 1.2E-09 1.0E-09 8.6E-10 7.4E-10 6.3E-10 5.4E-10 4.7E-10 4.0E-10 3.5E-10
 3.0E-10 2.8E-10 2.2E-10 1.9E-10 1.6E-10 1.4E-10 1.2E-10 1.0E-10 8.9E-11 7.8E-11
 H 1.0E-08 1.1E-09 9.1E-10 7.8E-10 6.7E-10 5.8E-10 5.0E-10 4.3E-10 3.7E-10 3.2E-10 2.7E-10 2.3E-10 2.0E-10 1.7E-10 1.5E-10
 1.3E-10 1.1E-10 9.4E-11 8.1E-11 7.0E-11
 H 6.7E-08 6.4E-08 5.5E-08 4.8E-08 4.1E-08 3.5E-08 3.0E-08 2.6E-08 2.2E-08 1.9E-08 1.7E-08 1.4E-08 1.2E-08 1.0E-08 9.0E-09
 7.8E-09 6.7E-09 5.7E-09 4.9E-09 4.2E-09 3.6E-09 3.1E-09 2.7E-09 2.3E-09 2.0E-09 1.7E-09 1.5E-09 1.3E-09 1.1E-09 9.4E-10
 8.0E-10 6.9E-10 5.9E-10 5.1E-10 4.4E-10 3.8E-10 3.2E-10 2.8E-10 2.4E-10 2.1E-10 1.8E-10 1.5E-10 1.3E-10 1.1E-10 9.7E-11
 8.3E-11 7.2E-11
 H 1.4E-08 1.3E-08 1.1E-08 9.5E-09 8.2E-09 7.0E-09 6.1E-09 5.2E-09 4.5E-09 3.9E-09 3.3E-09 2.8E-09 2.4E-09 2.1E-09 1.8E-09
 1.6E-09 1.3E-09 1.1E-09 9.9E-10 8.5E-10 7.3E-10 6.3E-10 5.4E-10 4.6E-10 4.0E-10 3.4E-10 3.0E-10 2.6E-10 2.2E-10 1.9E-10

DOSINC.DAT

1.6E-10 1.4E-10 1.2E-10 1.0E-10 8.8E-11 7.6E-11
 H 8.2E-10 7.1E-10 6.1E-10 5.3E-10 4.6E-10 3.9E-10 3.3E-10 2.9E-10 2.5E-10 2.1E-10 1.8E-10 1.6E-10 1.3E-10 1.2E-10 1.0E-10
 8.6E-11 7.4E-11
 H 2.2E-09 1.4E-09 1.2E-09 1.0E-09 8.6E-10 7.4E-10 6.4E-10 5.5E-10 4.7E-10 4.0E-10 3.5E-10 3.0E-10 2.6E-10 2.2E-10 1.9E-10
 1.6E-10 1.4E-10 1.2E-10 1.0E-10 8.9E-11 7.7E-11
 H 2.8E-09 1.8E-09 1.5E-09 1.3E-09 1.1E-09 9.7E-10 8.4E-10 7.2E-10 6.2E-10 5.3E-10 4.6E-10 3.9E-10 3.4E-10 2.9E-10 2.5E-10
 2.2E-10 1.8E-10 1.6E-10 1.4E-10 1.2E-10 1.0E-10 8.7E-11 7.5E-11
 H 1.0E-09 7.7E-10 6.6E-10 5.7E-10 4.9E-10 4.2E-10 3.6E-10 3.1E-10 2.7E-10 2.3E-10 2.0E-10 1.7E-10 1.5E-10 1.3E-10 1.1E-10
 9.3E-11 8.0E-11 6.8E-11
 H 6.4E-09 3.8E-09 3.3E-09 2.8E-09 2.4E-09 2.1E-09 1.8E-09 1.5E-09 1.3E-09 1.1E-09 9.8E-10 8.4E-10 7.3E-10 6.2E-10 5.4E-10
 4.6E-10 4.0E-10 3.4E-10 2.9E-10 2.5E-10 2.2E-10 1.9E-10 1.6E-10 1.4E-10 1.2E-10 1.0E-10 8.7E-11 7.5E-11
 H 5.5E-08 5.1E-08 4.4E-08 3.8E-08 3.3E-08 2.8E-08 2.4E-08 2.1E-08 1.8E-08 1.5E-08 1.3E-08 1.1E-08 9.8E-09 8.4E-09 7.2E-09
 6.2E-09 5.3E-09 4.6E-09 4.0E-09 3.4E-09 2.9E-09 2.5E-09 2.2E-09 1.9E-09 1.6E-09 1.4E-09 1.2E-09 1.0E-09 8.7E-10 7.5E-10
 6.4E-10 5.5E-10 4.8E-10 4.1E-10 3.5E-10 3.0E-10 2.6E-10 2.2E-10 1.9E-10 1.7E-10 1.4E-10 1.2E-10 1.1E-10 9.8E-11 7.8E-11

! BU155 Class: W F1: 0.00100 12/05/87 18:40:52.2 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 16 17

1 1 1 1 1 20 9 1 1 1 1 15

G 2.6E-12

G 9.7E-11

G 2.8E-10

G 1.2E-09

G 3.5E-09

G 2.5E-10 1.9E-10 1.6E-10 1.3E-10 1.0E-10 8.2E-11 6.7E-11 5.4E-11 4.4E-11 3.5E-11 2.9E-11 2.3E-11 1.9E-11 1.5E-11 1.2E-11

9.9E-12 8.8E-12 8.5E-12 5.2E-12 4.2E-12

G 6.8E-11 1.9E-11 1.5E-11 1.2E-11 9.9E-12 8.8E-12 6.5E-12 5.2E-12 4.2E-12

G 6.4E-12

G 9.6E-11

G 1.1E-11

G 3.8E-13

G 1.4E-11

G 8.3E-11 6.2E-11 5.0E-11 4.1E-11 3.3E-11 2.7E-11 2.2E-11 1.7E-11 1.4E-11 1.1E-11 9.2E-12 7.5E-12 6.8E-12 4.9E-12 3.9E-12

10 8 8 9 5 34 23 2 4 7 3 11 28

H 1.1E-08 2.5E-10 1.3E-10 1.1E-10 8.7E-11 7.1E-11 5.7E-11 4.8E-11 3.7E-11 3.0E-11

H 2.4E-10 1.0E-10 8.1E-11 6.6E-11 5.3E-11 4.3E-11 3.5E-11 2.8E-11

H 2.5E-10 9.7E-11 7.8E-11 6.9E-11 5.1E-11 4.1E-11 3.3E-11 2.7E-11

H 7.8E-10 1.4E-10 1.1E-10 9.1E-11 7.4E-11 6.0E-11 4.8E-11 3.9E-11 3.2E-11

H 1.8E-09 5.2E-11 4.1E-11 3.3E-11 2.7E-11

H 2.6E-08 2.3E-08 1.9E-08 1.5E-08 1.2E-08 1.0E-08 8.1E-09 6.5E-09 5.3E-09 4.3E-09 3.5E-09 2.8E-09 2.3E-09 1.8E-09 1.5E-09

1.2E-09 9.7E-10 7.8E-10 6.3E-10 5.1E-10 4.2E-10 3.4E-10 2.7E-10 2.2E-10 1.8E-10 1.4E-10 1.2E-10 9.4E-11 7.8E-11 6.2E-11

5.8E-11 4.0E-11 3.3E-11 2.6E-11

H 2.8E-09 2.3E-09 1.8E-09 1.5E-09 1.2E-09 9.7E-10 7.9E-10 6.4E-10 5.2E-10 4.2E-10 3.4E-10 2.7E-10 2.2E-10 1.8E-10 1.4E-10

1.2E-10 9.5E-11 7.8E-11 6.2E-11 5.0E-11 4.0E-11 3.3E-11 2.6E-11

H 3.3E-11 2.7E-11

H 1.1E-10 4.9E-11 3.9E-11 3.2E-11

H 1.8E-10 8.8E-11 7.1E-11 5.7E-11 4.6E-11 3.8E-11 3.0E-11

H 7.8E-11 3.4E-11 2.7E-11

H 5.8E-10 2.1E-10 1.7E-10 1.4E-10 1.1E-10 9.0E-11 7.3E-11 5.9E-11 4.8E-11 3.9E-11 3.1E-11

H 8.4E-09 7.5E-09 6.1E-09 4.9E-09 4.0E-09 3.2E-09 2.6E-09 2.1E-09 1.7E-09 1.4E-09 1.1E-09 9.1E-10 7.3E-10 5.9E-10 4.8E-10

3.9E-10 3.1E-10 2.5E-10 2.1E-10 1.7E-10 1.3E-10 1.1E-10 8.8E-11 7.1E-11 5.8E-11 4.7E-11 3.8E-11 3.0E-11

DOSINC.DAT

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I TH230 Class: Y F1: 0.00020 12/05/87 10:52:00.3 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
2 2 2 2 2 50 50 2 2 2 2 0
G 2.2E-10 1.5E-10
G 1.3E-09 1.5E-10
G 3.0E-09 1.5E-10
G 1.0E-08 1.5E-10
G 4.9E-08 1.5E-10
G 1.3E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07 1.0E-07 9.9E-08 9.6E-08 9.3E-08 9.1E-08 8.8E-08
8.5E-08 8.3E-08 8.1E-08 7.8E-08 7.6E-08 7.4E-08 7.2E-08 7.0E-08 6.8E-08 6.6E-08 6.4E-08 6.2E-08 6.0E-08 5.8E-08 5.7E-08
5.5E-08 5.3E-08 5.2E-08 5.0E-08 4.9E-08 4.8E-08 4.6E-08 4.5E-08 4.4E-08 4.2E-08 4.1E-08 4.0E-08 3.9E-08 3.8E-08 3.7E-08
3.5E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08
G 1.1E-08 1.1E-08 1.0E-08 1.0E-08 9.7E-09 9.4E-09 9.1E-09 8.8E-09 8.6E-09 8.3E-09 8.1E-09 7.8E-09 7.6E-09 7.4E-09 7.2E-09
7.0E-09 6.8E-09 6.6E-09 6.4E-09 6.2E-09 6.0E-09 5.8E-09 5.7E-09 5.5E-09 5.3E-09 5.2E-09 5.0E-09 4.9E-09 4.8E-09 4.6E-09
4.5E-09 4.4E-09 4.2E-09 4.1E-09 4.0E-09 3.9E-09 3.8E-09 3.7E-09 3.5E-09 3.4E-09 3.3E-09 3.2E-09 3.1E-09 3.0E-09
2.9E-09 2.8E-09 2.7E-09 2.6E-09 2.6E-09
G 2.2E-10 1.5E-10
G 2.2E-10 1.5E-10
G 2.2E-10 1.5E-10
G 2.2E-10 1.5E-10
G 1.0E-09 1.3E-09 8.8E-10 8.2E-10 4.3E-10 3.0E-10 2.1E-10 1.5E-10
50 1 1 1 1 50 50 1 1 1 1 1
H 6.0E-05 4.2E-05 3.0E-05 2.2E-05 1.8E-05 1.2E-05 9.6E-06 7.7E-06 6.2E-06 5.2E-06 4.4E-06 3.8E-06 3.3E-06 3.0E-06 2.7E-06
2.5E-06 2.4E-06 2.3E-06 2.2E-06 2.1E-06 2.1E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06
1.9E-06 1.9E-06 1.9E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06
2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06
H 8.7E-09
H 9.6E-09
H 1.6E-08
H 3.3E-08
H 4.8E-08 9.1E-08 1.3E-08 1.6E-08 1.9E-08 2.1E-08 2.3E-08 2.4E-08 2.5E-08 2.5E-08 2.5E-08 2.5E-08 2.5E-08 2.5E-08 2.4E-08
2.4E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08 2.1E-08 2.1E-08 2.0E-08 2.0E-08 1.9E-08 1.9E-08 1.8E-08 1.7E-08 1.7E-08 1.7E-08
1.6E-08 1.6E-08 1.5E-08 1.5E-08 1.4E-08 1.4E-08 1.3E-08 1.3E-08 1.3E-08 1.2E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08
1.0E-08 1.0E-08 9.8E-09 9.5E-09 9.2E-09
H 4.0E-07 7.5E-07 1.1E-07 1.4E-07 1.6E-07 1.8E-07 1.9E-07 2.0E-07 2.0E-07 2.1E-07 2.1E-07 2.1E-07 2.0E-07 2.0E-07 2.0E-07
1.9E-07 1.9E-07 1.9E-07 1.8E-07 1.8E-07 1.7E-07 1.7E-07 1.6E-07 1.6E-07 1.6E-07 1.5E-07 1.5E-07 1.4E-07 1.4E-07 1.3E-07
1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07 1.0E-07 9.8E-08 9.5E-08 9.2E-08 8.9E-08 8.7E-08
8.4E-08 8.2E-08 8.0E-08 7.7E-08 7.5E-08
H 8.2E-09
H 8.2E-09
H 8.2E-09
H 8.2E-09
H 6.7E-08 1.1E-07 1.3E-07 1.4E-07 1.4E-07 1.4E-07 1.2E-07 1.1E-07 9.6E-08 8.2E-08 6.9E-08
I RA228 Class: W F1: 0.20000 12/05/87 10:52:17.7 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 50 50 1 1 1 1
G 2.5E-09
G 3.8E-09
G 4.7E-09
G 1.5E-08
G 4.2E-08

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DOSINC.DAT

G 5.7E-07 4.5E-07 3.8E-07 3.3E-07 2.9E-07 2.7E-07 2.4E-07 2.2E-07 2.0E-07 1.9E-07 1.8E-07 1.7E-07 1.6E-07 1.5E-07 1.4E-07
 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.0E-07 9.7E-08 9.3E-08 8.9E-08 8.5E-08 8.2E-08 7.8E-08 7.5E-08 7.2E-08 6.9E-08
 6.7E-08 6.4E-08 6.2E-08 5.9E-08 5.7E-08 5.5E-08 5.3E-08 5.1E-08 4.9E-08 4.7E-08 4.6E-08 4.4E-08 4.3E-08 4.1E-08 4.0E-08
 3.8E-08 3.7E-08 3.6E-08 3.5E-08 3.3E-08
 G 6.0E-08 5.0E-08 4.3E-08 3.7E-08 3.2E-08 2.8E-08 2.5E-08 2.2E-08 2.0E-08 1.7E-08 1.6E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08
 9.7E-09 8.9E-09 8.2E-09 7.6E-09 7.0E-09 6.5E-09 6.0E-09 5.6E-09 5.2E-09 4.8E-09 4.5E-09 4.2E-09 3.9E-09 3.6E-09 3.4E-09
 3.2E-09 2.9E-09 2.8E-09 2.6E-09 2.4E-09 2.2E-09 2.1E-09 2.0E-09 1.8E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09
 1.1E-09 1.1E-09 1.0E-09 9.4E-10 8.0E-10
 G 2.5E-09
 G 2.5E-09
 G 2.5E-09
 G 2.5E-09
 2 1 1 1 1 50 11 1 1 1 1
 H 1.8E-05 1.4E-07
 H 3.3E-09
 H 3.9E-09
 H 9.2E-09
 H 2.3E-08
 H 5.9E-07 5.0E-07 4.2E-07 3.7E-07 3.3E-07 3.0E-07 2.7E-07 2.5E-07 2.3E-07 2.1E-07 2.0E-07 1.8E-07 1.7E-07 1.6E-07 1.5E-07
 1.5E-07 1.4E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.0E-07 9.9E-08 9.5E-08 9.1E-08 8.7E-08 8.4E-08 8.0E-08 7.7E-08
 7.4E-08 7.1E-08 6.9E-08 6.6E-08 6.4E-08 6.1E-08 5.9E-08 5.7E-08 5.5E-08 5.3E-08 5.1E-08 4.9E-08 4.7E-08 4.6E-08 4.4E-08
 4.3E-08 4.1E-08 4.0E-08 3.8E-08 3.7E-08
 H 6.2E-08 5.6E-08 4.8E-08 4.2E-08 3.6E-08 3.2E-08 2.8E-08 2.5E-08 2.2E-08 2.0E-08 1.8E-08
 H 2.8E-09
 H 2.8E-09
 H 2.8E-09
 H 2.8E-09
 ! PB210 Class: D F1: 0.20000 12/05/87 20:45:04.7 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 37 38 38 38 38 50 50 37 38 37 36 50 50
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DOSINC.DAT

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 H 4.4E-08 3.2E-08 1.9E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08 1.1E-08 1.0E-08 9.8E-09 9.3E-09 8.8E-09 8.4E-09 7.9E-09

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7.5E-09 7.1E-09 6.8E-09 6.4E-09 6.1E-09 5.8E-09 5.5E-09 5.2E-09 5.0E-09 4.7E-09 4.5E-09 4.2E-09 4.0E-09 3.8E-09 3.6E-09
3.4E-09 3.3E-09 3.1E-09 2.9E-09 2.8E-09 2.6E-09 2.5E-09
H 4.4E-08 3.1E-08 1.9E-08 1.5E-08 1.3E-08 1.3E-08 1.2E-08 1.1E-08 1.1E-08 1.0E-08 9.7E-09 9.2E-09 8.7E-09 8.3E-09 7.8E-09
7.4E-09 7.1E-09 6.7E-09 6.4E-09 6.0E-09 5.7E-09 5.4E-09 5.2E-09 4.9E-09 4.7E-09 4.4E-09 4.2E-09 4.0E-09 3.8E-09 3.6E-09
3.4E-09 3.2E-09 3.1E-09 2.9E-09 2.8E-09 2.6E-09 2.5E-09
H 2.1E-08 1.5E-08 8.0E-07 6.9E-07 6.2E-07 5.8E-07 5.5E-07 5.1E-07 4.9E-07 4.6E-07 4.3E-07 4.1E-07 3.9E-07 3.7E-07 3.5E-07
3.3E-07 3.1E-07 2.9E-07 2.8E-07 2.6E-07 2.5E-07 2.3E-07 2.2E-07 2.1E-07 2.0E-07 1.9E-07 1.8E-07 1.7E-07 1.6E-07 1.5E-07
1.4E-07 1.3E-07 1.3E-07 1.2E-07 1.1E-07 1.1E-07 1.0E-07 9.5E-08 8.9E-08 8.5E-08 8.0E-08 7.5E-08 7.1E-08 6.7E-08 6.4E-08
6.0E-08 5.7E-08 5.4E-08 5.1E-08 4.8E-08
H 9.7E-07 8.9E-07 4.1E-07 3.2E-07 2.9E-07 2.7E-07 2.5E-07 2.4E-07 2.3E-07 2.1E-07 2.0E-07 1.9E-07 1.8E-07 1.7E-07 1.6E-07
1.5E-07 1.4E-07 1.4E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.0E-07 9.7E-08 9.2E-08 8.7E-08 8.2E-08 7.8E-08 7.3E-08 6.9E-08
6.6E-08 6.2E-08 5.9E-08 5.5E-08 5.2E-08 4.9E-08 4.7E-08 4.4E-08 4.2E-08 3.9E-08 3.7E-08 3.5E-08 3.3E-08 3.1E-08 3.0E-08
2.8E-08 2.7E-08 2.5E-08 2.4E-08 2.2E-08
I BI210 Class: W F1: 0.05000 12/05/87 21:12:09.1 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 16
1 1 1 1 1 1 1 1 1 1 1 1
Q 2.0E-11
Q 4.7E-10
Q 1.1E-09
Q 5.8E-09
Q 1.5E-08
Q 1.0E-11
Q 2.0E-11
Q 2.0E-11
Q 2.0E-11
Q 2.0E-11
Q 2.0E-11
Q 5.8E-09
2 1 1 1 1 1 1 1 1 1 1 1
H 4.3E-07 6.9E-10
H 2.5E-10
H 4.8E-10
H 2.3E-09
H 6.0E-09
H 3.8E-11
H 6.7E-11
H 6.7E-11
H 6.6E-11
H 6.7E-11
H 6.6E-11
H 1.9E-08
I P0210 Class: W F1: 0.10000 12/05/87 21:28:32.5 Acute Sv/Bq
14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
1 1 1 1 1 1 1 1 1 1 1 1 1 2
Q 8.5E-08
Q 9.5E-08
Q 9.7E-08
Q 1.1E-07
Q 1.4E-07
Q 4.2E-08
Q 8.4E-08

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DOSINC.DAT

G 0.4E-08
 G 0.4E-08
 Q 0.5E-08
 Q 0.4E-08
 G 4.4E-07
 Q 2.0E-08
 G 4.4E-08 4.5E-09
 2 1 1 1 1 1 1 1 1 1 2 2
 H 1.3E-06 1.8E-08
 H 1.5E-07
 H 1.5E-07
 H 1.5E-07
 H 1.7E-07
 H 0.5E-08
 H 1.3E-07
 H 1.3E-07
 H 1.3E-07
 H 1.3E-07
 H 1.3E-07
 H 0.7E-07
 H 3.9E-06 1.6E-08
 H 0.7E-08 2.7E-08
 ! U 234 Class: Y F1: 0.00200 12/05/87 21:34:50.5 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 18
 1 1 1 1 1 50 22 1 1 1 1 21
 G 0.6E-11
 G 1.2E-09
 G 2.8E-09
 G 1.7E-08
 G 5.0E-08
 G 4.0E-09 2.2E-09 2.1E-09 2.0E-09 1.9E-09 1.8E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09 1.3E-09 1.3E-09 1.2E-09 1.2E-09
 1.1E-09 1.0E-09 9.9E-10 9.4E-10 8.9E-10 8.5E-10 8.1E-10 7.7E-10 7.3E-10 6.9E-10 6.6E-10 6.3E-10 6.0E-10 5.7E-10 5.4E-10
 5.1E-10 4.9E-10 4.6E-10 4.4E-10 4.2E-10 4.0E-10 3.8E-10 3.6E-10 3.4E-10 3.3E-10 3.1E-10 2.9E-10 2.8E-10 2.7E-10 2.5E-10
 2.4E-10 2.3E-10 2.2E-10 2.1E-10 2.0E-10
 G 3.1E-10 1.4E-10 1.4E-10 1.3E-10 1.2E-10 1.2E-10 1.1E-10 1.0E-10 9.9E-11 9.4E-11 8.9E-11 8.4E-11 8.0E-11 7.6E-11 7.2E-11
 6.9E-11 6.6E-11 6.2E-11 5.9E-11 5.6E-11 5.3E-11 5.0E-11
 G 0.6E-11
 G 0.6E-11
 G 0.6E-11
 G 0.6E-11
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 1.2E-10 1.0E-10 8.5E-11 7.2E-11 6.1E-11 5.1E-11
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 2.5E-06 2.4E-06 2.2E-06 2.1E-06 2.1E-06 2.0E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06
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 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
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 H 1.8E-09
 H 8.9E-09
 H 2.8E-08

DOSINC.DAT

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H 3.7E-10
H 3.7E-10
H 3.7E-10
H 5.7E-08
! U 236 Class: Y F1: 0.00200 12/05/87 21:43:08.9 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 16
1 1 1 1 1 50 22 1 1 1 1 21
G 6.2E-11
G 1.1E-09
G 2.6E-09
G 1.5E-08
G 4.7E-08
G 3.8E-09 2.1E-09 2.0E-09 1.9E-09 1.8E-09 1.7E-09 1.6E-09 1.8E-09 1.5E-09 1.4E-09 1.3E-09 1.3E-09 1.2E-09 1.2E-09 1.1E-09
1.8E-09 9.9E-10 9.4E-10 8.9E-10 8.5E-10 8.1E-10 7.7E-10 7.3E-10 6.9E-10 6.6E-10 6.3E-10 6.0E-10 5.7E-10 5.4E-10 5.1E-10
4.9E-10 4.6E-10 4.4E-10 4.2E-10 4.0E-10 3.8E-10 3.6E-10 3.4E-10 3.2E-10 3.1E-10 2.9E-10 2.8E-10 2.7E-10 2.5E-10 2.4E-10
2.3E-10 2.2E-10 2.1E-10 2.0E-10 1.9E-10
G 2.9E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.1E-10 1.0E-10 9.8E-11 9.3E-11 8.8E-11 8.3E-11 7.9E-11 7.5E-11 7.1E-11 6.8E-11
6.4E-11 6.1E-11 5.8E-11 5.5E-11 5.2E-11 5.0E-11 4.7E-11
G 6.1E-11
G 6.4E-11
G 6.2E-11
G 6.2E-11
G 1.0E-08 1.2E-09 1.0E-09 8.8E-10 7.4E-10 6.2E-10 5.3E-10 4.5E-10 3.8E-10 3.2E-10 2.7E-10 2.3E-10 1.9E-10 1.6E-10 1.4E-10
1.2E-10 9.8E-11 8.3E-11 7.0E-11 5.9E-11 5.0E-11
50 1 1 1 1 1 1 1 1 1 1 1
H 5.8E-05 4.1E-05 2.9E-05 2.1E-05 1.6E-05 1.2E-05 9.2E-06 7.3E-06 5.9E-06 4.9E-06 4.1E-06 3.6E-06 3.1E-06 2.8E-06 2.6E-06
2.4E-06 2.2E-06 2.1E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.9E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06
1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06
H 8.8E-10
H 1.8E-09
H 8.1E-09
H 2.5E-08
H 1.8E-08
H 1.4E-09
H 3.4E-10
H 3.4E-10
H 3.5E-10
H 3.4E-10
H 5.5E-08
! U 235 Class: Y F1: 0.00200 12/05/87 21:58:02.7 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 16
1 1 1 1 1 50 19 1 1 1 1 20
G 6.4E-11
G 1.2E-09
G 3.0E-09
G 1.7E-08
G 5.4E-08

```

5.920

9/30/88

Q 3.7E-09 2.0E-09 1.9E-09 1.8E-09 1.8E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09 1.4E-09 1.3E-09 1.2E-09 1.2E-09 1.1E-09 1.1E-09
 1.0E-09 9.6E-10 9.1E-10 8.6E-10 8.2E-10 7.8E-10 7.4E-10 7.1E-10 6.7E-10 6.4E-10 6.1E-10 5.8E-10 5.5E-10 5.2E-10 5.0E-10
 4.7E-10 4.5E-10 4.3E-10 4.1E-10 3.9E-10 3.7E-10 3.5E-10 3.3E-10 3.1E-10 3.0E-10 2.8E-10 2.7E-10 2.6E-10 2.4E-10 2.3E-10
 2.2E-10 2.1E-10 2.0E-10 1.9E-10 1.8E-10
 Q 3.5E-10 1.3E-10 1.2E-10 1.2E-10 1.1E-10 1.1E-10 1.0E-10 9.6E-11 9.1E-11 8.7E-11 8.2E-11 7.8E-11 7.4E-11 7.0E-11 6.7E-11
 6.3E-11 6.0E-11 5.7E-11 5.4E-11
 Q 7.9E-11
 Q 3.0E-10
 Q 8.4E-11
 Q 6.2E-11
 Q 9.8E-09 1.2E-09 1.0E-09 8.5E-10 7.2E-10 6.1E-10 5.1E-10 4.3E-10 3.7E-10 3.1E-10 2.6E-10 2.2E-10 1.9E-10 1.6E-10 1.3E-10
 1.1E-10 9.5E-11 8.0E-11 6.8E-11 5.7E-11
 50 1 1 1 1 1 1 1 1 1 1
 H 5.7E-06 4.0E-06 2.6E-06 2.1E-06 1.5E-06 1.2E-06 9.0E-07 7.2E-07 5.0E-07 4.8E-07 4.1E-07 3.5E-07 3.1E-07 2.0E-07 2.5E-06
 2.3E-06 2.2E-06 2.1E-06 2.0E-06 1.9E-06 1.9E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.7E-06 1.7E-06 1.7E-06
 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06
 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06
 H 1.7E-09
 H 2.0E-09
 H 9.5E-09
 H 2.9E-08
 H 1.6E-08
 H 2.1E-09
 H 3.8E-10
 H 5.1E-10
 H 9.4E-10
 H 8.7E-10
 H 5.4E-08
 (TH231 Class: Y F1: 0.00020 12/05/87 23:58:01.0 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1
 G 1.4E-13
 G 1.9E-10
 G 4.6E-10
 G 1.9E-09
 G 3.4E-09
 G 2.1E-12
 G 5.2E-12
 G 5.3E-13
 G 2.1E-11
 G 1.4E-12
 G 8.7E-15
 G 9.9E-13
 10 1 1 1 1 50 1 1 1 1 1 1
 H 7.9E-10 4.4E-12 3.6E-12 3.0E-12 2.4E-12 2.0E-12 1.7E-12 1.5E-12 1.3E-12 1.1E-12
 H 6.4E-11
 H 1.5E-10
 H 6.2E-10
 H 1.1E-09
 H 1.0E-11 8.0E-08 1.6E-12 2.3E-12 3.0E-12 3.6E-12 4.2E-12 4.8E-12 5.2E-12 5.6E-12 6.0E-12 6.2E-12 6.5E-12 6.7E-12 6.8E-12
 6.9E-12 7.0E-12 7.1E-12 7.1E-12 7.1E-12 7.1E-12 7.1E-12 7.0E-12 7.0E-12 6.9E-12 6.9E-12 6.8E-12 6.7E-12 6.6E-12 6.5E-12

DOSINC.DAT

6.4E-12 6.3E-12 6.2E-12 6.1E-12 6.0E-12 5.9E-12 5.8E-12 5.6E-12 5.5E-12 5.4E-12 5.3E-12 5.2E-12 5.1E-12 5.0E-12 4.9E-12
 4.7E-12 4.6E-12 4.5E-12 4.4E-12 4.3E-12
 H 3.7E-12
 H 2.7E-13
 H 6.9E-12
 H 1.4E-12
 H 2.8E-13
 H 1.5E-12
 I PA231 Class: Y F1: 0.00100 12/06/07 00:51:59.0 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 16
 1 1 1 1 1 50 50 1 1 1 1 1 1
 Q 8.1E-12
 G 1.2E-09
 Q 3.0E-09
 Q 1.7E-08
 Q 5.4E-08
 Q 4.6E-07 5.4E-07 6.1E-07 6.9E-07 7.6E-07 8.2E-07 8.9E-07 9.5E-07 1.0E-06 1.1E-06 1.1E-06 1.2E-06 1.2E-06 1.2E-06 1.3E-06
 1.3E-06 1.4E-06 1.4E-06 1.4E-06 1.5E-06 1.5E-06 1.5E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.7E-06 1.7E-06 1.7E-06
 1.7E-06 1.7E-06 1.7E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
 G 3.6E-08 4.2E-08 4.8E-08 5.4E-08 6.0E-08 6.5E-08 7.0E-08 7.5E-08 8.0E-08 8.4E-08 8.8E-08 9.2E-08 9.6E-08 9.9E-08 1.0E-07
 1.1E-07 1.1E-07 1.1E-07 1.1E-07 1.2E-07 1.2E-07 1.2E-07 1.2E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07
 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.5E-07 1.5E-07
 1.5E-07 1.5E-07 1.5E-07 1.5E-07 1.5E-07
 G 1.1E-11
 G 7.1E-11
 G 1.3E-11
 G 7.8E-12
 G 4.7E-09
 G 6.7E-09
 50 1 1 1 1 50 50 1 1 1 1 1 1
 H 8.0E-05 5.7E-05 4.8E-05 3.6E-05 3.2E-05 2.6E-05 2.2E-05 1.9E-05 1.6E-05 1.4E-05 1.3E-05 1.2E-05 1.1E-05 1.0E-05 9.6E-06
 9.2E-06 9.0E-06 8.8E-06 8.7E-06 8.7E-06 8.7E-06 8.7E-06 8.8E-06 8.9E-06 9.0E-06 9.1E-06 9.2E-06 9.3E-06 9.5E-06 9.6E-06
 9.7E-06 9.9E-06 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05
 1.1E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05
 H 9.0E-10
 H 1.7E-09
 H 9.1E-09
 H 2.6E-08
 H 3.5E-05 7.8E-06 1.3E-05 1.8E-05 2.4E-05 2.9E-05 3.5E-05 4.0E-05 4.4E-05 4.8E-05 5.2E-05 5.6E-05 5.9E-05 6.2E-05 6.5E-05
 6.7E-05 7.0E-05 7.2E-05 7.4E-05 7.6E-05 7.8E-05 7.9E-05 8.1E-05 8.2E-05 8.3E-05 8.5E-05 8.6E-05 8.7E-05 8.8E-05 8.9E-05
 8.9E-05 9.0E-05 9.1E-05 9.1E-05 9.2E-05 9.3E-05 9.3E-05 9.4E-05 9.4E-05 9.4E-05 9.5E-05 9.5E-05 9.5E-05 9.5E-05 9.5E-05
 9.6E-05 9.6E-05 9.6E-05 9.6E-05 9.6E-05
 H 2.8E-07 8.1E-07 1.0E-06 1.4E-06 1.9E-06 2.3E-06 2.7E-06 3.1E-06 3.5E-06 3.8E-06 4.1E-06 4.4E-06 4.7E-06 4.9E-06 5.2E-06
 5.4E-06 5.5E-06 5.7E-06 5.9E-06 6.0E-06 6.2E-06 6.3E-06 6.4E-06 6.5E-06 6.6E-06 6.7E-06 6.8E-06 6.9E-06 7.0E-06 7.0E-06
 7.1E-06 7.2E-06 7.2E-06 7.3E-06 7.3E-06 7.4E-06 7.4E-06 7.4E-06 7.5E-06 7.5E-06 7.5E-06 7.5E-06 7.6E-06 7.6E-06 7.6E-06
 7.6E-06 7.6E-06 7.6E-06 7.6E-06 7.6E-06
 H 9.0E-11
 H 1.3E-10
 H 2.6E-10
 H 1.7E-10

DOSINC.DAT

H 4.8E-08
 H 8.6E-08
 I AC227 Class: Y F1: 0.00100 12/06/87 01:45:43.4 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 G 1.0E-11
 G 4.9E-11
 G 1.5E-10
 G 1.3E-09
 G 7.6E-09
 Q 2.7E-06 2.9E-06 2.8E-06 2.7E-06 2.8E-06 2.5E-06 2.4E-06 2.3E-06 2.2E-06 2.1E-06 2.1E-06 2.0E-06 1.9E-06 1.8E-06 1.8E-06
 1.7E-06 1.6E-06 1.6E-06 1.5E-06 1.4E-06 1.4E-06 1.3E-06 1.3E-06 1.2E-06 1.2E-06 1.1E-06 1.1E-06 1.1E-06 1.0E-06 9.8E-07
 9.5E-07 9.1E-07 8.7E-07 8.4E-07 8.1E-07 7.8E-07 7.5E-07 7.2E-07 6.9E-07 6.7E-07 6.4E-07 6.2E-07 5.9E-07 5.7E-07 5.5E-07
 5.3E-07 5.1E-07 4.9E-07 4.7E-07 4.5E-07
 G 2.1E-07 2.3E-07 2.2E-07 2.1E-07 2.1E-07 2.0E-07 1.9E-07 1.8E-07 1.8E-07 1.7E-07 1.6E-07 1.6E-07 1.5E-07 1.5E-07 1.4E-07
 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.0E-07 9.9E-08 9.5E-08 9.1E-08 8.8E-08 8.5E-08 8.1E-08 7.8E-08
 7.5E-08 7.2E-08 7.0E-08 6.7E-08 6.5E-08 6.2E-08 6.0E-08 5.7E-08 5.5E-08 5.3E-08 5.1E-08 4.9E-08 4.7E-08 4.6E-08 4.4E-08
 4.2E-08 4.1E-08 3.9E-08 3.8E-08 3.6E-08
 Q 2.9E-08 3.1E-08 3.0E-08 2.9E-08 2.8E-08 2.7E-08 2.6E-08 2.5E-08 2.4E-08 2.3E-08 2.2E-08 2.1E-08 2.0E-08 2.0E-08 1.9E-08
 1.8E-08 1.8E-08 1.7E-08 1.6E-08 1.6E-08 1.5E-08 1.4E-08 1.4E-08 1.3E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08
 1.0E-08 9.8E-09 9.4E-09 9.1E-09 8.7E-09 8.4E-09 8.1E-09 7.8E-09 7.5E-09 7.2E-09 6.9E-09 6.7E-09 6.4E-09 6.2E-09 5.9E-09
 5.7E-09 5.5E-09 5.3E-09 5.1E-09 4.9E-09
 G 1.5E-11
 G 7.4E-12
 G 3.4E-12
 G 7.2E-07 7.0E-07 7.4E-07 7.0E-07 6.7E-07 6.4E-07 6.1E-07 5.8E-07 5.5E-07 5.3E-07 5.0E-07 4.8E-07 4.5E-07 4.3E-07 4.1E-07
 3.9E-07 3.7E-07 3.6E-07 3.4E-07 3.2E-07 3.1E-07 2.9E-07 2.8E-07 2.7E-07 2.5E-07 2.4E-07 2.3E-07 2.2E-07 2.1E-07 2.0E-07
 1.9E-07 1.8E-07 1.7E-07 1.6E-07 1.6E-07 1.5E-07 1.4E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.0E-07 9.8E-08
 9.1E-08 8.7E-08 8.3E-08 7.9E-08 7.5E-08
 50 1 1 1 1 50 50 41 1 1 1 50
 H 3.8E-04 2.8E-04 1.9E-04 1.4E-04 9.8E-05 7.2E-05 5.4E-05 4.1E-05 3.3E-05 2.8E-05 2.1E-05 1.8E-05 1.5E-05 1.3E-05 1.2E-05
 1.0E-05 9.5E-06 8.8E-06 8.2E-06 7.6E-06 7.2E-06 6.8E-06 6.5E-06 6.2E-06 6.0E-06 5.7E-06 5.5E-06 5.3E-06 5.1E-06 5.0E-06
 4.8E-06 4.6E-06 4.5E-06 4.3E-06 4.2E-06 4.1E-06 3.9E-06 3.8E-06 3.7E-06 3.6E-06 3.5E-06 3.4E-06 3.3E-06 3.2E-06 3.1E-06
 3.0E-06 2.9E-06 2.8E-06 2.7E-06 2.6E-06
 H 2.1E-09
 H 1.4E-09
 H 5.9E-09
 H 1.9E-08
 H 2.1E-05 4.2E-05 5.8E-05 7.2E-05 8.2E-05 8.9E-05 9.3E-05 9.8E-05 9.7E-05 9.7E-05 9.7E-05 9.5E-05 9.3E-05 9.1E-05 8.8E-05
 8.6E-05 8.3E-05 8.0E-05 7.7E-05 7.5E-05 7.2E-05 6.9E-05 6.7E-05 6.4E-05 6.2E-05 6.0E-05 5.8E-05 5.5E-05 5.3E-05 5.1E-05
 4.9E-05 4.7E-05 4.6E-05 4.4E-05 4.2E-05 4.1E-05 3.9E-05 3.8E-05 3.6E-05 3.5E-05 3.4E-05 3.2E-05 3.1E-05 3.0E-05 2.9E-05
 2.8E-05 2.7E-05 2.6E-05 2.5E-05 2.4E-05
 H 1.7E-06 3.3E-06 4.8E-06 5.7E-06 6.5E-06 7.1E-06 7.5E-06 7.7E-06 7.8E-06 7.8E-06 7.7E-06 7.6E-06 7.4E-06 7.2E-06 7.0E-06
 6.8E-06 6.6E-06 6.4E-06 6.2E-06 6.0E-06 5.7E-06 5.5E-06 5.3E-06 5.1E-06 5.0E-06 4.8E-06 4.6E-06 4.4E-06 4.2E-06 4.1E-06
 3.9E-06 3.8E-06 3.6E-06 3.5E-06 3.4E-06 3.2E-06 3.1E-06 3.0E-06 2.9E-06 2.8E-06 2.7E-06 2.6E-06 2.4E-06 2.3E-06
 2.2E-06 2.1E-06 2.0E-06 2.0E-06 1.9E-06
 H 2.3E-07 4.5E-07 6.3E-07 7.7E-07 8.8E-07 9.8E-07 1.0E-06 1.0E-06 1.1E-06 1.1E-06 1.0E-06 1.0E-06 1.0E-06 9.8E-07 9.5E-07
 9.2E-07 9.0E-07 8.7E-07 8.4E-07 8.1E-07 7.8E-07 7.5E-07 7.2E-07 7.0E-07 6.7E-07 6.4E-07 6.2E-07 6.0E-07 5.7E-07 5.5E-07
 5.3E-07 5.1E-07 4.9E-07 4.7E-07 4.6E-07 4.4E-07 4.2E-07 4.1E-07 3.9E-07 3.8E-07 3.6E-07
 H 4.4E-10
 H 1.4E-09

DOSINC.DAT

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H 1.1E-09
H 5.7E-06 1.1E-05 1.6E-05 1.9E-05 2.2E-05 2.3E-05 2.4E-05 2.5E-05 2.5E-05 2.5E-05 2.4E-05 2.4E-05 2.3E-05 2.2E-05 2.2E-05
  2.1E-05 2.0E-05 1.9E-05 1.8E-05 1.7E-05 1.7E-05 1.6E-05 1.5E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.2E-05 1.1E-05 1.1E-05
  1.0E-05 9.8E-06 9.4E-06 8.9E-06 8.5E-06 8.1E-06 7.7E-06 7.4E-06 7.0E-06 6.7E-06 6.4E-06 6.1E-06 5.8E-06 5.5E-06 5.2E-06
  5.0E-06 4.7E-06 4.5E-06 4.3E-06 4.1E-06
! TH227 Class: Y F1: 0.00020 12/06/87 02:26:31.1 Acute Sv/Bq
  12 1 3 4 5 6 7 8 11 12 13 14 17
  1 1 1 1 1 1 1 1 1 1 1 1 1
G 1.3E-10
G 1.7E-09
Q 4.1E-09
G 2.5E-08
G 9.2E-08
G 7.0E-08
G 5.7E-09
Q 1.4E-10
G 3.0E-10
Q 1.4E-10
G 1.3E-10
G 1.1E-09
  1 1 1 1 1 1 1 1 1 1 1 1
H 3.6E-05
H 4.0E-09
H 5.3E-09
H 1.7E-08
H 5.3E-08
H 1.6E-06
H 1.3E-07
H 3.0E-09
H 3.1E-09
H 3.1E-09
H 3.0E-09
H 2.4E-08
! FR223 Class: D F1: 1.00000 12/06/87 02:51:46.2 Acute Sv/Bq
  11 1 3 4 5 6 7 8 11 12 13 14
  1 1 1 1 1 1 1 1 1 1 1
G 1.9E-09
Q 2.4E-09
Q 2.2E-09
G 2.2E-09
G 2.2E-09
G 9.7E-10
G 1.9E-09
G 1.9E-09
Q 2.0E-09
Q 1.9E-09
Q 1.9E-09
  1 1 1 1 1 1 1 1 1 1
H 2.0E-09
H 1.4E-09
H 1.4E-09

```

H 1.4E-09
H 1.4E-09
H 6.1E-10
H 1.2E-09
H 1.2E-09
H 1.2E-09
H 1.2E-09
H 1.2E-09

! RA223 Class: W F1: 0.20000 12/06/87 03:07:01.8 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1 1

G 1.2E-08
G 1.9E-08
G 2.0E-08
G 9.3E-08
G 2.5E-07
G 1.1E-06
G 7.7E-08
G 1.2E-08
G 1.2E-08
G 1.2E-08
G 1.2E-08

1 1 1 1 1 1 1 1 1 1

H 1.7E-05
H 1.2E-08
H 1.5E-08
H 4.3E-08
H 1.1E-07
H 9.0E-07
H 6.2E-08
H 9.5E-09
H 9.8E-09
H 9.5E-09
H 9.5E-09

! U 237 Class: Y F1: 0.00200 12/06/87 03:19:58.5 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 16
1 1 1 1 1 1 1 1 1 1 1

G 2.2E-12
G 2.0E-10
G 7.4E-10
G 3.4E-09
G 8.9E-09
G 3.5E-11
G 5.8E-11
G 1.2E-11
G 1.9E-10
G 1.8E-11
G 2.3E-13
G 3.0E-11

1 1 1 1 1 1 1 1 1 1 1

H 4.9E-09

H 1.5E-10
 H 3.3E-10
 H 1.5E-09
 H 4.0E-09
 H 7.2E-11
 H 5.5E-11
 H 5.7E-12
 H 8.4E-11
 H 2.8E-11
 H 1.1E-11
 H 4.4E-11
 I NP237 Class: W Fl: 0.00100 12/06/07 04:39:24.9 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 G 1.2E-11
 G 1.2E-09
 G 3.1E-09
 G 1.7E-08
 G 5.3E-08
 G 7.8E-07 7.5E-07 7.5E-07 7.4E-07 7.4E-07 7.3E-07 7.3E-07 7.2E-07 7.2E-07 7.1E-07 7.1E-07 7.0E-07 7.0E-07 6.9E-07 6.9E-07
 6.8E-07 6.8E-07 6.7E-07 6.7E-07 6.6E-07 6.6E-07 6.5E-07 6.5E-07 6.4E-07 6.4E-07 6.3E-07 6.3E-07 6.2E-07 6.2E-07
 6.1E-07 6.1E-07 6.1E-07 6.0E-07 6.0E-07 5.9E-07 5.9E-07 5.9E-07 5.8E-07 5.8E-07 5.7E-07 5.7E-07 5.7E-07 5.6E-07 5.6E-07
 5.5E-07 5.5E-07 5.5E-07 5.4E-07 5.4E-07
 G 6.1E-08 6.0E-08 6.0E-08 5.9E-08 5.9E-08 5.9E-08 5.8E-08 5.8E-08 5.7E-08 5.7E-08 5.7E-08 5.6E-08 5.6E-08 5.5E-08 5.5E-08
 5.5E-08 5.4E-08 5.4E-08 5.3E-08 5.3E-08 5.3E-08 5.2E-08 5.2E-08 5.2E-08 5.1E-08 5.1E-08 5.1E-08 5.0E-08 5.0E-08 5.0E-08
 4.9E-08 4.9E-08 4.9E-08 4.8E-08 4.8E-08 4.8E-08 4.7E-08 4.7E-08 4.7E-08 4.6E-08 4.6E-08 4.6E-08 4.5E-08 4.5E-08 4.5E-08
 4.4E-08 4.4E-08 4.4E-08 4.3E-08 4.3E-08
 G 5.0E-09 4.9E-09 4.9E-09 4.8E-09 4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09 4.6E-09 4.6E-09 4.6E-09 4.5E-09 4.5E-09
 4.5E-09 4.4E-09 4.4E-09 4.4E-09 4.3E-09 4.3E-09 4.3E-09 4.2E-09 4.2E-09 4.2E-09 4.2E-09 4.1E-09 4.1E-09 4.1E-09 4.0E-09
 4.0E-09 4.0E-09 4.0E-09 3.9E-09 3.9E-09 3.9E-09 3.9E-09 3.8E-09 3.8E-09 3.8E-09 3.8E-09 3.7E-09 3.7E-09 3.7E-09 3.6E-09
 3.6E-09 3.6E-09 3.6E-09 3.5E-09 3.5E-09
 G 7.7E-11
 G 1.8E-11
 G 9.8E-12
 G 4.1E-08 4.0E-08 3.9E-08 3.9E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08
 3.2E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08
 2.5E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08 2.1E-08 2.1E-08 2.1E-08 2.0E-08 2.0E-08 2.0E-08 1.9E-08
 1.9E-08 1.9E-08 1.8E-08 1.8E-08 1.8E-08
 2 1 1 1 1 50 50 50 1 1 1 50
 H 1.8E-05 1.4E-07
 H 2.0E-09
 H 2.8E-09
 H 1.0E-08
 H 2.9E-08
 H 8.2E-05 9.1E-05 9.0E-05 8.9E-05 8.9E-05 8.8E-05 8.8E-05 8.7E-05 8.6E-05 8.6E-05 8.5E-05 8.5E-05 8.4E-05 8.3E-05 8.3E-05
 8.2E-05 8.2E-05 8.1E-05 8.1E-05 8.0E-05 7.9E-05 7.9E-05 7.8E-05 7.8E-05 7.7E-05 7.7E-05 7.6E-05 7.6E-05 7.5E-05 7.5E-05
 7.4E-05 7.4E-05 7.3E-05 7.3E-05 7.2E-05 7.2E-05 7.1E-05 7.1E-05 7.0E-05 7.0E-05 6.9E-05 6.9E-05 6.8E-05 6.8E-05 6.7E-05
 6.7E-05 6.6E-05 6.6E-05 6.5E-05 6.5E-05
 H 6.8E-06 7.2E-06 7.2E-06 7.2E-06 7.1E-06 7.1E-06 7.0E-06 7.0E-06 6.9E-06 6.9E-06 6.8E-06 6.8E-06 6.7E-06 6.7E-06 6.6E-06
 6.6E-06 6.5E-06 6.5E-06 6.5E-06 6.4E-06 6.4E-06 6.3E-06 6.3E-06 6.2E-06 6.2E-06 6.1E-06 6.1E-06 6.1E-06 6.0E-06 6.0E-06
 5.9E-06 5.9E-06 5.9E-06 5.8E-06 5.8E-06 5.7E-06 5.7E-06 5.7E-06 5.6E-06 5.6E-06 5.5E-06 5.5E-06 5.5E-06 5.4E-06 5.4E-06

DOSINC.DAT

5.926

9/30/88

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5.4E-08 5.3E-08 5.3E-08 5.2E-08 5.2E-08
H 5.4E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.7E-07 5.7E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.4E-07
5.4E-07 5.3E-07 5.3E-07 5.3E-07 5.2E-07 5.2E-07 5.2E-07 5.1E-07 5.1E-07 5.1E-07 5.0E-07 5.0E-07 5.0E-07 4.9E-07 4.9E-07
4.0E-07 4.0E-07 4.0E-07 4.7E-07 4.7E-07 4.7E-07 4.7E-07 4.0E-07 4.0E-07 4.0E-07 4.0E-07 4.0E-07 4.0E-07 4.4E-07 4.4E-07
4.4E-07 4.3E-07 4.3E-07 4.3E-07 4.3E-07
H 1.2E-09
H 1.4E-09
H 1.2E-09
H 4.4E-08 4.0E-08 4.0E-08 4.7E-08 4.0E-08 4.0E-08 4.4E-08 4.4E-08 4.3E-08 4.2E-08 4.2E-08 4.1E-08 4.0E-08 3.9E-08 3.9E-08
3.0E-08 3.0E-08 3.7E-08 3.0E-08 3.0E-08 3.0E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08
3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.6E-08 2.6E-08 2.4E-08 2.4E-08 2.3E-08
2.3E-08 2.3E-08 2.2E-08 2.2E-08 2.2E-08
! PA233 Class: Y F1: 0.00100 12/08/87 05:48:48.8 Acute Sv/Bq
13 1 3 4 5 6 7 8 11 12 13 14 17 18
1 1 1 1 1 1 1 1 1 1 1 1 1 1
Q 3.7E-12
Q 2.9E-10
Q 0.0E-10
Q 3.0E-09
G 1.0E-08
Q 9.6E-11
G 0.9E-11
G 2.1E-11
G 2.6E-10
G 2.7E-11
Q 5.0E-13
G 2.4E-11
G 3.4E-11
2 1 1 1 1 1 1 1 1 1 1 1 1
H 1.7E-08 2.2E-11
H 2.4E-10
H 3.9E-10
H 1.7E-09
H 4.0E-09
H 4.0E-10
H 1.0E-10
H 1.1E-11
H 1.3E-10
H 9.4E-11
H 5.7E-11
H 1.0E-10
H 9.1E-11
! U 233 Class: Y F1: 0.00200 12/08/87 06:38:17.1 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 18
1 1 1 1 1 60 22 1 1 1 1 21
Q 0.0E-11
Q 1.2E-09
Q 2.0E-09
Q 1.7E-08
Q 5.0E-08
Q 4.1E-09 2.2E-09 2.1E-09 2.0E-09 1.9E-09 1.8E-09 1.7E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09 1.4E-09 1.3E-09 1.2E-09 1.2E-09

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DOSINC.DAT

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1.1E-09 1.1E-09 1.0E-09 9.8E-10 9.1E-10 8.7E-10 8.3E-10 7.9E-10 7.5E-10 7.1E-10 6.8E-10 6.4E-10 6.1E-10 5.8E-10 5.5E-10
5.3E-10 5.0E-10 4.8E-10 4.5E-10 4.3E-10 4.1E-10 3.9E-10 3.7E-10 3.5E-10 3.4E-10 3.2E-10 3.0E-10 2.9E-10 2.8E-10 2.6E-10
2.5E-10 2.4E-10 2.3E-10 2.1E-10 2.0E-10
Q 3.1E-10 1.4E-10 1.4E-10 1.3E-10 1.2E-10 1.2E-10 1.1E-10 1.0E-10 9.9E-11 9.4E-11 8.9E-11 8.5E-11 8.1E-11 7.7E-11 7.3E-11
8.9E-11 8.6E-11 8.3E-11 5.9E-11 5.8E-11 5.4E-11 5.1E-11
Q 6.8E-11
Q 6.8E-11
Q 6.8E-11
Q 6.8E-11
Q 1.1E-08 1.3E-09 1.1E-09 9.4E-10 7.9E-10 8.7E-10 5.7E-10 4.8E-10 4.0E-10 3.4E-10 2.9E-10 2.4E-10 2.1E-10 1.7E-10 1.5E-10
1.2E-10 1.1E-10 8.9E-11 7.5E-11 6.4E-11 5.4E-11
50 1 1 1 1 1 1 1 1 1 1 1 1 1 1
H 8.2E-05 4.3E-05 3.1E-05 2.2E-05 1.7E-05 1.3E-05 9.8E-06 7.8E-06 6.3E-06 5.2E-06 4.4E-06 3.8E-06 3.4E-06 3.0E-06 2.8E-06
2.8E-06 2.4E-06 2.3E-06 2.2E-06 2.1E-06 2.1E-06 2.0E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06
1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06
1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06
H 9.3E-10
H 1.8E-09
H 8.9E-09
H 2.8E-08
H 1.9E-08
H 1.5E-09
H 3.7E-10
H 3.7E-10
H 3.7E-10
H 3.7E-10
H 5.9E-08
! TH229 Class: Y F1: 0.00020 12/08/87 07:13:23.1 Acute Sv/Bq
12 1 3 4 5 8 7 8 11 12 13 14 17
2 2 2 2 2 50 2 2 2 2 8
Q 1.3E-09 1.0E-09
Q 2.6E-09 1.0E-09
Q 4.8E-09 1.0E-09
Q 2.0E-08 1.0E-09
Q 8.1E-08 1.0E-09
Q 8.5E-07 9.0E-07 8.0E-07 8.5E-07 8.2E-07 8.0E-07 7.7E-07 7.5E-07 7.2E-07 7.0E-07 6.8E-07 6.6E-07 6.4E-07 6.2E-07 6.0E-07
5.8E-07 5.6E-07 5.4E-07 5.3E-07 5.1E-07 4.9E-07 4.8E-07 4.8E-07 4.5E-07 4.4E-07 4.2E-07 4.1E-07 4.0E-07 3.8E-07 3.7E-07
3.6E-07 3.5E-07 3.4E-07 3.3E-07 3.2E-07 3.1E-07 3.0E-07 2.9E-07 2.8E-07 2.7E-07 2.6E-07 2.5E-07 2.5E-07 2.4E-07 2.3E-07
2.2E-07 2.2E-07 2.1E-07 2.0E-07 2.0E-07
Q 7.0E-08 7.4E-08 7.1E-08 6.9E-08 6.7E-08 6.4E-08 6.2E-08 6.0E-08 5.8E-08 5.7E-08 5.5E-08 5.3E-08 5.1E-08 5.0E-08 4.8E-08
4.7E-08 4.5E-08 4.4E-08 4.2E-08 4.1E-08 4.0E-08 3.9E-08 3.7E-08 3.6E-08 3.5E-08 3.4E-08 3.3E-08 3.2E-08 3.1E-08 3.0E-08
2.9E-08 2.8E-08 2.7E-08 2.6E-08 2.6E-08 2.5E-08 2.4E-08 2.3E-08 2.3E-08 2.2E-08 2.1E-08 2.0E-08 2.0E-08 1.9E-08 1.9E-08
1.8E-08 1.7E-08 1.7E-08 1.6E-08 1.6E-08
Q 1.3E-09 1.0E-09
Q 1.5E-09 1.0E-09
Q 1.3E-09 1.0E-09
Q 1.3E-09 1.0E-09
Q 1.1E-08 8.7E-09 8.0E-09 4.2E-09 2.9E-09 2.0E-09 1.4E-09 9.9E-10
50 1 1 1 1 50 50 1 1 1 1 12
H 3.8E-04 2.9E-04 2.1E-04 1.6E-04 1.1E-04 8.5E-05 6.8E-05 5.2E-05 4.2E-05 3.5E-05 3.0E-05 2.6E-05 2.2E-05 2.0E-05 1.8E-05
1.7E-05 1.6E-05 1.5E-05 1.5E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05

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DOSINC.DAT

5.928

9/30/88

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1.3E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05
1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05
H 5.3E-08
H 5.4E-08
H 5.5E-08
H 9.4E-08
H 3.2E-05 6.4E-05 9.2E-05 1.1E-04 1.3E-04 1.5E-04 1.6E-04 1.7E-04 1.7E-04 1.7E-04 1.7E-04 1.7E-04 1.7E-04 1.7E-04 1.7E-04
1.6E-04 1.6E-04 1.5E-04 1.5E-04 1.5E-04 1.4E-04 1.4E-04 1.3E-04 1.3E-04 1.3E-04 1.2E-04 1.2E-04 1.2E-04 1.1E-04 1.1E-04
1.0E-04 1.0E-04 9.9E-05 9.8E-05 9.3E-05 9.0E-05 8.7E-05 8.4E-05 8.2E-05 7.9E-05 7.7E-05 7.4E-05 7.2E-05 7.0E-05 6.7E-05
8.5E-05 8.3E-05 8.1E-05 6.9E-05 5.8E-05
H 2.8E-08 5.2E-08 7.5E-08 9.4E-08 1.1E-05 1.2E-05 1.3E-05 1.3E-05 1.4E-05 1.4E-05 1.4E-05 1.4E-05 1.4E-05 1.4E-05 1.3E-05
1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.0E-05 9.9E-05 9.8E-05 9.3E-05 9.0E-05 8.7E-05
8.5E-05 8.2E-05 8.0E-05 7.7E-05 7.5E-05 7.2E-05 7.0E-05 6.8E-05 6.8E-05 6.4E-05 6.2E-05 6.0E-05 5.8E-05 5.6E-05 5.4E-05
5.3E-05 5.1E-05 4.9E-05 4.8E-05 4.6E-05
H 5.2E-08
H 5.3E-08
H 5.3E-08
H 5.2E-08
H 4.3E-07 7.4E-07 9.1E-07 9.8E-07 9.8E-07 9.3E-07 8.5E-07 7.5E-07 6.5E-07 5.5E-07 4.7E-07 3.9E-07
! RA225 Class: W F1: 0.20000 12/06/07 07:41:18.4 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1 1
G 1.8E-09
G 1.9E-09
G 2.2E-09
G 8.9E-09
G 3.1E-08
G 1.5E-08
G 9.4E-08
G 1.8E-09
G 1.9E-09
G 1.8E-09
G 1.8E-09
1 1 1 1 1 1 1 1 1 1
H 1.6E-05
H 2.8E-09
H 3.1E-09
H 7.8E-09
H 2.3E-08
H 1.3E-08
H 8.2E-08
H 2.4E-09
H 2.5E-09
H 2.4E-09
H 2.4E-09
! AC225 Class: Y F1: 0.00100 12/06/07 07:59:40.2 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 1 1 1 1 1 1
G 4.3E-11
G 7.2E-09
G 1.8E-08

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DOSINC.DAT

G 9.9E-08
 G 2.8E-07
 G 1.8E-07
 G 8.4E-09
 G 1.2E-09
 G 2.9E-10
 G 8.6E-11
 G 3.9E-11
 G 2.8E-08
 1 1 1 1 1 1 1 1 1 1
 H 1.8E-05
 H 3.5E-09
 H 8.4E-09
 H 4.5E-08
 H 1.3E-07
 H 4.7E-07
 H 3.8E-08
 H 5.3E-09
 H 3.8E-10
 H 2.3E-10
 H 2.1E-10
 H 1.3E-07
 ! U 238 Class: Y F1: 0.00200 12/07/87 12:18:34.7 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 16
 1 1 1 1 1 50 22 1 1 1 1 21
 G 5.7E-11
 G 1.8E-09
 G 2.8E-09
 G 1.5E-08
 G 4.8E-08
 G 3.8E-09 2.0E-09 1.9E-09 1.8E-09 1.7E-09 1.6E-09 1.8E-09 1.5E-09 1.4E-09 1.3E-09 1.3E-09 1.2E-09 1.2E-09 1.1E-09 1.0E-09
 9.9E-10 9.4E-10 8.9E-10 8.6E-10 8.1E-10 7.7E-10 7.3E-10 6.9E-10 6.6E-10 6.3E-10 6.0E-10 5.7E-10 5.4E-10 5.1E-10 4.9E-10
 4.6E-10 4.4E-10 4.2E-10 4.0E-10 3.8E-10 3.6E-10 3.4E-10 3.3E-10 3.1E-10 2.9E-10 2.8E-10 2.7E-10 2.6E-10 2.4E-10 2.3E-10
 2.2E-10 2.1E-10 2.0E-10 1.9E-10 1.8E-10
 G 2.9E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.1E-10 1.0E-10 9.8E-11 9.3E-11 8.8E-11 8.3E-11 7.9E-11 7.5E-11 7.1E-11 6.8E-11
 6.4E-11 6.1E-11 5.8E-11 5.6E-11 5.2E-11 5.0E-11 4.7E-11
 G 5.8E-11
 G 8.8E-11
 G 5.8E-11
 G 5.8E-11
 G 9.5E-09 1.2E-09 9.8E-10 8.3E-10 7.8E-10 6.9E-10 6.0E-10 4.2E-10 3.8E-10 3.8E-10 2.6E-10 2.1E-10 1.8E-10 1.5E-10 1.3E-10
 1.1E-10 9.2E-11 7.8E-11 6.8E-11 5.8E-11 4.7E-11
 50 1 1 1 1 1 1 1 1 1 1
 H 5.6E-05 3.0E-05 2.7E-05 2.0E-05 1.5E-05 1.1E-05 8.8E-06 8.8E-06 5.5E-06 4.8E-06 3.9E-06 3.3E-06 2.9E-06 2.6E-06 2.4E-06
 2.2E-06 2.1E-06 2.0E-06 1.9E-06 1.8E-06 1.8E-06 1.8E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.6E-06 1.6E-06
 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06
 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06
 H 9.9E-10
 H 1.8E-09
 H 8.5E-09
 H 2.8E-08

DOSINC.DAT

H 1.7E-08
H 1.5E-09
H 3.2E-10
H 3.4E-10
H 4.1E-10
H 3.9E-10
H 5.2E-08

! TH234 Class: Y F1: 0.00020 12/07/87 12:44:27.1 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 1 1 1 1 1 1 1

G 8.6E-13
G 9.9E-10
G 2.6E-09
G 1.6E-08
G 4.2E-08
G 2.0E-11
G 1.8E-11
G 2.3E-12
G 2.8E-11
G 3.3E-12
G 2.9E-13
G 4.0E-12

1 1 1 1 1 1 1 1 1 1

H 6.4E-08
H 4.8E-10
H 1.2E-09
H 7.0E-09
H 2.0E-08
H 4.1E-10
H 2.4E-10
H 8.6E-12
H 2.0E-11
H 1.6E-11
H 1.2E-11
H 5.7E-11

! PA234 Class: Y F1: 0.00100 12/07/87 12:58:50.0 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 16
1 1 1 1 1 1 1 1 1 1 1 1

G 1.5E-11
G 7.8E-10
G 1.5E-09
G 3.2E-09
G 2.8E-09
G 2.8E-11
G 8.2E-11
G 2.5E-11
G 3.5E-10
G 5.2E-11
G 1.9E-12
G 8.2E-11
G 8.8E-11

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1 1 1 1 1 1 1 1 1 1 1 1
H 9.2E-10
H 1.6E-10
H 2.8E-10
H 6.0E-10
H 4.9E-10
H 1.9E-11
H 2.9E-11
H 5.1E-12
H 6.6E-12
H 2.3E-11
H 1.3E-11
H 3.6E-11
H 2.0E-11
! PU238 Class: Y F1: 0.00010 12/07/87 13:05:01.9 Acute Sv/Bq
12 1 3 4 6 8 7 8 11 12 13 14 17
1 1 1 1 1 50 50 50 1 1 1 50
G 8.0E-13
G 1.3E-09
G 3.2E-09
G 1.9E-08
G 5.7E-08
G 5.2E-08 5.1E-08 5.0E-08 4.8E-08 4.7E-08 4.6E-08 4.5E-08 4.4E-08 4.3E-08 4.3E-08 4.2E-08 4.1E-08 4.0E-08 3.9E-08 3.8E-08
3.7E-08 3.7E-08 3.6E-08 3.5E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08
2.7E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08 2.1E-08 2.1E-08 2.0E-08 2.0E-08
1.9E-08 1.9E-08 1.9E-08 1.8E-08 1.8E-08
G 4.2E-09 4.1E-09 4.0E-09 3.9E-09 3.8E-09 3.7E-09 3.7E-09 3.6E-09 3.5E-09 3.4E-09 3.3E-09 3.3E-09 3.2E-09 3.1E-09 3.1E-09
3.0E-09 2.9E-09 2.9E-09 2.8E-09 2.8E-09 2.7E-09 2.6E-09 2.6E-09 2.5E-09 2.5E-09 2.4E-09 2.4E-09 2.3E-09 2.3E-09 2.2E-09
2.2E-09 2.1E-09 2.1E-09 2.0E-09 2.0E-09 1.9E-09 1.9E-09 1.9E-09 1.8E-09 1.8E-09 1.7E-09 1.7E-09 1.7E-09 1.6E-09 1.6E-09
1.6E-09 1.5E-09 1.5E-09 1.5E-09 1.4E-09
G 5.6E-10 5.5E-10 5.5E-10 5.4E-10 5.3E-10 5.2E-10 5.1E-10 5.1E-10 5.0E-10 4.9E-10 4.8E-10 4.8E-10 4.7E-10 4.6E-10 4.6E-10
4.5E-10 4.4E-10 4.4E-10 4.3E-10 4.2E-10 4.2E-10 4.1E-10 4.1E-10 4.0E-10 3.9E-10 3.9E-10 3.8E-10 3.8E-10 3.7E-10 3.7E-10
3.6E-10 3.5E-10 3.5E-10 3.4E-10 3.4E-10 3.3E-10 3.3E-10 3.2E-10 3.2E-10 3.2E-10 3.1E-10 3.1E-10 3.0E-10 3.0E-10 2.9E-10
2.9E-10 2.8E-10 2.8E-10 2.8E-10 2.7E-10
G 3.9E-12
G 9.0E-13
G 8.0E-13
G 1.4E-08 1.3E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.0E-08 9.8E-09 9.4E-09 9.0E-09 8.6E-09 8.3E-09 7.9E-09 7.6E-09
7.3E-09 7.0E-09 6.7E-09 6.4E-09 6.2E-09 5.9E-09 5.6E-09 5.4E-09 5.2E-09 5.0E-09 4.8E-09 4.6E-09 4.4E-09 4.2E-09 4.0E-09
3.9E-09 3.7E-09 3.5E-09 3.4E-09 3.2E-09 3.1E-09 3.0E-09 2.9E-09 2.7E-09 2.6E-09 2.5E-09 2.4E-09 2.3E-09 2.2E-09 2.1E-09
2.0E-09 1.9E-09 1.9E-09 1.8E-09 1.7E-09
50 1 1 1 1 50 50 50 1 1 1 50
H 7.0E-05 4.8E-05 3.4E-05 2.4E-05 1.8E-05 1.4E-05 1.0E-05 8.2E-06 6.6E-06 5.4E-06 4.8E-06 3.9E-06 3.4E-06 3.0E-06 2.7E-06
2.5E-06 2.3E-06 2.2E-06 2.1E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.8E-06 1.8E-06 1.8E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06
1.7E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06
1.5E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06
H 7.4E-10
H 1.6E-09
H 9.8E-09
H 2.9E-08
H 3.7E-08 7.1E-08 1.0E-05 1.3E-05 1.5E-05 1.7E-05 1.8E-05 1.9E-05 1.9E-05 2.0E-05 2.0E-05 2.0E-05 2.0E-05 2.0E-05 2.0E-05

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DOSINC.DAT

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1.9E-05 1.9E-05 1.9E-05 1.8E-05 1.8E-05 1.8E-05 1.7E-05 1.7E-05 1.7E-05 1.6E-05 1.6E-05 1.6E-05 1.5E-05 1.5E-05 1.5E-05
1.4E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05
1.0E-05 1.0E-05 9.9E-06 9.7E-06 9.5E-06
H 3.0E-07 5.7E-07 8.2E-07 1.0E-06 1.2E-06 1.3E-06 1.4E-06 1.5E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06
1.6E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06 1.4E-06 1.4E-06 1.4E-06 1.3E-06 1.3E-06 1.3E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06
1.2E-06 1.1E-06 1.1E-06 1.1E-06 1.1E-06 1.0E-06 1.0E-06 9.9E-07 9.7E-07 9.5E-07 9.3E-07 9.1E-07 8.9E-07 8.7E-07 8.5E-07
8.4E-07 8.2E-07 8.0E-07 7.8E-07 7.7E-07
H 4.0E-08 7.7E-08 1.1E-07 1.4E-07 1.8E-07 1.8E-07 2.0E-07 2.1E-07 2.2E-07 2.2E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07
2.3E-07 2.2E-07 2.2E-07 2.2E-07 2.2E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.0E-07 2.0E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07
1.9E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.7E-07 1.7E-07 1.7E-07 1.7E-07 1.6E-07 1.6E-07 1.6E-07 1.5E-07 1.5E-07
1.5E-07 1.5E-07 1.4E-07 1.4E-07 1.4E-07
H 8.7E-11
H 9.4E-11
H 8.5E-11
H 9.9E-07 1.9E-06 2.7E-06 3.3E-06 3.8E-06 4.2E-06 4.4E-06 4.8E-06 4.7E-06 4.7E-06 4.8E-06 4.8E-06 4.5E-06 4.4E-06 4.3E-06
4.1E-06 4.0E-06 3.9E-06 3.7E-06 3.6E-06 3.4E-06 3.3E-06 3.2E-06 3.1E-06 2.9E-06 2.8E-06 2.7E-06 2.6E-06 2.5E-06 2.4E-06
2.3E-06 2.2E-06 2.1E-06 2.0E-06 1.9E-06 1.8E-06 1.8E-06 1.7E-06 1.6E-06 1.6E-06 1.5E-06 1.4E-06 1.3E-06 1.3E-06
1.2E-06 1.2E-06 1.1E-06 1.1E-06 1.0E-06
! PU240 Class: Y F1: 0.00010 12/07/87 13:12:52.5 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 50 50 50 1 1 1 50
G 7.5E-13
G 1.2E-09
G 3.0E-09
G 1.7E-08
G 5.4E-08
G 5.0E-08 4.9E-08 4.8E-08 4.8E-08 4.7E-08 4.6E-08 4.6E-08 4.5E-08 4.4E-08 4.4E-08 4.3E-08 4.3E-08 4.2E-08 4.1E-08 4.1E-08
4.0E-08 4.0E-08 3.9E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08
3.3E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08
2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08
G 3.8E-09 3.8E-09 3.7E-09 3.7E-09 3.6E-09 3.6E-09 3.5E-09 3.5E-09 3.4E-09 3.4E-09 3.3E-09 3.3E-09 3.2E-09 3.2E-09 3.2E-09
3.1E-09 3.1E-09 3.0E-09 3.0E-09 2.9E-09 2.9E-09 2.9E-09 2.8E-09 2.8E-09 2.7E-09 2.7E-09 2.7E-09 2.6E-09 2.6E-09 2.6E-09
2.5E-09 2.5E-09 2.5E-09 2.4E-09 2.4E-09 2.4E-09 2.3E-09 2.3E-09 2.3E-09 2.2E-09 2.2E-09 2.2E-09 2.1E-09 2.1E-09 2.1E-09
2.0E-09 2.0E-09 2.0E-09 2.0E-09 1.9E-09
G 5.3E-10 5.3E-10 5.2E-10 5.2E-10 5.1E-10 5.1E-10 5.1E-10 5.0E-10 5.0E-10 5.0E-10 4.9E-10 4.9E-10 4.9E-10 4.8E-10 4.8E-10
4.8E-10 4.7E-10 4.7E-10 4.7E-10 4.6E-10 4.6E-10 4.6E-10 4.5E-10 4.5E-10 4.5E-10 4.4E-10 4.4E-10 4.4E-10 4.3E-10 4.3E-10
4.3E-10 4.3E-10 4.2E-10 4.2E-10 4.2E-10 4.1E-10 4.1E-10 4.1E-10 4.0E-10 4.0E-10 4.0E-10 3.9E-10 3.9E-10 3.9E-10
3.9E-10 3.8E-10 3.8E-10 3.8E-10 3.7E-10
G 3.7E-12
G 8.4E-13
G 7.5E-13
G 1.3E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08 9.8E-09 9.5E-09 9.2E-09 8.8E-09 8.5E-09 8.3E-09 8.0E-09
7.7E-09 7.4E-09 7.2E-09 6.9E-09 6.7E-09 6.5E-09 6.2E-09 6.0E-09 5.8E-09 5.6E-09 5.4E-09 5.3E-09 5.1E-09 4.9E-09 4.7E-09
4.6E-09 4.4E-09 4.3E-09 4.1E-09 4.0E-09 3.8E-09 3.7E-09 3.6E-09 3.5E-09 3.3E-09 3.2E-09 3.1E-09 3.0E-09 2.9E-09 2.8E-09
2.7E-09 2.6E-09 2.5E-09 2.4E-09 2.4E-09
50 1 1 1 1 50 50 50 1 1 1 50
H 8.4E-05 4.4E-05 3.1E-05 2.3E-05 1.7E-05 1.3E-05 1.0E-05 7.9E-06 6.4E-06 5.3E-06 4.5E-06 3.9E-06 3.4E-06 3.1E-06 2.8E-06
2.6E-06 2.4E-06 2.3E-06 2.2E-06 2.1E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06
1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06
1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06
H 7 1E-10

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DOSINC.DAT

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H 1.6E-09
H 9.0E-09
H 2.0E-08
H 3.5E-08 6.0E-08 9.0E-08 1.3E-08 1.5E-08 1.7E-08 1.8E-08 1.9E-08 2.0E-08 2.0E-08 2.1E-08 2.1E-08 2.1E-08 2.1E-08 2.1E-08
2.1E-08 2.1E-08 2.1E-08 2.0E-08 2.0E-08 2.0E-08 2.0E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08
1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.6E-08 1.6E-08 1.6E-08 1.6E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.4E-08
1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.3E-08
H 2.7E-07 5.3E-07 7.7E-07 9.7E-07 1.1E-06 1.3E-06 1.4E-06 1.5E-06 1.5E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06
1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.6E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06
1.3E-06 1.3E-06 1.3E-06 1.3E-06 1.3E-06 1.3E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.1E-06 1.1E-06 1.1E-06
1.1E-06 1.1E-06 1.1E-06 1.0E-06 1.0E-06
H 3.8E-08 7.3E-08 1.1E-07 1.4E-07 1.6E-07 1.8E-07 2.0E-07 2.1E-07 2.2E-07 2.2E-07 2.3E-07 2.3E-07 2.4E-07 2.4E-07 2.4E-07
2.4E-07 2.4E-07 2.4E-07 2.4E-07 2.4E-07 2.4E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.2E-07 2.2E-07
2.2E-07 2.2E-07 2.2E-07 2.2E-07 2.2E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.0E-07 2.0E-07 2.0E-07 2.0E-07
2.0E-07 2.0E-07 2.0E-07 2.0E-07 1.9E-07
H 8.1E-11
H 8.8E-11
H 8.0E-11
H 9.3E-07 1.0E-06 2.5E-06 3.2E-06 3.7E-06 4.1E-06 4.4E-06 4.5E-06 4.7E-06 4.7E-06 4.7E-06 4.7E-06 4.6E-06 4.6E-06 4.5E-06
4.4E-06 4.2E-06 4.1E-06 4.0E-06 3.9E-06 3.8E-06 3.7E-06 3.5E-06 3.4E-06 3.3E-06 3.2E-06 3.1E-06 3.0E-06 2.9E-06 2.8E-06
2.7E-06 2.6E-06 2.5E-06 2.4E-06 2.4E-06 2.3E-06 2.2E-06 2.1E-06 2.1E-06 2.0E-06 1.9E-06 1.8E-06 1.8E-06 1.7E-06 1.7E-06
1.6E-06 1.6E-06 1.5E-06 1.4E-06 1.4E-06
! PU239 Class: Y F1: 0.00010 12/07/87 13:20:41.9 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 50 50 50 1 1 1 50
G 7.5E-13
G 1.2E-09
G 3.0E-09
G 1.7E-08
G 5.3E-08
G 5.0E-08 4.9E-08 4.8E-08 4.8E-08 4.7E-08 4.6E-08 4.6E-08 4.5E-08 4.4E-08 4.4E-08 4.3E-08 4.3E-08 4.2E-08 4.1E-08 4.1E-08
4.0E-08 4.0E-08 3.9E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08
3.3E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08
2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08
G 3.0E-09 3.0E-09 3.7E-09 3.7E-09 3.6E-09 3.6E-09 3.5E-09 3.5E-09 3.4E-09 3.4E-09 3.3E-09 3.3E-09 3.3E-09 3.2E-09 3.2E-09
3.1E-09 3.1E-09 3.0E-09 3.0E-09 2.9E-09 2.9E-09 2.9E-09 2.8E-09 2.8E-09 2.8E-09 2.7E-09 2.7E-09 2.6E-09 2.6E-09 2.6E-09
2.5E-09 2.5E-09 2.5E-09 2.4E-09 2.4E-09 2.4E-09 2.3E-09 2.3E-09 2.3E-09 2.2E-09 2.2E-09 2.2E-09 2.1E-09 2.1E-09 2.1E-09
2.1E-09 2.0E-09 2.0E-09 2.0E-09 1.9E-09
G 5.3E-10 5.3E-10 5.2E-10 5.2E-10 5.1E-10 5.1E-10 5.1E-10 5.0E-10 5.0E-10 5.0E-10 4.9E-10 4.9E-10 4.9E-10 4.8E-10 4.8E-10
4.8E-10 4.7E-10 4.7E-10 4.7E-10 4.6E-10 4.6E-10 4.6E-10 4.5E-10 4.5E-10 4.5E-10 4.4E-10 4.4E-10 4.4E-10 4.4E-10 4.3E-10
4.3E-10 4.3E-10 4.2E-10 4.2E-10 4.2E-10 4.1E-10 4.1E-10 4.1E-10 4.1E-10 4.0E-10 4.0E-10 4.0E-10 3.9E-10 3.9E-10 3.9E-10
3.9E-10 3.8E-10 3.8E-10 3.8E-10 3.8E-10
G 2.0E-12
G 7.9E-13
G 7.5E-13
G 1.3E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08 9.8E-09 9.5E-09 9.2E-09 8.9E-09 8.6E-09 8.3E-09 8.0E-09
7.7E-09 7.4E-09 7.2E-09 6.9E-09 6.7E-09 6.5E-09 6.3E-09 6.0E-09 5.8E-09 5.6E-09 5.4E-09 5.3E-09 5.1E-09 4.9E-09 4.7E-09
4.6E-09 4.4E-09 4.3E-09 4.1E-09 4.0E-09 3.9E-09 3.7E-09 3.6E-09 3.5E-09 3.4E-09 3.2E-09 3.1E-09 3.0E-09 2.9E-09 2.8E-09
2.7E-09 2.6E-09 2.5E-09 2.5E-09 2.4E-09
50 1 1 1 1 50 50 50 1 1 1 50
H 6.4E-05 4.4E-05 3.1E-05 2.3E-05 1.7E-05 1.3E-05 1.0E-05 7.9E-06 6.4E-06 5.3E-06 4.5E-06 3.9E-06 3.4E-06 3.1E-06 2.8E-06

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DOSINC.DAT

2.0E-08 2.4E-08 2.3E-08 2.2E-08 2.1E-08 2.1E-08 2.0E-08 2.0E-08 2.0E-08 2.0E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08
 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08
 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08
 H 7.1E-10
 H 1.0E-09
 H 9.0E-09
 H 2.7E-08
 H 3.5E-08 0.8E-08 9.9E-08 1.3E-08 1.5E-08 1.7E-08 1.0E-08 1.9E-08 2.0E-08 2.0E-08 2.1E-08 2.1E-08 2.1E-08 2.1E-08 2.1E-08
 2.1E-08 2.1E-08 2.1E-08 2.0E-08 2.0E-08 2.0E-08 2.0E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08
 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.6E-08 1.6E-08 1.6E-08 1.6E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.4E-08
 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.3E-08
 H 2.7E-07 5.3E-07 7.7E-07 9.7E-07 1.1E-07 1.3E-07 1.4E-07 1.5E-07 1.5E-07 1.6E-07 1.6E-07 1.6E-07 1.6E-07 1.6E-07 1.6E-07
 1.6E-07 1.6E-07 1.6E-07 1.6E-07 1.6E-07 1.6E-07 1.5E-07 1.5E-07 1.5E-07 1.5E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07
 1.4E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.2E-07 1.2E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07
 1.1E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07
 H 3.0E-08 7.3E-08 1.1E-07 1.4E-07 1.6E-07 1.8E-07 2.0E-07 2.1E-07 2.2E-07 2.2E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07
 2.4E-07 2.4E-07 2.4E-07 2.4E-07 2.4E-07 2.4E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.3E-07 2.2E-07 2.2E-07
 2.2E-07 2.2E-07 2.2E-07 2.2E-07 2.2E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.0E-07 2.0E-07 2.0E-07
 2.0E-07 2.0E-07 2.0E-07 2.0E-07 1.9E-07
 H 0.1E-11
 H 0.3E-11
 H 0.0E-11
 H 9.3E-07 1.8E-08 2.5E-08 3.2E-08 3.7E-08 4.1E-08 4.4E-08 4.5E-08 4.7E-08 4.7E-08 4.7E-08 4.7E-08 4.7E-08 4.6E-08 4.6E-08 4.5E-08
 4.4E-08 4.3E-08 4.1E-08 4.0E-08 3.9E-08 3.8E-08 3.7E-08 3.5E-08 3.4E-08 3.3E-08 3.2E-08 3.1E-08 3.0E-08 2.9E-08 2.8E-08
 2.7E-08 2.6E-08 2.5E-08 2.4E-08 2.4E-08 2.3E-08 2.2E-08 2.1E-08 2.1E-08 2.0E-08 1.9E-08 1.9E-08 1.8E-08 1.7E-08 1.7E-08
 1.6E-08 1.6E-08 1.5E-08 1.5E-08 1.4E-08
 I PU241 Class: Y F1: 0.00010 12/07/87 13:28:35.6 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 G 1.7E-10
 G 5.8E-12
 G 1.5E-11
 G 9.0E-11
 G 2.0E-10
 G 4.4E-11 1.2E-10 1.9E-10 2.0E-10 3.2E-10 3.8E-10 4.3E-10 4.7E-10 5.2E-10 5.6E-10 5.9E-10 6.3E-10 6.6E-10 6.8E-10 7.1E-10
 7.3E-10 7.5E-10 7.7E-10 7.8E-10 8.0E-10 8.1E-10 8.2E-10 8.3E-10 8.3E-10 8.4E-10 8.4E-10 8.5E-10 8.5E-10 8.5E-10 8.5E-10
 8.5E-10 8.5E-10 8.5E-10 8.5E-10 8.4E-10 8.4E-10 8.4E-10 8.3E-10 8.3E-10 8.2E-10 8.2E-10 8.1E-10 8.0E-10 8.0E-10 7.9E-10
 7.8E-10 7.8E-10 7.7E-10 7.6E-10 7.5E-10
 G 3.5E-12 9.5E-12 1.5E-11 2.0E-11 2.5E-11 2.9E-11 3.3E-11 3.7E-11 4.1E-11 4.4E-11 4.8E-11 4.9E-11 5.1E-11 5.3E-11 5.5E-11
 5.7E-11 5.9E-11 6.0E-11 6.1E-11 6.2E-11 6.3E-11 6.4E-11 6.5E-11 6.5E-11 6.6E-11 6.6E-11 6.7E-11 6.7E-11 6.7E-11
 6.7E-11 6.7E-11 6.7E-11 6.6E-11 6.6E-11 6.6E-11 6.6E-11 6.5E-11 6.5E-11 6.4E-11 6.4E-11 6.3E-11 6.3E-11 6.2E-11 6.2E-11
 6.1E-11 6.1E-11 6.0E-11 6.0E-11 5.9E-11
 G 4.0E-13 1.3E-12 2.1E-12 2.9E-12 3.8E-12 4.2E-12 4.6E-12 5.4E-12 5.9E-12 6.4E-12 6.9E-12 7.3E-12 7.7E-12 8.1E-12 8.5E-12
 8.8E-12 9.1E-12 9.4E-12 9.6E-12 9.9E-12 1.0E-11 1.0E-11 1.0E-11 1.1E-11 1.1E-11 1.1E-11 1.1E-11 1.1E-11 1.1E-11 1.1E-11
 1.1E-11 1.1E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11
 1.2E-11 1.2E-11 1.2E-11 1.2E-11 1.2E-11
 G 2.0E-15
 G 3.7E-10
 G 7.1E-17
 G 1.2E-11 3.2E-11 4.9E-11 6.5E-11 7.8E-11 9.0E-11 1.0E-10 1.1E-10 1.2E-10 1.2E-10 1.3E-10 1.3E-10 1.4E-10 1.4E-10 1.4E-10
 1.4E-10 1.4E-10 1.4E-10 1.4E-10 1.4E-10 1.4E-10 1.4E-10 1.4E-10 1.4E-10 1.3E-10 1.3E-10 1.3E-10 1.3E-10 1.3E-10 1.2E-10

DOSINC.DAT

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1.2E-10 1.2E-10 1.2E-10 1.1E-10 1.1E-10 1.1E-10 1.1E-10 1.0E-10 1.0E-10 9.8E-11 9.5E-11 9.2E-11 9.0E-11 8.7E-11 8.5E-11
8.2E-11 8.0E-11 7.7E-11 7.5E-11 7.3E-11
50 1 1 1 1 50 50 50 1 1 1 50
H 5.8E-08 1.1E-07 1.3E-07 1.3E-07 1.2E-07 1.1E-07 9.8E-08 8.8E-08 7.9E-08 7.1E-08 6.5E-08 6.0E-08 5.8E-08 5.3E-08 5.1E-08
4.9E-08 4.8E-08 4.7E-08 4.7E-08 4.7E-08 4.7E-08 4.7E-08 4.8E-08 4.8E-08 4.9E-08 4.9E-08 5.0E-08 5.0E-08 5.1E-08 5.2E-08
5.2E-08 5.3E-08 5.3E-08 5.4E-08 5.4E-08 5.5E-08 5.5E-08 5.6E-08 5.6E-08 5.7E-08 5.7E-08 5.7E-08 5.8E-08 5.8E-08 5.8E-08
5.9E-08 5.9E-08 5.9E-08 5.9E-08 6.0E-08
H 3.2E-12
H 8.0E-12
H 4.7E-11
H 1.4E-10
H 3.8E-09 1.7E-08 4.0E-08 6.9E-08 1.0E-07 1.3E-07 1.7E-07 2.0E-07 2.3E-07 2.6E-07 2.8E-07 3.1E-07 3.3E-07 3.5E-07 3.8E-07
3.8E-07 3.9E-07 4.0E-07 4.1E-07 4.2E-07 4.3E-07 4.4E-07 4.4E-07 4.4E-07 4.5E-07 4.5E-07 4.5E-07 4.5E-07 4.5E-07 4.5E-07
4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07 4.6E-07
4.2E-07 4.2E-07 4.1E-07 4.1E-07 4.0E-07
H 2.8E-10 1.4E-09 3.1E-09 5.4E-09 7.9E-09 1.1E-08 1.3E-08 1.6E-08 1.8E-08 2.0E-08 2.2E-08 2.4E-08 2.6E-08 2.7E-08 2.8E-08
3.0E-08 3.1E-08 3.1E-08 3.2E-08 3.3E-08 3.3E-08 3.4E-08 3.4E-08 3.5E-08 3.5E-08 3.5E-08 3.5E-08 3.5E-08 3.6E-08 3.6E-08
3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08 3.6E-08
3.3E-08 3.2E-08 3.2E-08 3.2E-08 3.2E-08
H 3.9E-11 1.9E-10 4.4E-10 7.6E-10 1.1E-09 1.5E-09 1.9E-09 2.2E-09 2.6E-09 2.9E-09 3.2E-09 3.5E-09 3.8E-09 4.0E-09 4.2E-09
4.4E-09 4.6E-09 4.8E-09 4.9E-09 5.0E-09 5.2E-09 5.3E-09 5.4E-09 5.5E-09 5.5E-09 5.6E-09 5.7E-09 5.7E-09 5.8E-09 5.8E-09
5.9E-09 5.9E-09 6.0E-09 6.0E-09 6.0E-09 6.0E-09 6.0E-09 6.0E-09 6.0E-09 6.1E-09 6.1E-09 6.1E-09 6.0E-09 6.0E-09 6.0E-09
6.0E-09 6.0E-09 6.0E-09 6.0E-09 5.9E-09
H 5.8E-14
H 1.5E-13
H 8.0E-14
H 9.7E-10 4.6E-09 1.0E-08 1.8E-08 2.6E-08 3.4E-08 4.2E-08 4.9E-08 5.5E-08 6.1E-08 6.6E-08 7.0E-08 7.4E-08 7.7E-08 7.9E-08
8.1E-08 8.2E-08 8.3E-08 8.3E-08 8.3E-08 8.3E-08 8.3E-08 8.2E-08 8.1E-08 8.0E-08 7.9E-08 7.8E-08 7.6E-08 7.5E-08 7.4E-08
7.2E-08 7.1E-08 6.9E-08 6.7E-08 6.6E-08 6.4E-08 6.3E-08 6.1E-08 5.9E-08 5.8E-08 5.6E-08 5.5E-08 5.3E-08 5.2E-08 5.0E-08
4.9E-08 4.7E-08 4.8E-08 4.4E-08 4.3E-08
! AM241 Class: W F1: 0.00100 12/07/87 13:42:35.3 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 50 50 50 1 1 1 50
G 9.3E-12
G 1.3E-09
G 3.3E-09
G 1.9E-08
G 5.8E-08
G 5.2E-07 5.1E-07 5.0E-07 5.0E-07 4.9E-07 4.8E-07 4.7E-07 4.7E-07 4.6E-07 4.5E-07 4.4E-07 4.4E-07 4.3E-07 4.2E-07 4.2E-07
4.1E-07 4.1E-07 4.0E-07 3.9E-07 3.9E-07 3.8E-07 3.8E-07 3.7E-07 3.6E-07 3.6E-07 3.5E-07 3.5E-07 3.4E-07 3.4E-07 3.3E-07
3.3E-07 3.2E-07 3.2E-07 3.1E-07 3.1E-07 3.0E-07 3.0E-07 2.9E-07 2.9E-07 2.8E-07 2.8E-07 2.8E-07 2.7E-07 2.7E-07 2.6E-07
2.6E-07 2.5E-07 2.5E-07 2.5E-07 2.4E-07
G 4.1E-08 4.0E-08 3.9E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08
3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08
2.6E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08 2.2E-08 2.1E-08 2.1E-08 2.1E-08
2.0E-08 2.0E-08 2.0E-08 1.9E-08 1.9E-08
G 5.8E-09 5.6E-09 5.5E-09 5.5E-09 5.4E-09 5.4E-09 5.3E-09 5.3E-09 5.2E-09 5.2E-09 5.1E-09 5.1E-09 5.0E-09 5.0E-09
5.0E-09 4.9E-09 4.9E-09 4.8E-09 4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.6E-09 4.6E-09 4.6E-09 4.5E-09 4.5E-09 4.4E-09 4.4E-09
4.4E-09 4.3E-09 4.3E-09 4.3E-09 4.2E-09 4.2E-09 4.1E-09 4.1E-09 4.1E-09 4.0E-09 4.0E-09 4.0E-09 3.9E-09 3.9E-09 3.9E-09
3.8E-09 3.8E-09 3.8E-09 3.7E-09 3.7E-09
G 6.3E-11

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DOSINC.DAT

Q 1.9E-11
 G 8.1E-12
 Q 1.4E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.0E-07 1.0E-07 9.8E-08 9.3E-08 9.0E-08 8.8E-08 8.3E-08
 8.0E-08 7.8E-08 7.5E-08 7.2E-08 7.0E-08 6.7E-08 6.5E-08 6.2E-08 6.0E-08 5.8E-08 5.6E-08 5.4E-08 5.2E-08 5.0E-08 4.8E-08
 4.7E-08 4.5E-08 4.3E-08 4.2E-08 4.0E-08 3.9E-08 3.8E-08 3.6E-08 3.5E-08 3.4E-08 3.2E-08 3.1E-08 3.0E-08 2.9E-08 2.8E-08
 2.7E-08 2.6E-08 2.5E-08 2.4E-08 2.3E-08
 2 1 1 1 1 50 50 50 1 1 1 50
 H 1.8E-05 1.8E-07
 H 1.7E-09
 H 2.7E-09
 H 1.1E-08
 H 3.1E-08
 H 5.8E-05 8.2E-05 8.1E-05 8.0E-05 5.9E-05 5.8E-05 5.7E-05 5.8E-05 5.5E-05 5.5E-05 5.4E-05 5.3E-05 5.2E-05 5.1E-05 5.0E-05
 5.0E-05 4.9E-05 4.8E-05 4.7E-05 4.7E-05 4.8E-05 4.5E-05 4.5E-05 4.4E-05 4.3E-05 4.3E-05 4.2E-05 4.1E-05 4.1E-05 4.0E-05
 3.9E-05 3.9E-05 3.8E-05 3.8E-05 3.7E-05 3.6E-05 3.6E-05 3.6E-05 3.4E-05 3.4E-05 3.3E-05 3.3E-05 3.2E-05 3.2E-05
 3.1E-05 3.1E-05 3.0E-05 3.0E-05 2.9E-05
 H 4.4E-08 4.8E-08 4.8E-08 4.7E-08 4.6E-08 4.5E-08 4.5E-08 4.4E-08 4.3E-08 4.3E-08 4.2E-08 4.1E-08 4.1E-08 4.0E-08 3.9E-08
 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.1E-08
 3.1E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08
 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08
 H 8.1E-07 8.7E-07 8.7E-07 8.8E-07 8.8E-07 8.5E-07 8.5E-07 8.4E-07 8.4E-07 8.3E-07 8.2E-07 8.2E-07 8.1E-07 8.1E-07 8.0E-07
 8.0E-07 5.9E-07 5.9E-07 5.8E-07 5.8E-07 5.7E-07 5.7E-07 5.6E-07 5.6E-07 5.5E-07 5.5E-07 5.4E-07 5.4E-07 5.3E-07
 5.3E-07 5.2E-07 5.2E-07 5.1E-07 5.1E-07 5.0E-07 5.0E-07 4.9E-07 4.9E-07 4.8E-07 4.8E-07 4.8E-07 4.7E-07 4.7E-07
 4.6E-07 4.6E-07 4.6E-07 4.5E-07 4.5E-07
 H 1.0E-09
 H 1.1E-09
 H 1.0E-09
 H 1.5E-05 1.8E-05 1.8E-05 1.5E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.0E-05 1.0E-05
 9.7E-06 9.4E-06 9.0E-06 8.7E-06 8.4E-06 8.1E-06 7.8E-06 7.5E-06 7.3E-06 7.0E-06 6.8E-06 6.5E-06 6.3E-06 6.1E-06 5.9E-06
 5.8E-06 5.4E-06 5.3E-06 5.1E-06 4.9E-06 4.7E-06 4.5E-06 4.4E-06 4.2E-06 4.1E-06 3.9E-06 3.8E-06 3.7E-06 3.5E-06 3.4E-06
 3.3E-06 3.2E-06 3.0E-06 2.9E-06 2.8E-06
 ! BE10 Class: Y F1: 0.00500 12/07/87 13:50:01.7 Acute Sv/Bq
 11 1 3 4 5 8 7 8 11 12 13 14
 1 1 1 1 1 20 13 1 1 1 1
 Q 4.7E-12
 G 3.0E-10
 G 7.4E-10
 G 4.3E-09
 G 1.3E-08
 G 3.3E-10 2.8E-10 2.4E-10 2.0E-10 1.7E-10 1.4E-10 1.2E-10 1.0E-10 8.8E-11 7.3E-11 6.1E-11 5.2E-11 4.4E-11 3.7E-11 3.1E-11
 2.6E-11 2.2E-11 1.9E-11 1.6E-11 1.3E-11
 G 1.1E-10 9.8E-11 8.1E-11 8.8E-11 5.8E-11 4.9E-11 4.1E-11 3.5E-11 2.9E-11 2.5E-11 2.1E-11 1.8E-11 1.5E-11
 Q 4.7E-12
 Q 4.7E-12
 Q 4.7E-12
 Q 4.8E-12
 50 1 1 1 3 25 18 1 1 1 1
 H 1.8E-07 1.1E-07 7.9E-08 5.7E-08 4.2E-08 3.2E-08 2.5E-08 2.0E-08 1.8E-08 1.3E-08 1.1E-08 9.7E-09 8.5E-09 7.7E-09 7.0E-09
 6.5E-09 6.1E-09 5.8E-09 5.5E-09 5.4E-09 5.2E-09 5.1E-09 5.0E-09 5.0E-09 4.9E-09 4.9E-09 4.8E-09 4.8E-09 4.8E-09 4.8E-09
 4.8E-09 4.8E-09 4.8E-09 4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09
 4.7E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09

DOSINC.DAT

H 1.6E-10
H 3.8E-10
H 2.2E-09
H 6.8E-09 3.1E-10 1.9E-10
H 6.4E-10 1.0E-09 1.3E-09 1.4E-09 1.5E-09 1.6E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.0E-09 9.4E-10 8.4E-10 7.4E-10
6.5E-10 6.7E-10 4.9E-10 4.3E-10 3.7E-10 3.2E-10 2.8E-10 2.4E-10 2.0E-10 1.8E-10
H 2.2E-10 3.4E-10 4.4E-10 5.0E-10 5.3E-10 5.4E-10 5.3E-10 5.0E-10 4.7E-10 4.4E-10 4.0E-10 3.6E-10 3.2E-10 2.9E-10 2.6E-10
2.2E-10 1.9E-10 1.7E-10

H 9.8E-12
H 9.9E-12
H 9.8E-12
H 1.0E-11

I F 10 Class: D F1: 1.00000 12/07/87 13:57:48.9 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1

G 8.0E-12
G 2.9E-10
G 8.0E-12
G 9.7E-12
G 7.2E-12
G 5.2E-11
G 5.2E-11
G 4.2E-12
G 6.4E-12
G 7.6E-12
G 5.8E-12

1 1 1 1 1 1 1 1 1 1

H 1.1E-10
H 4.3E-11
H 3.1E-12
H 3.3E-12
H 2.8E-12
H 2.4E-11
H 2.5E-11
H 1.9E-12
H 2.9E-12
H 4.5E-12
H 4.1E-12

I NA22 Class: D F1: 1.00000 12/07/87 14:02:48.8 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
4 3 4 3 4 6 6 3 4 4 4

G 3.3E-09 3.5E-11 1.6E-11 7.4E-12
G 3.2E-09 2.1E-11 9.5E-12
G 4.2E-09 2.0E-11 1.3E-11 6.0E-12
G 3.9E-09 2.6E-11 1.2E-11
G 4.3E-09 3.5E-11 1.6E-11 7.5E-12
G 5.8E-09 2.5E-10 1.2E-10 5.4E-11 2.5E-11 1.2E-11
G 4.9E-09 1.5E-10 7.0E-11 3.2E-11 1.5E-11 6.9E-12
G 3.7E-09 2.3E-11 1.1E-11
G 3.8E-09 3.5E-11 1.6E-11 7.5E-12
G 3.4E-09 4.0E-11 1.8E-11 8.4E-12

DOSINC.DAT

5.938

9/30/88

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G 3.3E-09 3.6E-11 1.8E-11 7.4E-12
  4 3 4 3 4 8 8 3 4 4 4
H 2.4E-09 2.2E-11 1.8E-11 4.7E-12
H 1.9E-09 1.3E-11 8.8E-12
H 2.7E-09 1.8E-11 8.3E-12 3.8E-12
H 2.5E-09 1.8E-11 7.5E-12
H 2.7E-09 2.2E-11 1.8E-11 4.7E-12
H 3.7E-09 1.8E-10 7.4E-11 3.4E-11 1.8E-11 7.3E-12
H 3.1E-09 9.6E-11 4.4E-11 2.8E-11 9.4E-12 4.3E-12
H 2.4E-09 1.6E-11 8.8E-12
H 2.4E-09 2.2E-11 1.8E-11 4.7E-12
H 2.2E-09 2.6E-11 1.2E-11 5.3E-12
H 2.1E-09 2.2E-11 1.8E-11 4.7E-12
I P 33 Class: D F1: 0.80000 12/07/87 14:18:39.8 Acute Sv/Bq
  11 1 3 4 5 6 7 8 11 12 13 14
    1 1 1 1 1 1 1 1 1 1 1
G 9.6E-11
Q 1.4E-10
G 9.2E-11
Q 2.9E-10
Q 7.9E-10
G 1.3E-09
Q 5.3E-10
G 9.8E-11
G 9.8E-11
G 9.8E-11
G 9.8E-11
  1 1 1 1 1 1 1 1 1 1 1
H 2.3E-10
H 5.1E-11
H 4.3E-11
H 7.1E-11
H 1.5E-10
H 1.8E-09
H 3.9E-10
H 7.3E-11
H 7.3E-11
H 7.3E-11
H 7.3E-11
I S 35 Class: W F1: 0.80000 12/07/87 14:18:40.8 Acute Sv/Bq
  11 1 3 4 5 6 7 8 11 12 13 14
    2 2 2 2 2 2 2 2 2 2 2
G 7.6E-11 2.2E-12
G 1.8E-10 1.3E-12
Q 7.2E-11 1.3E-12
G 2.8E-10 1.1E-12
G 5.4E-10 1.3E-12
G 3.7E-11 1.1E-12
G 7.8E-11 2.3E-12
G 7.8E-11 2.2E-12
G 7.8E-11 2.2E-12

```

DOSINC.DAT

Q 7.8E-11 2.2E-12
 Q 7.8E-11 2.2E-12
 1 1 1 1 1 1 1 1 1 1
 H 5.1E-09
 H 5.3E-11
 H 4.8E-11
 H 1.8E-10
 H 2.8E-10
 H 2.2E-11
 H 4.8E-11
 H 4.5E-11
 H 4.8E-11
 H 4.8E-11
 H 4.8E-11
 ! CL38 Class: D F1: 1.00000 12/07/87 14:28:35.3 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1
 G 8.8E-10
 G 7.7E-10
 G 8.8E-10
 G 8.5E-10
 G 8.8E-10
 G 4.8E-10
 G 7.9E-10
 G 8.8E-10
 G 8.1E-10
 G 8.1E-10
 G 8.2E-10
 1 1 1 1 1 1 1 1 1 1
 H 8.2E-10
 H 3.4E-10
 H 5.5E-10
 H 5.5E-10
 H 5.5E-10
 H 2.8E-10
 H 5.1E-10
 H 5.1E-10
 H 5.2E-10
 H 5.1E-10
 H 5.3E-10
 ! K 48 Class: D F1: 1.00000 12/07/87 14:33:38.1 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1
 Q 4.9E-09
 Q 3.6E-09
 Q 5.4E-09
 G 5.3E-09
 Q 5.4E-09
 Q 2.6E-09
 G 4.7E-09
 G 5.8E-09

DOSINC.DAT

G 5.1E-09
 G 5.0E-09
 G 4.9E-09
 1 1 1 1 1 1 1 1 1 1
 H 1.8E-09
 H 1.9E-09
 H 3.5E-09
 H 3.4E-09
 H 3.5E-09
 H 1.0E-09
 H 3.0E-09
 H 3.2E-09
 H 3.3E-09
 H 3.2E-09
 H 3.1E-09
 ! CA41 Class: W F1: 0.30000 12/87/87 14:40:49.1 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 50 50 1 1 1 1
 G 9.7E-13
 G 3.3E-12
 G 5.4E-12
 G 2.9E-11
 G 8.5E-11
 G 2.0E-10 2.2E-10 2.0E-10 1.0E-10 1.0E-10 1.5E-10 1.4E-10 1.3E-10 1.3E-10 1.2E-10 1.1E-10 1.1E-10 1.0E-10 9.8E-11 9.1E-11
 8.7E-11 8.3E-11 8.0E-11 7.0E-11 7.3E-11 7.0E-11 6.0E-11 6.5E-11 6.3E-11 6.1E-11 5.9E-11 5.7E-11 5.5E-11 5.3E-11 5.1E-11
 4.9E-11 4.8E-11 4.6E-11 4.5E-11 4.4E-11 4.2E-11 4.1E-11 4.0E-11 3.9E-11 3.7E-11 3.6E-11 3.5E-11 3.4E-11 3.3E-11 3.2E-11
 3.1E-11 3.0E-11 2.9E-11 2.9E-11 2.8E-11
 G 1.9E-10 1.8E-10 1.3E-10 1.1E-10 9.9E-11 8.7E-11 7.7E-11 6.0E-11 6.1E-11 5.5E-11 4.9E-11 4.4E-11 4.0E-11 3.6E-11 3.3E-11
 3.0E-11 2.7E-11 2.5E-11 2.3E-11 2.1E-11 1.9E-11 1.0E-11 1.7E-11 1.5E-11 1.4E-11 1.3E-11 1.3E-11 1.2E-11 1.1E-11 1.0E-11
 9.9E-12 9.4E-12 8.0E-12 8.5E-12 8.1E-12 7.7E-12 7.4E-12 7.1E-12 6.0E-12 6.5E-12 6.3E-12 6.0E-12 5.8E-12 5.6E-12 5.4E-12
 5.2E-12 5.0E-12 4.9E-12 4.7E-12 4.5E-12
 G 9.0E-13
 G 1.1E-12
 G 9.9E-13
 G 1.0E-12
 2 1 1 1 1 50 50 1 1 1 1
 H 4.4E-10 3.9E-12
 H 1.9E-12
 H 3.0E-12
 H 1.5E-11
 H 4.4E-11
 H 2.2E-10 2.0E-10 1.8E-10 1.0E-10 1.5E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.1E-10 1.0E-10 9.7E-11 9.2E-11 8.7E-11 8.3E-11
 7.9E-11 7.6E-11 7.3E-11 7.0E-11 6.7E-11 6.4E-11 6.2E-11 6.0E-11 5.7E-11 5.5E-11 5.3E-11 5.2E-11 5.0E-11 4.8E-11 4.7E-11
 4.5E-11 4.4E-11 4.2E-11 4.1E-11 4.0E-11 3.9E-11 3.7E-11 3.6E-11 3.5E-11 3.4E-11 3.3E-11 3.2E-11 3.1E-11 3.0E-11 2.9E-11
 2.8E-11 2.8E-11 2.7E-11 2.8E-11 2.5E-11
 H 1.6E-10 1.5E-10 1.2E-10 1.1E-10 9.1E-11 8.0E-11 7.1E-11 6.3E-11 5.8E-11 5.0E-11 4.5E-11 4.0E-11 3.7E-11 3.3E-11 3.0E-11
 2.7E-11 2.5E-11 2.3E-11 2.1E-11 1.9E-11 1.8E-11 1.0E-11 1.5E-11 1.4E-11 1.3E-11 1.2E-11 1.1E-11 1.1E-11 1.0E-11 9.6E-12
 9.0E-12 8.6E-12 8.1E-12 7.8E-12 7.4E-12 7.1E-12 6.7E-12 6.5E-12 6.2E-12 5.9E-12 5.7E-12 5.5E-12 5.3E-12 5.1E-12 4.9E-12
 4.7E-12 4.6E-12 4.4E-12 4.3E-12 4.1E-12
 H 9.0E-13
 H 9.0E-13

DOSINC.DAT

H 9.9E-13
 H 9.1E-13
 I CA45 Class: W F1: 0.30000 12/07/87 14:49:38.8 Acute Sv/Bq
 11 1 9 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 5 4 1 1 1 1
 G 2.4E-11
 G 9.9E-11
 G 1.7E-10
 G 9.5E-10
 G 2.8E-09
 G 4.2E-09 7.8E-10 1.5E-10 2.8E-11 5.5E-12
 Q 2.9E-09 5.8E-10 9.9E-11 1.8E-11
 G 2.4E-11
 G 2.4E-11
 G 2.4E-11
 Q 2.4E-11
 2 1 1 1 1 4 4 1 1 1 1
 H 9.8E-09 1.8E-11
 H 5.2E-11
 H 8.5E-11
 H 4.7E-10
 H 1.4E-09
 H 3.4E-09 7.1E-10 1.3E-10 2.8E-11
 H 2.4E-09 5.2E-10 9.1E-11 1.8E-11
 H 2.8E-11
 H 2.8E-11
 H 2.8E-11
 H 2.8E-11
 I SC48 Class: Y F1: 0.00010 12/07/87 14:50:24.8 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 1 1 1 1 1 1 1 1 1 1 1 1
 G 5.0E-11
 G 8.8E-10
 G 2.3E-09
 G 4.8E-09
 G 1.8E-08
 G 1.4E-10
 G 4.8E-10
 Q 1.7E-10
 G 2.8E-09
 Q 2.5E-10
 Q 7.7E-12
 Q 2.8E-10
 G 2.4E-10
 3 2 1 1 1 2 2 1 1 2 2 2 2
 H 4.4E-08 1.5E-09 5.3E-11
 H 3.3E-09 1.1E-10
 H 1.8E-09
 H 3.8E-09
 H 5.2E-09
 H 1.6E-09 6.2E-11

DOSINC.DAT

H 2.1E-09 7.2E-11
H 1.8E-10
H 1.3E-09
H 2.1E-09 7.1E-11
H 2.0E-09 6.9E-11
H 3.9E-09 1.7E-10
H 4.3E-09 2.2E-10

I MN54 Class: W F1: 0.10000 12/07/87 15:06:16.1 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 1 1 1 1 1 1 1

G 2.3E-10
G 4.0E-10
G 9.7E-10
G 1.4E-09
G 2.3E-09
G 5.7E-10
G 4.9E-10
G 2.1E-10
G 9.6E-10
G 2.8E-10
G 1.4E-10
G 1.0E-09

2 1 1 1 1 2 1 1 1 1 1 2

H 6.7E-09 2.7E-11
H 1.1E-09
H 8.2E-10
H 1.1E-09
H 1.3E-09
H 1.2E-09 7.0E-12
H 1.1E-09
H 2.8E-10
H 7.0E-10
H 8.6E-10
H 7.4E-10
H 2.5E-09 1.3E-11

I MN58 Class: W F1: 0.10000 12/07/87 15:14:20.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 1 1 1 1 1 1 1

G 9.1E-12
G 9.0E-10
G 1.1E-09
G 1.4E-09
G 5.7E-10
G 1.1E-11
G 2.5E-11
G 8.1E-12
G 8.9E-11
G 1.0E-11
G 2.5E-12
G 2.8E-11

1 1 1 1 1 1 1 1 1 1 1 1

DOSINC.DAT

H 5.5E-10
H 7.7E-11
H 0.0E-11
H 1.1E-10
H 4.0E-11
H 0.0E-12
H 1.1E-11
H 3.3E-12
H 9.9E-12
H 8.1E-12
H 6.5E-12
H 2.0E-11

I FE55 Class: W F1: 0.10000 12/07/87 15:19:36.2 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 19

14 13 13 12 13 11 13 14 14 14 14 17 18

G 3.3E-11 2.3E-11 1.5E-11 1.0E-11 7.1E-12 4.0E-12 3.3E-12 2.3E-12 1.5E-12 1.1E-12 7.2E-13 4.9E-13 3.3E-13 2.3E-13
G 2.9E-11 1.7E-11 1.1E-11 7.7E-12 5.3E-12 3.8E-12 2.5E-12 1.7E-12 1.1E-12 7.8E-13 5.3E-13 3.8E-13 2.5E-13
G 3.5E-11 1.0E-11 1.1E-11 7.3E-12 5.0E-12 3.4E-12 2.3E-12 1.0E-12 1.1E-12 7.3E-13 5.0E-13 3.4E-13 2.3E-13
G 0.0E-11 1.5E-11 1.0E-11 6.9E-12 4.7E-12 3.2E-12 2.2E-12 1.5E-12 1.0E-12 6.9E-13 4.7E-13 3.2E-13
G 2.2E-10 1.7E-11 1.2E-11 7.9E-12 5.4E-12 3.7E-12 2.5E-12 1.7E-12 1.2E-12 7.9E-13 5.4E-13 3.7E-13 2.5E-13
G 1.4E-11 9.0E-12 6.7E-12 4.6E-12 3.1E-12 2.1E-12 1.5E-12 9.9E-13 6.7E-13 4.6E-13 3.1E-13
G 3.0E-11 2.1E-11 1.4E-11 9.0E-12 6.5E-12 4.4E-12 3.0E-12 2.1E-12 1.4E-12 9.0E-13 6.5E-13 4.4E-13 3.0E-13
G 3.4E-11 2.3E-11 1.8E-11 1.1E-11 7.4E-12 5.0E-12 3.4E-12 2.3E-12 1.8E-12 1.1E-12 7.4E-13 5.0E-13 3.4E-13 2.3E-13
G 3.6E-11 2.4E-11 1.7E-11 1.1E-11 7.7E-12 5.3E-12 3.6E-12 2.4E-12 1.7E-12 1.1E-12 7.7E-13 5.3E-13 3.6E-13 2.4E-13
G 3.4E-11 2.3E-11 1.6E-11 1.1E-11 7.4E-12 5.0E-12 3.4E-12 2.3E-12 1.6E-12 1.1E-12 7.4E-13 5.0E-13 3.4E-13 2.3E-13
G 3.0E-11 2.5E-11 1.7E-11 1.1E-11 7.8E-12 5.3E-12 3.6E-12 2.5E-12 1.7E-12 1.1E-12 7.8E-13 5.3E-13 3.6E-13 2.5E-13
G 1.1E-10 7.4E-11 5.0E-11 3.4E-11 2.3E-11 1.6E-11 1.1E-11 7.4E-12 5.0E-12 3.4E-12 2.3E-12 1.6E-12 1.1E-12 7.4E-13 5.0E-13
3.5E-13 2.4E-13
G 1.0E-10 1.2E-10 8.4E-11 5.7E-11 3.9E-11 2.7E-11 1.8E-11 1.2E-11 8.5E-12 5.8E-12 3.9E-12 2.7E-12 1.8E-12 1.2E-12 8.5E-13
5.8E-13 4.0E-13 2.7E-13

2 11 10 10 11 9 11 11 12 11 12 14 16

H 8.9E-10 6.7E-12

H 4.1E-11 2.9E-11 2.0E-11 1.4E-11 9.3E-12 6.3E-12 4.3E-12 2.9E-12 2.0E-12 1.4E-12 9.3E-13
H 4.3E-11 2.7E-11 1.9E-11 1.3E-11 8.7E-12 5.9E-12 4.0E-12 2.8E-12 1.9E-12 1.3E-12
H 6.9E-11 2.6E-11 1.8E-11 1.2E-11 8.2E-12 5.6E-12 3.8E-12 2.6E-12 1.8E-12 1.2E-12
H 1.4E-10 3.0E-11 2.0E-11 1.4E-11 9.4E-12 6.4E-12 4.4E-12 3.0E-12 2.0E-12 1.4E-12 9.5E-13
H 2.3E-11 1.7E-11 1.2E-11 8.0E-12 5.5E-12 3.7E-12 2.5E-12 1.7E-12 1.2E-12
H 4.0E-11 3.6E-11 2.5E-11 1.7E-11 1.1E-11 7.8E-12 5.3E-12 3.6E-12 2.5E-12 1.7E-12 1.2E-12
H 5.4E-11 4.1E-11 2.8E-11 1.9E-11 1.3E-11 8.0E-12 5.6E-12 4.1E-12 2.8E-12 1.9E-12 1.3E-12
H 5.7E-11 4.3E-11 2.9E-11 2.0E-11 1.4E-11 9.2E-12 6.3E-12 4.3E-12 2.9E-12 2.0E-12 1.4E-12 9.3E-13
H 5.5E-11 4.1E-11 2.8E-11 1.9E-11 1.3E-11 8.8E-12 6.0E-12 4.1E-12 2.8E-12 1.9E-12 1.3E-12
H 5.7E-11 4.3E-11 3.0E-11 2.0E-11 1.4E-11 9.4E-12 6.4E-12 4.4E-12 3.0E-12 2.0E-12 1.4E-12 9.4E-13
H 1.7E-10 1.3E-10 8.7E-11 5.9E-11 4.0E-11 2.8E-11 1.9E-11 1.3E-11 8.7E-12 6.0E-12 4.1E-12 2.8E-12 1.9E-12 1.3E-12
H 2.8E-10 2.1E-10 1.5E-10 9.9E-11 6.8E-11 4.6E-11 3.1E-11 2.1E-11 1.5E-11 1.0E-11 6.8E-12 4.6E-12 3.2E-12 2.2E-12 1.5E-12
1.0E-12

I FE59 Class: W F1: 0.10000 12/07/87 15:27:39.2 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 19

1 1 1 1 1 1 1 1 1 1 1 1 1 1

G 6.5E-10
G 1.0E-09
G 2.0E-09

DOSINC.DAT

G 3.8E-09
 G 8.3E-09
 G 5.2E-10
 G 7.7E-10
 G 7.9E-10
 G 1.6E-09
 G 7.5E-10
 G 6.4E-10
 G 1.8E-09
 G 1.8E-09

1 1 1 1 1 1 1 1 1 1 1 1

H 1.4E-08
 H 1.8E-09
 H 1.8E-09
 H 2.4E-09
 H 4.4E-09
 H 9.3E-10
 H 1.2E-09
 H 1.8E-09
 H 1.4E-09
 H 1.3E-09
 H 1.2E-09
 H 2.7E-09
 H 2.9E-09

I C057 Class: Y F1: 0.05000 12/07/87 15:35:59.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
 2 2 2 2 2 3 2 3 2 2 3

G 2.4E-11 4.2E-12
 G 8.3E-11 3.9E-12
 G 2.2E-10 4.2E-12
 G 5.2E-10 4.2E-12
 G 1.3E-09 3.7E-12
 G 3.8E-11 4.2E-12
 G 7.9E-11 5.4E-12 1.5E-12
 G 2.9E-11 3.4E-12
 G 1.8E-10 4.8E-12 1.3E-12
 G 3.8E-11 3.8E-12
 G 1.5E-11 3.8E-12
 G 7.4E-11 1.2E-11 3.4E-12

8 3 2 2 2 3 3 1 1 3 3 3

H 1.2E-08 3.4E-09 9.4E-10 2.7E-10 7.9E-11 2.4E-11
 H 4.1E-10 1.0E-10 2.9E-11
 H 1.5E-10 1.5E-11
 H 3.0E-10 1.9E-11
 H 6.5E-10 1.5E-11
 H 3.3E-10 8.0E-11 2.5E-11
 H 4.3E-10 1.1E-10 3.2E-11
 H 1.8E-11
 H 1.1E-10
 H 2.8E-10 7.3E-11 2.1E-11
 H 2.0E-10 5.4E-11 1.5E-11

DOSINC.DAT

5.944

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H 5.1E-10 1.4E-10 4.0E-11
! C058 Class: Y F1: 0.05000 12/07/87 15:43:59.1 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 1 1 1 1 1 1 1
G 8.8E-11
G 3.8E-10
G 1.1E-09
G 2.0E-09
G 3.9E-09
G 1.2E-10
G 2.8E-10
G 1.7E-10
G 1.0E-09
G 1.8E-10
G 6.6E-11
G 2.5E-10
2 2 1 1 1 1 2 1 1 2 2 2
H 1.0E-08 3.1E-10
H 1.4E-09 2.4E-11
H 7.5E-10
H 1.2E-09
H 2.0E-09
H 8.8E-10
H 9.2E-10 1.6E-11
H 1.1E-10
H 8.1E-10
H 9.2E-10 1.7E-11
H 8.8E-10 1.7E-11
H 1.0E-09 3.1E-11
! N159 Class: W F1: 0.05000 12/07/87 15:52:00.0 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 16
16 15 15 14 15 12 16 16 17 16 17 1
G 8.9E-12 5.8E-12 4.5E-12 3.8E-12 3.0E-12 2.4E-12 1.9E-12 1.6E-12 1.3E-12 1.0E-12 8.3E-13 6.7E-13 5.5E-13 4.4E-13 3.6E-13
2.9E-13
G 1.1E-11 4.2E-12 3.4E-12 2.8E-12 2.2E-12 1.8E-12 1.5E-12 1.2E-12 9.8E-13 7.8E-13 6.3E-13 5.1E-13 4.1E-13 3.3E-13 2.7E-13
G 2.0E-11 3.9E-12 3.2E-12 2.6E-12 2.1E-12 1.7E-12 1.4E-12 1.1E-12 9.0E-13 7.3E-13 5.9E-13 4.8E-13 3.9E-13 3.1E-13 2.5E-13
G 8.5E-11 3.7E-12 3.0E-12 2.4E-12 1.9E-12 1.6E-12 1.3E-12 1.0E-12 8.4E-13 6.8E-13 5.5E-13 4.4E-13 3.6E-13 2.9E-13
G 2.4E-10 4.2E-12 3.4E-12 2.8E-12 2.2E-12 1.8E-12 1.5E-12 1.2E-12 9.8E-13 7.8E-13 6.3E-13 5.1E-13 4.2E-13 3.4E-13 2.7E-13
G 3.1E-12 2.5E-12 2.0E-12 1.6E-12 1.3E-12 1.1E-12 8.8E-13 6.9E-13 5.6E-13 4.5E-13 3.7E-13 3.0E-13
G 6.0E-12 4.8E-12 3.9E-12 3.1E-12 2.5E-12 2.1E-12 1.7E-12 1.4E-12 1.1E-12 8.9E-13 7.2E-13 5.8E-13 4.7E-13 3.8E-13 3.1E-13
2.5E-13
G 7.0E-12 5.7E-12 4.6E-12 3.7E-12 3.0E-12 2.4E-12 2.0E-12 1.6E-12 1.3E-12 1.1E-12 8.5E-13 6.9E-13 5.6E-13 4.5E-13 3.7E-13
3.0E-13
G 8.6E-12 6.9E-12 4.9E-12 3.9E-12 3.2E-12 2.6E-12 2.1E-12 1.7E-12 1.4E-12 1.1E-12 9.0E-13 7.3E-13 5.9E-13 4.8E-13 3.9E-13
3.1E-13 2.5E-13
G 7.1E-12 5.7E-12 4.6E-12 3.7E-12 3.0E-12 2.5E-12 2.0E-12 1.6E-12 1.3E-12 1.1E-12 8.6E-13 6.9E-13 5.6E-13 4.6E-13 3.7E-13
3.0E-13
G 7.8E-12 6.3E-12 5.1E-12 4.1E-12 3.3E-12 2.7E-12 2.2E-12 1.8E-12 1.4E-12 1.2E-12 9.4E-13 7.7E-13 6.2E-13 5.0E-13 4.1E-13

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DOSINC.DAT

3.3E-13 2.7E-13
 Q 1.9E-13
 2 13 13 12 13 11 14 15 15 15 15 1
 H 1.1E-09 1.0E-11
 H 1.7E-11 1.3E-11 1.0E-11 8.3E-12 6.7E-12 5.4E-12 4.4E-12 3.6E-12 2.9E-12 2.3E-12 1.9E-12 1.5E-12 1.2E-12
 H 2.1E-11 1.2E-11 9.8E-12 7.8E-12 6.3E-12 5.1E-12 4.1E-12 3.3E-12 2.7E-12 2.2E-12 1.8E-12 1.4E-12 1.2E-12
 H 5.3E-11 1.1E-11 8.9E-12 7.2E-12 5.9E-12 4.7E-12 3.8E-12 3.1E-12 2.5E-12 2.0E-12 1.7E-12 1.3E-12
 H 1.3E-10 1.3E-11 1.0E-11 8.3E-12 6.8E-12 5.5E-12 4.4E-12 3.6E-12 2.9E-12 2.4E-12 1.9E-12 1.5E-12 1.3E-12
 H 8.3E-12 7.4E-12 6.0E-12 4.9E-12 3.9E-12 3.2E-12 2.6E-12 2.1E-12 1.7E-12 1.4E-12 1.1E-12
 H 1.6E-11 1.4E-11 1.2E-11 9.5E-12 7.7E-12 6.2E-12 5.0E-12 4.1E-12 3.3E-12 2.7E-12 2.2E-12 1.8E-12 1.4E-12 1.2E-12
 H 1.9E-11 1.7E-11 1.4E-11 1.1E-11 9.1E-12 7.4E-12 6.0E-12 4.8E-12 3.9E-12 3.2E-12 2.6E-12 2.1E-12 1.7E-12 1.4E-12 1.1E-12

 H 2.1E-11 1.8E-11 1.5E-11 1.2E-11 9.6E-12 7.8E-12 6.3E-12 5.1E-12 4.1E-12 3.4E-12 2.7E-12 2.2E-12 1.8E-12 1.4E-12 1.2E-12
 H 2.0E-11 1.7E-11 1.4E-11 1.1E-11 9.1E-12 7.4E-12 6.0E-12 4.9E-12 3.9E-12 3.2E-12 2.6E-12 2.1E-12 1.7E-12 1.4E-12 1.1E-12
 H 2.1E-11 1.9E-11 1.5E-11 1.2E-11 1.0E-11 8.2E-12 6.6E-12 5.4E-12 4.3E-12 3.5E-12 2.8E-12 2.3E-12 1.9E-12 1.5E-12 1.2E-12

 H 5.2E-13
 ! NI63 Class: W FI: 0.05000 12/07/07 15:59:38.9 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 16
 14 12 12 11 12 11 14 14 14 14 14 1
 G 1.7E-11 1.4E-11 1.1E-11 8.8E-12 7.1E-12 5.7E-12 4.6E-12 3.7E-12 3.0E-12 2.4E-12 1.9E-12 1.5E-12 1.2E-12 1.0E-12
 G 2.9E-11 7.6E-12 6.1E-12 4.9E-12 4.0E-12 3.2E-12 2.6E-12 2.1E-12 1.7E-12 1.3E-12 1.1E-12 8.6E-13
 G 5.6E-11 7.7E-12 6.2E-12 5.0E-12 4.0E-12 3.2E-12 2.6E-12 2.1E-12 1.7E-12 1.4E-12 1.1E-12 8.6E-13
 G 2.9E-10 8.5E-12 6.2E-12 4.2E-12 3.4E-12 2.7E-12 2.2E-12 1.8E-12 1.4E-12 1.1E-12 9.1E-13
 G 6.4E-10 7.6E-12 6.1E-12 4.9E-12 4.0E-12 3.2E-12 2.6E-12 2.1E-12 1.7E-12 1.3E-12 1.1E-12 8.6E-13
 G 8.5E-12 6.8E-12 5.5E-12 4.4E-12 3.6E-12 2.9E-12 2.3E-12 1.8E-12 1.5E-12 1.2E-12 9.6E-13
 G 1.8E-11 1.3E-11 1.1E-11 8.5E-12 6.9E-12 5.5E-12 4.4E-12 3.6E-12 2.9E-12 2.3E-12 1.9E-12 1.5E-12 1.2E-12 9.7E-13
 G 1.7E-11 1.4E-11 1.1E-11 8.9E-12 7.1E-12 5.7E-12 4.6E-12 3.7E-12 3.0E-12 2.4E-12 1.9E-12 1.5E-12 1.2E-12 1.0E-12
 G 1.8E-11 1.4E-11 1.1E-11 9.1E-12 7.3E-12 5.9E-12 4.7E-12 3.8E-12 3.1E-12 2.5E-12 2.0E-12 1.6E-12 1.3E-12 1.0E-12
 G 1.7E-11 1.4E-11 1.1E-11 8.8E-12 7.1E-12 5.7E-12 4.6E-12 3.7E-12 3.0E-12 2.4E-12 1.9E-12 1.5E-12 1.2E-12 1.0E-12
 G 1.7E-11 1.4E-11 1.1E-11 8.9E-12 7.1E-12 5.7E-12 4.6E-12 3.7E-12 3.0E-12 2.4E-12 1.9E-12 1.6E-12 1.3E-12 1.0E-12
 G 2.8E-13
 2 11 11 10 11 11 14 14 14 14 14 1
 H 2.8E-09 2.4E-11
 H 3.6E-11 2.3E-11 1.8E-11 1.5E-11 1.2E-11 9.8E-12 7.7E-12 6.2E-12 5.0E-12 4.0E-12 3.2E-12
 H 4.9E-11 2.3E-11 1.9E-11 1.5E-11 1.2E-11 9.7E-12 7.8E-12 6.3E-12 5.1E-12 4.1E-12 3.3E-12
 H 1.6E-10 2.0E-11 1.6E-11 1.3E-11 1.0E-11 8.2E-12 6.6E-12 5.3E-12 4.3E-12 3.4E-12
 H 4.5E-10 2.3E-11 1.8E-11 1.5E-11 1.2E-11 9.6E-12 7.7E-12 6.2E-12 5.0E-12 4.0E-12 3.2E-12
 H 2.3E-11 2.1E-11 1.7E-11 1.3E-11 1.1E-11 8.6E-12 6.9E-12 5.6E-12 4.5E-12 3.6E-12 2.9E-12
 H 4.4E-11 4.0E-11 3.2E-11 2.6E-11 2.1E-11 1.7E-11 1.3E-11 1.1E-11 8.0E-12 7.0E-12 5.8E-12 4.5E-12 3.6E-12 2.9E-12
 H 4.0E-11 4.1E-11 3.3E-11 2.7E-11 2.1E-11 1.7E-11 1.4E-11 1.1E-11 9.0E-12 7.2E-12 5.8E-12 4.7E-12 3.8E-12 3.0E-12
 H 4.7E-11 4.2E-11 3.4E-11 2.7E-11 2.2E-11 1.8E-11 1.4E-11 1.1E-11 9.2E-12 7.4E-12 6.0E-12 4.8E-12 3.9E-12 3.1E-12
 H 4.0E-11 4.1E-11 3.3E-11 2.7E-11 2.1E-11 1.7E-11 1.4E-11 1.1E-11 8.9E-12 7.2E-12 5.8E-12 4.7E-12 3.7E-12 3.0E-12
 H 4.0E-11 4.1E-11 3.3E-11 2.7E-11 2.2E-11 1.7E-11 1.4E-11 1.1E-11 9.0E-12 7.2E-12 5.8E-12 4.7E-12 3.8E-12 3.0E-12
 H 8.1E-13
 ! NI65 Class: W FI: 0.05000 12/07/07 16:07:18.5 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 16
 1 1 1 1 1 1 1 1 1 1 1
 G 2.8E-12

DOSINC.DAT

G 8.5E-10
 G 7.5E-10
 G 9.8E-10
 G 3.9E-10
 G 3.0E-12
 G 7.7E-12
 G 2.3E-12
 G 2.5E-11
 G 5.8E-12
 G 7.0E-13
 G 1.1E-11
 1 1 1 1 1 1 1 1 1 1 1
 H 4.0E-10
 H 5.2E-11
 H 5.7E-11
 H 7.5E-11
 H 3.1E-11
 H 2.6E-12
 H 3.8E-12
 H 1.0E-12
 H 3.4E-12
 H 3.2E-12
 H 2.4E-12
 H 4.4E-12
 I CU04 Class: D F1: 0.50000 12/07/87 10:12:38.7 Acute Sv/Bq
 14 1 3 4 5 6 7 8 11 12 13 14 17 21 18
 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 G 1.4E-11
 G 1.7E-10
 G 2.1E-10
 G 8.2E-10
 G 7.8E-10
 G 2.0E-11
 G 2.0E-11
 G 1.6E-11
 G 4.9E-11
 G 1.7E-11
 G 1.2E-11
 G 3.9E-11
 G 3.9E-11
 G 4.4E-11
 1 1 1 1 1 1 1 1 1 1 1 1
 H 2.0E-10
 H 3.5E-11
 H 3.9E-11
 H 1.0E-10
 H 1.3E-10
 H 2.3E-11
 H 1.4E-11
 H 1.3E-11
 H 1.7E-11

H 1.3E-11
H 1.2E-11
H 3.5E-11
H 3.7E-11
H 3.0E-11
I ZN69M Class: Y F1: 0.50000 12/07/87 16:10:35.3 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1

G 3.7E-11
G 2.5E-10
G 4.0E-10
G 1.0E-09
Q 2.4E-09
G 7.9E-11
Q 1.0E-10
G 4.2E-11
Q 1.2E-10
G 4.6E-11
G 3.3E-11
1 1 1 1 1 1 1 1 1 1

H 1.0E-09
H 1.2E-10
H 1.5E-10
H 4.7E-10
H 0.3E-10
H 2.0E-11
H 3.3E-11
H 1.1E-11
H 3.3E-11
H 1.0E-11
H 1.4E-11

I ZN69 Class: Y F1: 0.50000 12/07/87 16:31:15.1 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1

G 4.3E-13
G 2.1E-10
G 1.1E-10
Q 0.3E-11
Q 1.1E-11
G 0.0E-13
G 8.9E-13
Q 4.3E-13
G 4.3E-13
G 4.5E-13
G 4.3E-13
1 1 1 1 1 1 1 1 1 1

H 0.1E-11
H 0.0E-12
H 4.5E-12
H 2.0E-12
H 4.4E-13

DOSINC.DAT

5.948

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H 4.5E-14
H 5.9E-14
H 2.9E-14
H 2.9E-14
H 3.0E-14
H 2.9E-14

I AS76 Class: W F1: 0.50000 12/07/87 10:30:06.4 Acute Sv/Bq

14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

G 1.0E-10
G 1.3E-09
G 1.7E-09
G 6.7E-09
G 1.2E-08
G 8.3E-11
G 1.4E-10
G 1.1E-10
G 2.2E-10
G 1.1E-10
G 9.0E-11
G 3.7E-10
G 4.3E-10
G 2.9E-10

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

H 5.2E-09
H 4.0E-10
H 4.8E-10
H 1.9E-09
H 3.4E-09
H 4.2E-11
H 6.7E-11
H 4.0E-11
H 8.0E-11
H 6.6E-11
H 5.0E-11
H 1.7E-10
H 1.9E-10
H 1.3E-10

I SE76 Class: W F1: 0.80000 12/07/87 10:43:06.7 Acute Sv/Bq

14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

G 1.7E-09 2.9E-11
G 2.0E-09 3.3E-11
G 1.9E-09 3.2E-11
G 2.0E-09 3.2E-11
G 1.8E-09 2.5E-11
G 1.6E-09 2.5E-11
G 1.9E-09 3.3E-11
G 1.2E-09 2.0E-11
G 1.7E-09 2.8E-11
G 1.4E-09 2.5E-11

DOSINC.DAT

5.949

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G 1.2E-09 2.0E-11
 G 5.7E-09 9.0E-11
 G 7.0E-09 1.2E-10
 G 3.5E-09 0.1E-11
 2 2 2 2 2 2 2 2 2 2 2
 H 5.3E-09 2.2E-11
 H 1.5E-09 2.5E-11
 H 1.2E-09 2.4E-11
 H 1.2E-09 2.4E-11
 H 1.1E-09 1.9E-11
 H 1.1E-09 1.9E-11
 H 1.4E-09 2.5E-11
 H 7.2E-10 1.5E-11
 H 1.0E-09 2.1E-11
 H 1.1E-09 1.9E-11
 H 8.5E-10 1.5E-11
 H 3.0E-09 7.4E-11
 H 4.4E-09 9.2E-11
 H 2.5E-09 4.0E-11
 ! SE79 Class: W F1: 0.00000 12/07/87 16:52:07.5 Acute Sv/Bq
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 3 3 3 3 3 3 3 3 3 3 3 4 4 4
 G 7.7E-10 1.2E-10 2.2E-11
 G 5.2E-10 7.0E-11 1.3E-11
 G 4.0E-10 0.9E-11 1.3E-11
 G 5.7E-10 5.0E-11 1.1E-11
 G 1.0E-09 0.8E-11 1.3E-11
 G 3.9E-10 0.0E-11 1.1E-11
 G 7.0E-10 1.2E-10 2.2E-11
 G 7.7E-10 1.2E-10 2.2E-11
 G 7.7E-10 1.2E-10 2.2E-11
 G 7.7E-10 1.2E-10 2.2E-11
 G 7.7E-10 1.2E-10 2.2E-11
 G 5.5E-09 0.4E-10 1.6E-10 2.9E-11
 G 1.1E-08 1.6E-09 3.0E-10 5.6E-11
 G 3.0E-09 5.0E-10 1.0E-10 1.9E-11
 2 3 3 2 3 2 3 3 3 3 3 4 4 4
 H 9.2E-09 0.0E-11
 H 3.3E-10 5.4E-11 1.0E-11
 H 3.1E-10 5.3E-11 0.0E-12
 H 3.4E-10 4.4E-11
 H 5.0E-10 5.2E-11 9.7E-12
 H 2.0E-10 4.0E-11
 H 5.0E-10 9.0E-11 1.7E-11
 H 5.0E-10 9.1E-11 1.7E-11
 H 5.0E-10 9.1E-11 1.7E-11
 H 5.0E-10 9.1E-11 1.7E-11
 H 5.0E-10 9.1E-11 1.7E-11
 H 3.5E-09 0.3E-10 1.2E-10 2.2E-11
 H 0.8E-09 1.2E-09 2.3E-10 4.2E-11
 H 2.3E-09 4.2E-10 7.9E-11 1.5E-11

DOSINC.DAT

! BR82 Class: D Fl: 1.00000 12/10/87 16:32:44.9 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

1 1 1 1 1 1 1 1 1 1

G 4.1E-10

G 8.1E-10

G 5.4E-10

G 5.1E-10

G 5.3E-10

G 1.5E-10

G 3.8E-10

G 5.0E-10

G 4.3E-10

G 4.1E-10

G 4.1E-10

1 1 1 1 1 1 1 1 1 1

H 7.4E-10

H 3.3E-10

H 3.1E-10

H 2.9E-10

H 3.0E-10

H 1.0E-10

H 2.4E-10

H 2.9E-10

H 2.4E-10

H 2.0E-10

H 2.5E-10

! BR83 Class: D Fl: 1.00000 12/10/87 16:39:40.7 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

1 1 1 1 1 1 1 1 1 1

G 8.4E-12

G 3.0E-10

G 9.0E-12

G 8.9E-12

G 9.0E-12

G 4.3E-12

G 8.2E-12

G 8.4E-12

G 8.4E-12

G 8.7E-12

G 8.4E-12

1 1 1 1 1 1 1 1 1 1

H 1.8E-10

H 4.4E-11

H 4.1E-12

H 4.0E-12

H 4.1E-12

H 1.9E-12

H 3.7E-12

H 3.8E-12

H 3.0E-12

H 4.0E-12

DOSINC.DAT

5.951

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H 3.8E-12
 I BR84 Class: D F1: 1.00000 12/10/87 16:50:04.1 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1 1

G 7.3E-12
 G 6.9E-10
 G 9.3E-12
 G 9.8E-12
 G 7.7E-12
 G 3.2E-12
 G 5.0E-12
 G 5.5E-12
 G 7.1E-12
 G 6.9E-12
 G 5.5E-12
 1 1 1 1 1 1 1 1 1 1

H 1.0E-10
 H 7.5E-11
 H 3.5E-12
 H 3.5E-12
 H 3.1E-12
 H 1.0E-12
 H 3.0E-12
 H 2.6E-12
 H 3.0E-12
 H 3.5E-12
 H 3.3E-12

I RB87 Class: D F1: 1.00000 12/10/87 16:54:58.9 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 2 2 1 1 1 1

G 1.1E-09
 G 7.1E-10
 G 1.1E-09
 G 1.1E-09
 G 1.1E-09
 G 4.0E-09 1.3E-11
 G 2.3E-09 7.3E-12
 G 1.1E-09
 G 1.1E-09
 G 1.1E-09
 G 1.1E-09
 1 1 1 1 1 2 2 1 1 1 1

H 3.5E-10
 H 3.9E-10
 H 7.3E-10
 H 7.3E-10
 H 7.3E-10
 H 2.5E-09 8.2E-12
 H 1.4E-09 4.6E-12
 H 7.3E-10
 H 7.3E-10

DOSINC.DAT

5.952

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H 7.3E-10
H 7.3E-10
I RB88 Class: D F1: 1.00000 12/10/87 17:02:35.1 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

1 1 1 1 1 1 1 1 1 1

G 3.1E-12

G 7.5E-10

G 3.4E-12

G 3.6E-12

G 3.1E-12

G 3.3E-12

G 3.4E-12

G 2.6E-12

G 2.9E-12

G 3.0E-12

G 2.5E-12

1 1 1 1 1 1 1 1 1 1

H 1.5E-10

H 6.4E-11

H 1.5E-12

H 1.5E-12

H 1.4E-12

H 1.8E-12

H 1.8E-12

H 1.3E-12

H 1.4E-12

H 1.5E-12

H 1.4E-12

I RB88 Class: D F1: 1.00000 12/10/87 17:07:25.5 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

1 1 1 1 1 1 1 1 1 1

G 3.8E-12

G 3.7E-10

G 4.9E-12

G 5.4E-12

G 3.8E-12

G 4.5E-12

G 3.8E-12

G 2.4E-12

G 3.5E-12

G 3.8E-12

G 2.3E-12

1 1 1 1 1 1 1 1 1 1

H 7.0E-11

H 3.1E-11

H 1.6E-12

H 1.7E-12

H 1.5E-12

H 2.7E-12

H 2.2E-12

H 1.3E-12

DOSINC.DAT

5.953

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H 1.4E-12
H 1.8E-12
H 1.7E-12
! RB88 Class: D F1: 1.00000 12/10/87 17:18:33.0 Acute Sv/Bq
  11 1 3 4 5 6 7 8 11 12 13 14
    1 1 1 1 1 1 1 1 1 1 1
G 2.2E-09
G 1.9E-09
G 2.2E-09
G 2.2E-09
G 2.2E-09
G 7.4E-09
G 4.3E-09
G 2.2E-09
G 2.2E-09
G 2.2E-09
G 2.2E-09
  1 1 1 1 1 1 1 1 1 1
H 2.0E-09
H 8.2E-10
H 1.4E-09
H 1.4E-09
H 1.4E-09
H 4.0E-09
H 2.7E-09
H 1.4E-09
H 1.4E-09
H 1.4E-09
H 1.4E-09
! SR85 Class: D F1: 0.30000 12/10/87 17:26:03.0 Acute Sv/Bq
  11 1 3 4 5 6 7 8 11 12 13 14
    2 1 1 1 2 2 2 1 2 2 2
G 1.8E-10 1.7E-12
G 2.4E-10
G 5.5E-10
G 7.8E-10
G 1.4E-09 1.8E-12
G 5.8E-10 8.0E-12
G 5.6E-10 8.9E-12
G 1.6E-10
G 5.7E-10 1.9E-12
G 2.1E-10 1.9E-12
G 1.8E-10 1.9E-12
  2 2 2 2 2 2 2 2 2 2 2
H 3.7E-10 2.9E-12
H 2.1E-10 1.7E-12
H 3.0E-10 2.4E-12
H 3.1E-10 2.1E-12
H 4.0E-10 2.7E-12
H 9.0E-10 1.4E-11
H 0.8E-10 1.2E-11

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DOSINC.DAT

H 2.1E-10 1.7E-12
 H 3.6E-10 3.2E-12
 H 2.9E-10 3.2E-12
 H 2.9E-10 3.2E-12
 ! SR91 Class: D F1: 0.30000 12/10/87 17:35:20.0 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1
 G 2.8E-11
 G 0.3E-10
 G 1.3E-09
 G 3.7E-09
 G 3.9E-09
 G 7.5E-11
 G 1.0E-10
 G 3.5E-11
 G 2.1E-10
 G 4.7E-11
 G 2.1E-11
 1 1 1 1 1 1 1 1 1 1
 H 9.0E-10
 H 1.5E-10
 H 2.2E-10
 H 5.7E-10
 H 0.0E-10
 H 1.1E-10
 H 1.1E-10
 H 3.4E-11
 H 5.9E-11
 H 4.0E-11
 H 3.0E-11
 ! Y 91M Class: Y F1: 0.00010 12/10/87 17:59:54.2 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1
 G 1.3E-12
 G 5.0E-11
 G 3.2E-11
 G 3.2E-11
 G 2.4E-11
 G 9.0E-13
 G 2.3E-12
 G 3.4E-13
 G 7.3E-12
 G 1.9E-12
 G 1.2E-13
 G 2.0E-12
 2 1 1 1 1 1 1 1 1 1 1
 H 7.0E-11 5.2E-13
 H 2.8E-12
 H 1.0E-12
 H 4.1E-12
 H 8.8E-12

DOSINC.DAT

H 6.3E-13
H 6.0E-13
H 3.4E-14
H 3.4E-13
H 0.2E-13
H 5.1E-13
H 1.3E-12

! Y 91 Class: Y F1: 0.00010 12/10/87 18:11:06.3 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 1 1 1 1 1 1 1

G 2.0E-13
G 6.9E-10
G 1.7E-09
G 1.0E-08
G 3.0E-08
G 6.2E-12
G 6.5E-12
G 4.1E-13
G 3.5E-12
G 5.5E-13
G 1.3E-13
G 6.0E-12

2 1 1 1 1 1 1 1 1 1 1 1
H 9.8E-08 9.1E-10

H 3.4E-10
H 6.4E-10
H 5.0E-09
H 1.4E-08
H 3.2E-10
H 3.1E-10
H 6.4E-12
H 6.3E-12
H 9.0E-12
H 6.5E-12
H 3.0E-10

! SR92 Class: D F1: 0.30000 12/10/87 18:18:59.8 Acute Sv/Bq
11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1 1 1

G 1.7E-11
G 5.2E-10
G 1.0E-09
G 3.0E-09
G 2.2E-09
G 2.4E-11
G 3.5E-11
G 1.7E-11
G 6.1E-11
G 2.8E-11
G 1.2E-11

1 1 1 1 1 1 1 1 1 1
H 7.1E-10

DOSINC.DAT

H 9.9E-11
 H 1.7E-10
 H 4.5E-10
 H 3.4E-10
 H 3.1E-11
 H 3.0E-11
 H 1.0E-11
 H 2.0E-11
 H 2.2E-11
 H 2.0E-11

I Y 92 Class: Y F1: 0.00010 12/10/87 10:30:26.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1

G 1.5E-12
 G 1.4E-09
 G 2.0E-09
 G 3.5E-09
 G 1.9E-09
 G 1.0E-12
 G 5.1E-12
 G 1.5E-12
 G 2.1E-11
 G 3.8E-12
 G 1.9E-13
 G 4.6E-12

1 1 1 1 1 1 1 1 1 1 1

H 1.3E-09
 H 1.7E-10
 H 2.5E-10
 H 4.2E-10
 H 2.3E-10
 H 1.6E-12
 H 2.3E-12
 H 3.7E-13
 H 2.8E-12
 H 1.0E-12
 H 1.1E-12
 H 2.0E-12

I Y 93 Class: Y F1: 0.00010 12/10/87 10:36:55.9 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1

G 8.0E-13
 G 1.3E-09
 G 2.6E-09
 G 0.1E-09
 G 9.4E-09
 G 1.0E-12
 G 5.1E-12
 G 1.0E-12
 G 2.3E-11
 G 3.2E-12

5.958

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G 1.3E-13
 G 3.6E-12
 1 1 1 1 1 1 1 1 1 1
 H 2.7E-09
 H 3.0E-10
 H 5.9E-10
 H 1.9E-09
 H 2.2E-09
 H 3.4E-12
 H 4.4E-12
 H 6.9E-13
 H 5.6E-12
 H 1.8E-12
 H 9.6E-13
 H 4.5E-12
 ! M093 Class: D F1: 0.80000 12/10/87 19:02:35.1 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 1 1 1 1 1 2 2 1 1 1 1 2 2
 G 1.1E-10
 G 7.9E-11
 G 7.1E-11
 G 9.0E-11
 G 1.8E-10
 G 1.4E-09 1.1E-11
 G 2.9E-10 2.0E-12
 G 8.3E-11
 G 1.3E-10
 G 1.0E-10
 G 9.6E-11
 G 1.8E-09 1.2E-11
 G 1.6E-09 1.1E-11
 1 1 1 1 1 2 2 1 1 1 1 2 2
 H 6.4E-11
 H 5.3E-11
 H 4.9E-11
 H 4.8E-11
 H 6.3E-11
 H 1.1E-09 8.3E-12
 H 2.2E-10 1.5E-12
 H 6.4E-11
 H 9.4E-11
 H 7.0E-11
 H 7.3E-11
 H 1.3E-09 9.4E-12
 H 1.2E-09 8.6E-12
 ! ZR93 Class: W F1: 0.00200 12/10/87 19:26:09.9 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 50 50 1 1 1 1
 G 4.7E-14
 G 2.3E-11
 G 5.5E-11

DOSINC.DAT

5.959

9/30/88

G 3.4E-10
 G 1.0E-09
 G 2.1E-10 2.2E-10 2.2E-10 2.3E-10 2.3E-10 2.3E-10 2.3E-10 2.3E-10 2.3E-10 2.3E-10 2.3E-10 2.3E-10 2.3E-10 2.3E-10 2.2E-10
 2.2E-10 2.2E-10 2.2E-10 2.1E-10 2.1E-10 2.1E-10 2.0E-10 2.0E-10 1.9E-10 1.9E-10 1.9E-10 1.8E-10 1.8E-10 1.7E-10 1.7E-10
 1.7E-10 1.6E-10 1.6E-10 1.5E-10 1.5E-10 1.5E-10 1.4E-10 1.4E-10 1.4E-10 1.3E-10 1.3E-10 1.2E-10 1.2E-10 1.2E-10 1.1E-10
 1.1E-10 1.1E-10 1.1E-10 1.0E-10 1.0E-10
 G 1.7E-11 1.7E-11 1.6E-11 1.6E-11 1.6E-11 1.6E-11 1.9E-11 1.9E-11 1.9E-11 1.9E-11 1.9E-11 1.9E-11 1.9E-11 1.8E-11 1.8E-11 1.8E-11
 1.8E-11 1.8E-11 1.7E-11 1.7E-11 1.7E-11 1.7E-11 1.6E-11 1.6E-11 1.6E-11 1.5E-11 1.5E-11 1.5E-11 1.4E-11 1.4E-11 1.4E-11
 1.3E-11 1.3E-11 1.3E-11 1.3E-11 1.2E-11 1.2E-11 1.2E-11 1.1E-11 1.1E-11 1.1E-11 1.0E-11 1.0E-11 9.0E-12 9.0E-12 9.3E-12
 9.1E-12 8.8E-12 8.6E-12 8.3E-12 8.1E-12
 G 4.6E-14
 G 4.7E-14
 G 4.6E-14
 G 4.6E-14
 2 1 1 1 1 50 50 1 1 1 1
 H 3.3E-09 3.1E-11
 H 1.3E-11
 H 3.0E-11
 H 1.7E-10
 H 5.2E-10
 H 1.1E-08 1.3E-08 1.3E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08
 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08
 1.0E-08 9.8E-09 9.6E-09 9.4E-09 9.1E-09 8.9E-09 8.7E-09 8.4E-09 8.2E-09 8.0E-09 7.8E-09 7.6E-09 7.4E-09 7.2E-09 7.0E-09
 6.8E-09 6.8E-09 6.4E-09 6.2E-09 6.1E-09
 H 9.2E-10 1.0E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09
 1.1E-09 1.1E-09 1.1E-09 1.0E-09 1.0E-09 1.0E-09 9.9E-10 9.7E-10 9.5E-10 9.3E-10 9.1E-10 9.0E-10 8.8E-10 8.6E-10 8.4E-10
 8.2E-10 8.0E-10 7.8E-10 7.6E-10 7.4E-10 7.2E-10 7.0E-10 6.9E-10 6.7E-10 6.5E-10 6.3E-10 6.2E-10 6.0E-10 5.8E-10 5.7E-10
 5.5E-10 5.4E-10 5.2E-10 5.1E-10 4.9E-10
 H 2.8E-12
 H 2.8E-12
 H 2.9E-12
 H 2.0E-12
 ! NB93W Class: Y F1: 0.01000 12/10/87 19:41:13.4 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 16 19
 1 1 1 1 1 3 2 1 1 1 1 3 3
 G 1.9E-12
 G 3.5E-11
 G 8.8E-11
 G 4.0E-10
 G 1.5E-09
 G 4.4E-11 1.1E-11 3.1E-12
 G 1.7E-11 4.4E-12
 G 1.8E-12
 G 5.2E-12
 G 2.0E-12
 G 1.9E-12
 G 2.5E-11 8.0E-12 1.8E-12
 G 2.5E-11 8.5E-12 1.7E-12
 50 1 1 1 3 6 1 1 1 1 1 3 3
 H 1.9E-06 1.2E-06 8.4E-09 5.8E-09 4.1E-09 3.0E-09 2.2E-09 1.7E-09 1.3E-09 1.0E-09 8.2E-10 6.7E-10 5.7E-10 4.8E-10 4.2E-10
 3.7E-10 3.3E-10 3.0E-10 2.8E-10 2.8E-10 2.4E-10 2.2E-10 2.1E-10 2.0E-10 1.8E-10 1.7E-10 1.7E-10 1.6E-10 1.5E-10 1.4E-10

DOSINC.DAT

1.3E-10 1.3E-10 1.2E-10 1.2E-10 1.1E-10 1.1E-10 1.0E-10 9.6E-11 9.2E-11 8.7E-11 8.3E-11 7.9E-11 7.6E-11 7.2E-11 6.9E-11
6.6E-11 6.3E-11 6.0E-11 5.7E-11 5.4E-11

H 2.1E-11

H 4.0E-11

H 2.6E-10

H 7.6E-10 3.6E-11 2.0E-11

H 5.0E-11 4.6E-11 3.0E-11 3.2E-11 2.6E-11 2.0E-11

H 2.4E-11

H 2.4E-12

H 4.2E-12

H 1.2E-11

H 2.4E-12

H 3.3E-11 2.5E-11 2.1E-11

H 3.5E-11 2.7E-11 2.2E-11

I ZR97 Class: W F1: 0.00200 12/10/87 19:50:37.7 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

1 1 1 1 1 1 1 1 1 1 1

G 1.8E-11

G 1.2E-09

G 3.4E-09

G 1.2E-08

G 1.0E-08

G 4.0E-11

G 1.3E-10

G 5.2E-11

G 6.2E-10

G 8.1E-11

G 2.7E-12

1 1 1 1 1 1 1 1 1 1 1

H 4.0E-09

H 4.1E-10

H 8.8E-10

H 3.0E-09

H 4.3E-09

H 1.3E-10

H 1.5E-10

H 3.0E-11

H 1.7E-10

H 5.9E-11

H 3.0E-11

I MB97M Class: Y F1: 0.01000 12/10/87 20:18:06.4 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 16 19

1 1 1 1 1 1 1 1 1 1 1 1 1

G 8.9E-14

G 7.3E-12

G 4.3E-12

G 3.3E-12

G 7.4E-13

G 4.4E-14

G 0.6E-14

G 1.6E-14

DOSINC.DAT

5.960

9/30/88

G 2.4E-13
G 9.5E-14
G 8.8E-15
Q 2.1E-13
G 4.8E-13

1 1 1 1 1 1 1 1 1 1 1

H 2.4E-12
H 3.8E-13
H 2.1E-13
H 1.7E-13
H 3.8E-14
H 2.3E-14
H 3.1E-14
H 1.6E-15
H 1.4E-14
H 3.1E-14
H 2.8E-14
H 2.8E-14
H 5.4E-14

I N097 Class: Y F1: 0.01000 12/10/87 20:27:18.9 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 16 19

1 1 1 1 1 1 1 1 1 1 1 1

Q 2.8E-12
G 3.8E-10
Q 3.1E-10
G 2.4E-10
G 5.3E-11
Q 1.6E-12
G 4.4E-12
G 8.2E-13
Q 1.5E-11
G 3.4E-12
G 2.2E-13
G 7.1E-12
G 1.8E-11

1 1 1 1 1 1 1 1 1 1 1

H 1.6E-10
H 2.1E-11
H 1.6E-11
H 1.3E-11
H 2.8E-12
H 8.8E-13
H 1.2E-12
H 9.5E-14
H 9.2E-13
H 1.2E-12
H 9.5E-13
H 1.2E-12
H 2.1E-12

I N094 Class: Y F1: 0.01000 12/10/87 20:32:44.9 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 16 19

DOSINC.DAT

5.961

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2 2 2 2 2 3 3 2 2 2 2 3 3
 Q 1.3E-10 2.7E-11
 G 7.3E-10 2.2E-11
 Q 2.2E-09 2.6E-11
 G 5.2E-09 2.3E-11
 Q 1.3E-08 2.8E-11
 G 5.8E-10 1.3E-10 3.6E-11
 G 6.3E-10 7.9E-11 2.2E-11
 Q 2.4E-10 2.3E-11
 G 1.8E-09 2.6E-11
 Q 3.1E-10 2.9E-11
 G 8.9E-11 2.3E-11
 Q 5.7E-10 9.3E-11 2.6E-11
 G 5.8E-10 8.9E-11 2.5E-11
 50 50 8 9 6 10 18 2 8 19 19 18 50
 H 1.5E-07 1.1E-07 7.8E-08 5.5E-08 4.1E-08 3.1E-08 2.4E-08 1.9E-08 1.5E-08 1.3E-08 1.1E-08 9.3E-09 8.2E-09 7.4E-09 6.7E-09
 6.2E-09 5.8E-09 5.5E-09 5.3E-09 5.1E-09 5.0E-09 4.9E-09 4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09
 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09
 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09
 H 8.8E-09 4.5E-09 3.2E-09 2.4E-09 1.8E-09 1.3E-09 1.0E-09 8.3E-10 6.7E-10 5.5E-10 4.7E-10 4.8E-10 3.5E-10 3.1E-10 2.9E-10
 2.6E-10 2.5E-10 2.3E-10 2.2E-10 2.2E-10 2.1E-10 2.1E-10 2.0E-10 2.0E-10 2.0E-10 2.0E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10
 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10
 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10 1.9E-10
 H 2.2E-09 8.8E-10 6.2E-10 4.8E-10 3.5E-10 2.7E-10 2.1E-10 1.7E-10
 H 4.1E-09 1.1E-09 6.1E-10 5.9E-10 4.4E-10 3.4E-10 2.8E-10 2.1E-10 1.6E-10
 H 6.8E-09 6.2E-10 4.3E-10 3.0E-10 2.2E-10 1.8E-10
 H 4.8E-09 2.8E-09 2.1E-09 1.6E-09 1.2E-09 9.5E-10 7.5E-10 5.9E-10 4.8E-10 3.9E-10 3.2E-10 2.7E-10 2.3E-10 2.0E-10 1.8E-10
 1.6E-10
 H 4.7E-09 3.2E-09 2.3E-09 1.7E-09 1.3E-09 1.0E-09 7.9E-10 6.3E-10 5.1E-10 4.2E-10 3.5E-10 3.0E-10 2.6E-10 2.3E-10 2.0E-10
 1.8E-10 1.7E-10 1.6E-10
 H 3.8E-10 1.7E-10
 H 1.5E-09 5.3E-10 3.9E-10 2.9E-10 2.2E-10 1.7E-10
 H 4.7E-09 3.2E-09 2.3E-09 1.7E-09 1.3E-09 9.7E-10 7.5E-10 6.0E-10 4.8E-10 4.0E-10 3.4E-10 2.9E-10 2.5E-10 2.2E-10 2.0E-10
 1.9E-10 1.7E-10 1.7E-10 1.6E-10
 H 4.6E-09 3.2E-09 2.3E-09 1.7E-09 1.2E-09 9.5E-10 7.4E-10 5.9E-10 4.8E-10 3.9E-10 3.3E-10 2.8E-10 2.5E-10 2.2E-10 2.0E-10
 1.9E-10 1.7E-10 1.6E-10 1.6E-10
 H 3.9E-09 2.7E-09 2.0E-09 1.5E-09 1.1E-09 8.8E-10 6.9E-10 5.5E-10 4.5E-10 3.7E-10 3.0E-10 2.6E-10 2.2E-10 1.9E-10 1.7E-10
 1.6E-10
 H 7.5E-09 5.2E-09 3.8E-09 2.8E-09 2.1E-09 1.8E-09 1.3E-09 1.0E-09 8.1E-10 6.7E-10 5.6E-10 4.8E-10 4.2E-10 3.7E-10 3.3E-10
 3.0E-10 2.8E-10 2.7E-10 2.6E-10 2.4E-10 2.3E-10 2.3E-10 2.2E-10 2.2E-10 2.2E-10 2.2E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10
 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10
 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10 2.1E-10
 ! MD99 Class: D F1: 0.00000 12/10/07 20:42:21.0 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 16
 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 G 2.0E-10
 G 8.0E-10
 G 3.9E-10
 G 1.4E-09
 G 3.1E-09
 G 9.3E-10

DOSINC.DAT

G 5.9E-10
G 1.7E-10
G 2.2E-10
G 1.9E-10
G 1.7E-10
G 2.7E-09
G 2.5E-09

1 1 1 1 1 1 1 1 1 1 1

H 1.1E-09
H 1.7E-10
H 1.3E-10
H 2.8E-10
H 5.4E-10
H 6.6E-10
H 4.1E-10
H 1.2E-10
H 1.3E-10
H 1.3E-10
H 1.2E-10
H 1.9E-09
H 1.8E-09

! TC99M Class: W F1: 0.80000 12/10/87 21:06:11.0 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 22 16

1 1 1 1 1 1 1 1 1 1 1 1 1

G 3.4E-12
G 7.3E-11
G 2.3E-11
G 3.8E-11
G 2.7E-11
G 2.8E-12
G 6.4E-12
G 2.4E-12
G 1.0E-11
G 3.9E-12
G 8.7E-11
G 7.3E-11
G 2.3E-11

1 1 1 1 1 1 1 1 1 1 1

H 3.1E-11
H 1.8E-11
H 3.7E-12
H 6.8E-12
H 4.1E-12
H 1.5E-12
H 2.5E-12
H 5.7E-13
H 1.8E-12
H 1.6E-12
H 2.2E-11
H 1.8E-11
H 5.8E-12

5.963

9/30/88

DOSINC.DAT

I TC101 Class: W F1: 0.00000 12/10/87 21:10:07.7 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 22 15

1 1 1 1 1 1 1 1 1 1 1 1 1 1

G 4.4E-13

G 1.6E-10

G 2.4E-11

G 5.2E-12

G 7.7E-13

G 2.7E-13

G 5.0E-13

G 1.3E-13

G 0.5E-13

G 4.2E-13

G 4.4E-12

G 1.5E-10

G 1.5E-12

1 1 1 1 1 1 1 1 1 1 1 1 1 1

H 9.1E-11

H 2.4E-12

H 2.7E-13

H 1.1E-13

H 5.6E-14

H 1.4E-13

H 1.9E-13

H 0.3E-14

H 7.0E-14

H 1.0E-13

H 2.5E-12

H 2.4E-12

H 4.9E-13

I RU105 Class: Y F1: 0.05000 12/10/87 21:24:02.2 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

1 1 1 1 1 1 1 1 1 1 1 1

G 0.7E-12

G 0.0E-10

G 9.7E-10

G 1.9E-09

G 1.0E-09

G 0.0E-12

G 2.0E-11

G 0.2E-12

G 1.1E-10

G 1.7E-11

G 2.1E-12

1 1 1 1 1 1 1 1 1 1 1 1

H 7.0E-10

H 9.0E-11

H 1.5E-10

H 3.3E-10

H 3.4E-10

H 4.9E-12

DOSINC.DAT

5.964

9/30/88

H 8.5E-12
H 1.7E-12
H 1.8E-11
H 7.2E-12
H 4.4E-12

! RH105 Class: Y Fl: 0.05000 12/10/87 21:35:21.1 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1 1

G 4.0E-12
G 1.9E-10
G 4.4E-10
G 1.9E-09
G 3.9E-09
G 5.4E-12
G 1.5E-11
G 7.5E-12
G 5.9E-11
G 9.2E-12
G 9.1E-12

1 1 1 1 1 1 1 1 1 1 1

H 1.0E-09
H 7.3E-11
H 1.8E-10
H 8.8E-10
H 1.4E-09
H 3.9E-12
H 7.8E-12
H 3.0E-12
H 2.2E-11
H 5.0E-12
H 3.1E-12

! PD107 Class: Y Fl: 0.00500 12/10/87 21:41:37.2 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 18
1 1 1 1 1 1 1 1 1 1 1 1 1

G 1.0E-14
G 1.1E-11
G 2.8E-11
G 1.6E-10
G 4.7E-10
G 1.5E-13
G 5.7E-14
G 1.0E-14
G 1.0E-14
G 1.0E-14
G 1.0E-14
G 3.5E-12
G 6.7E-12

50 1 1 1 3 1 1 1 1 1 1 1 5

H 5.9E-09 4.1E-09 2.9E-09 2.1E-09 1.6E-09 1.2E-09 9.3E-10 7.4E-10 6.0E-10 4.9E-10 4.2E-10 3.6E-10 3.2E-10 2.8E-10 2.8E-10
2.4E-10 2.3E-10 2.1E-10 2.1E-10 2.0E-10 1.9E-10 1.9E-10 1.9E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10
1.0E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10

DOSINC.DAT

1.8E-10 1.8E-10 1.8E-10 1.8E-10 1.8E-10

H 5.7E-12

H 1.4E-11

H 8.1E-11

H 2.4E-10 1.1E-11 6.8E-12

H 3.7E-13

H 1.4E-13

H 2.7E-14

H 2.8E-14

H 2.8E-14

H 2.8E-14

H 8.9E-12

H 1.7E-11 9.1E-12 8.3E-12 7.2E-12 6.8E-12

! PD109 Class: Y F1: 0.00500 12/10/87 21:49:18.8 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 18

1 1 1 1 1 1 1 1 1 1 1 1 1 1

G 2.2E-13

G 5.7E-10

G 1.2E-09

G 4.3E-09

G 5.7E-09

G 1.3E-12

G 3.9E-12

G 3.8E-13

G 1.8E-11

G 1.2E-12

G 1.2E-13

G 4.9E-12

G 8.8E-12

1 1 1 1 1 1 1 1 1 1 1 1

H 1.5E-09

H 1.5E-10

H 3.1E-10

H 1.1E-09

H 1.5E-09

H 1.0E-12

H 1.6E-12

H 2.0E-13

H 4.3E-12

H 9.5E-13

H 2.2E-13

H 5.9E-12

H 9.7E-12

! AG110M Class: D F1: 0.05000 12/10/87 21:50:18.2 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17

1 1 1 1 1 1 1 1 1 1 1 1

G 9.7E-10

G 2.9E-09

G 8.7E-09

G 2.5E-08

G 8.7E-08

DOSINC.DAT

5.966

9/30/88

G 5.2E-10
 G 1.0E-09
 G 5.8E-10
 G 3.2E-09
 G 0.0E-10
 G 3.3E-10
 G 2.8E-08
 1 1 1 1 1 1 1 1 1 1 2
 H 1.1E-08
 H 7.5E-09
 H 7.2E-09
 H 1.2E-08
 H 1.3E-08
 H 3.3E-09
 H 4.9E-09
 H 3.3E-09
 H 4.5E-09
 H 5.5E-09
 H 3.1E-09
 H 2.7E-07 0.2E-10
 ! AG111 Class: D F1: 0.05000 12/10/87 22:04:12.6 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1
 G 9.2E-12
 G 4.2E-10
 G 9.9E-10
 G 5.4E-09
 G 1.5E-08
 G 7.2E-12
 G 1.5E-11
 G 1.0E-11
 G 3.6E-11
 G 1.1E-11
 G 7.8E-12
 G 9.6E-10
 1 1 1 1 1 1 1 1 1 1 1
 H 1.0E-09
 H 1.2E-10
 H 2.0E-10
 H 0.8E-10
 H 2.3E-09
 H 5.1E-11
 H 9.0E-11
 H 7.5E-11
 H 0.0E-11
 H 7.9E-11
 H 7.5E-11
 H 9.0E-09
 ! CD109 Class: D F1: 0.05000 12/10/87 22:11:45.4 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 4 3 3 3 3 3 4 4 4 4 4 10 13

DOSINC.DAT

Q 1.4E-10 7.9E-11 4.4E-11 2.5E-11
 G 2.0E-10 5.0E-11 2.8E-11
 G 3.9E-10 4.0E-11 2.0E-11
 G 1.0E-09 4.2E-11 2.4E-11
 G 4.4E-09 4.5E-11 2.5E-11
 G 0.7E-11 3.8E-11 2.0E-11
 G 1.5E-10 7.8E-11 4.3E-11 2.4E-11
 G 1.1E-10 6.4E-11 3.6E-11 2.0E-11
 G 1.9E-10 8.0E-11 3.8E-11 2.2E-11
 G 1.4E-10 7.9E-11 4.5E-11 2.5E-11
 G 1.2E-10 8.9E-11 3.9E-11 2.2E-11
 Q 3.2E-09 1.8E-09 1.0E-09 5.8E-10 3.3E-10 1.9E-10 1.0E-10 5.9E-11 3.3E-11 1.9E-11
 G 1.8E-08 1.0E-08 5.7E-09 3.2E-09 1.8E-09 1.0E-09 5.8E-10 3.2E-10 1.8E-10 1.0E-10 5.8E-11 3.3E-11 1.9E-11
 2 3 3 3 3 3 4 4 4 4 10 13
 H 0.0E-10 1.0E-10
 H 0.9E-10 4.9E-10 2.8E-10
 H 0.5E-10 4.5E-10 2.8E-10
 H 9.7E-10 4.2E-10 2.3E-10
 H 1.4E-09 4.4E-10 2.5E-10
 H 0.2E-10 3.5E-10 2.0E-10
 H 1.3E-09 7.4E-10 4.2E-10 2.4E-10
 H 1.1E-09 8.3E-10 3.5E-10 2.0E-10
 H 1.2E-09 6.7E-10 3.8E-10 2.1E-10
 H 1.4E-09 7.7E-10 4.4E-10 2.5E-10
 H 1.2E-09 8.8E-10 3.8E-10 2.1E-10
 H 3.1E-08 1.8E-08 1.0E-08 5.8E-09 3.2E-09 1.8E-09 1.0E-09 5.7E-10 3.2E-10 1.8E-10
 H 1.7E-07 9.8E-08 5.5E-08 3.1E-08 1.8E-08 9.9E-09 5.8E-09 3.1E-09 1.8E-09 1.0E-09 5.8E-10 3.2E-10 1.8E-10
 I CD113M Class: D F1: 0.05000 12/10/87 22:19:43.0 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 23 10 10 14 10 15 23 24 24 24 50 50
 G 2.7E-10 2.5E-10 2.3E-10 2.1E-10 1.9E-10 1.8E-10 1.7E-10 1.5E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.5E-11 8.8E-11
 8.1E-11 7.5E-11 7.0E-11 6.4E-11 5.9E-11 5.5E-11 5.1E-11 4.7E-11
 G 3.8E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.4E-11 8.7E-11 8.0E-11 7.4E-11 6.9E-11 6.4E-11 5.9E-11 5.4E-11 5.0E-11
 4.8E-11
 G 0.8E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.5E-11 8.8E-11 8.1E-11 7.5E-11 6.9E-11 6.4E-11 5.9E-11 5.5E-11 5.0E-11
 4.7E-11
 G 3.1E-09 1.2E-10 1.1E-10 1.0E-10 9.5E-11 8.8E-11 8.1E-11 7.5E-11 6.9E-11 6.4E-11 5.9E-11 5.5E-11 5.1E-11 4.7E-11
 G 9.2E-09 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.3E-11 8.6E-11 8.0E-11 7.4E-11 6.8E-11 6.3E-11 5.8E-11 5.4E-11 5.0E-11
 4.8E-11
 G 1.4E-10 1.3E-10 1.2E-10 1.1E-10 9.9E-11 9.1E-11 8.4E-11 7.8E-11 7.2E-11 6.7E-11 6.2E-11 5.7E-11 5.3E-11 4.9E-11 4.5E-11

 G 2.8E-10 2.4E-10 2.2E-10 2.1E-10 1.9E-10 1.8E-10 1.8E-10 1.5E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.4E-11 8.7E-11
 8.0E-11 7.4E-11 6.9E-11 6.4E-11 5.9E-11 5.4E-11 5.0E-11 4.8E-11
 G 2.7E-10 2.5E-10 2.3E-10 2.1E-10 2.0E-10 1.8E-10 1.7E-10 1.8E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.7E-11 9.0E-11
 8.3E-11 7.7E-11 7.1E-11 6.5E-11 6.0E-11 5.8E-11 5.2E-11 4.8E-11 4.4E-11
 G 2.7E-10 2.5E-10 2.3E-10 2.1E-10 2.0E-10 1.8E-10 1.7E-10 1.8E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.1E-10 9.8E-11 9.0E-11
 8.4E-11 7.7E-11 7.1E-11 6.8E-11 6.1E-11 5.8E-11 5.2E-11 4.8E-11 4.5E-11
 G 2.7E-10 2.5E-10 2.3E-10 2.1E-10 2.0E-10 1.8E-10 1.7E-10 1.5E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.7E-11 8.9E-11
 8.3E-11 7.8E-11 7.1E-11 6.5E-11 6.0E-11 5.8E-11 5.1E-11 4.8E-11 4.4E-11
 G 2.7E-10 2.5E-10 2.3E-10 2.1E-10 2.0E-10 1.8E-10 1.7E-10 1.8E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.1E-10 9.7E-11 9.0E-11
 8.3E-11 7.7E-11 7.1E-11 6.8E-11 6.1E-11 5.8E-11 5.2E-11 4.8E-11 4.4E-11

DOSINC.DAT

G 7.3E-09 8.7E-09 8.2E-09 5.8E-09 5.3E-09 4.9E-09 4.0E-09 4.2E-09 3.9E-09 3.8E-09 3.3E-09 3.1E-09 2.8E-09 2.6E-09 2.4E-09
 2.2E-09 2.1E-09 1.9E-09 1.8E-09 1.6E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.4E-10 8.7E-10 8.1E-10 7.4E-10
 6.9E-10 6.4E-10 5.9E-10 5.4E-10 5.0E-10 4.8E-10 4.3E-10 4.0E-10 3.7E-10 3.4E-10 3.1E-10 2.9E-10 2.7E-10 2.5E-10 2.3E-10
 2.1E-10 2.0E-10 1.8E-10 1.7E-10 1.5E-10
 G 4.4E-08 4.0E-08 3.7E-08 3.5E-08 3.2E-08 3.0E-08 2.7E-08 2.5E-08 2.3E-08 2.2E-08 2.0E-08 1.8E-08 1.7E-08 1.6E-08 1.5E-08
 1.3E-08 1.2E-08 1.1E-08 1.1E-08 9.8E-09 9.1E-09 8.4E-09 7.7E-09 7.2E-09 6.8E-09 6.1E-09 5.7E-09 5.2E-09 4.8E-09 4.5E-09
 4.1E-09 3.8E-09 3.5E-09 3.3E-09 3.0E-09 2.8E-09 2.6E-09 2.4E-09 2.2E-09 2.0E-09 1.9E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09
 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.3E-10
 1 16 17 15 16 15 23 24 24 24 24 50 50
 H 5.8E-10
 H 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.2E-10 8.5E-10 7.9E-10 7.3E-10 6.7E-10 6.2E-10 5.8E-10 5.3E-10 4.9E-10
 4.6E-10
 H 1.8E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.3E-10 8.6E-10 7.9E-10 7.3E-10 6.8E-10 6.3E-10 5.8E-10 5.4E-10 5.0E-10
 4.8E-10 4.2E-10
 H 1.7E-09 1.2E-09 1.1E-09 1.0E-09 9.3E-10 8.8E-10 8.0E-10 7.4E-10 6.8E-10 6.3E-10 5.8E-10 5.4E-10 5.0E-10 4.6E-10 4.2E-10
 H 2.9E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 9.9E-10 9.2E-10 8.5E-10 7.8E-10 7.2E-10 6.7E-10 6.2E-10 5.7E-10 5.3E-10 4.9E-10
 4.5E-10
 H 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.7E-10 9.0E-10 8.3E-10 7.7E-10 7.1E-10 6.5E-10 6.0E-10 5.6E-10 5.2E-10 4.8E-10 4.4E-10
 H 2.6E-09 2.4E-09 2.2E-09 2.0E-09 1.9E-09 1.7E-09 1.8E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.2E-10 8.5E-10
 7.9E-10 7.3E-10 6.7E-10 6.2E-10 5.8E-10 5.3E-10 4.9E-10 4.6E-10
 H 2.6E-09 2.4E-09 2.3E-09 2.1E-09 1.9E-09 1.8E-09 1.7E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.5E-10 8.8E-10
 8.1E-10 7.5E-10 7.0E-10 6.4E-10 5.9E-10 5.5E-10 5.1E-10 4.7E-10 4.3E-10
 H 2.7E-09 2.5E-09 2.3E-09 2.1E-09 1.9E-09 1.8E-09 1.7E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.6E-10 8.9E-10
 8.2E-10 7.6E-10 7.0E-10 6.5E-10 6.0E-10 5.5E-10 5.1E-10 4.7E-10 4.4E-10
 H 2.6E-09 2.4E-09 2.3E-09 2.1E-09 1.9E-09 1.8E-09 1.8E-09 1.6E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.5E-10 8.8E-10
 8.1E-10 7.5E-10 6.9E-10 6.4E-10 5.9E-10 5.5E-10 5.1E-10 4.7E-10 4.3E-10
 H 2.7E-09 2.5E-09 2.3E-09 2.1E-09 1.9E-09 1.8E-09 1.7E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.6E-10 8.9E-10
 8.2E-10 7.6E-10 7.0E-10 6.4E-10 6.0E-10 5.5E-10 5.1E-10 4.7E-10 4.3E-10
 H 7.0E-08 6.5E-08 6.0E-08 5.8E-08 5.2E-08 4.8E-08 4.4E-08 4.1E-08 3.8E-08 3.5E-08 3.2E-08 3.0E-08 2.7E-08 2.5E-08 2.3E-08
 2.2E-08 2.0E-08 1.9E-08 1.7E-08 1.6E-08 1.5E-08 1.4E-08 1.2E-08 1.1E-08 9.9E-09 9.1E-09 8.4E-09 7.8E-09 7.2E-09
 6.7E-09 6.2E-09 5.7E-09 5.3E-09 4.9E-09 4.5E-09 4.2E-09 3.8E-09 3.5E-09 3.3E-09 3.0E-09 2.8E-09 2.6E-09 2.4E-09 2.2E-09
 2.0E-09 1.9E-09 1.7E-09 1.6E-09 1.5E-09
 H 4.2E-07 3.9E-07 3.6E-07 3.3E-07 3.1E-07 2.9E-07 2.6E-07 2.4E-07 2.3E-07 2.1E-07 1.9E-07 1.8E-07 1.6E-07 1.5E-07 1.4E-07
 1.3E-07 1.2E-07 1.1E-07 1.0E-07 9.5E-08 8.8E-08 8.1E-08 7.5E-08 6.9E-08 6.4E-08 5.9E-08 5.5E-08 5.1E-08 4.7E-08 4.3E-08
 4.0E-08 3.7E-08 3.4E-08 3.2E-08 2.9E-08 2.7E-08 2.5E-08 2.3E-08 2.1E-08 2.0E-08 1.8E-08 1.7E-08 1.6E-08 1.4E-08 1.3E-08
 1.2E-08 1.1E-08 1.0E-08 9.7E-09 9.0E-09
 ! CD115M Class: D F1: 0.05000 12/10/87 22:28:54.2 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 1 1 1 1 1 1 1 1 1 1 1 2
 G 1.7E-10
 G 8.0E-10
 G 1.0E-09
 G 1.0E-08
 G 2.0E-08
 G 8.5E-11
 G 1.7E-10
 G 1.7E-10
 G 1.9E-10
 G 1.7E-10

DOSINC.DAT

G 1.6E-10
 G 4.5E-09
 G 2.6E-08 8.9E-11
 1 1 1 1 1 1 1 1 1 1 1 2
 H 1.9E-09
 H 1.1E-09
 H 1.2E-09
 H 2.4E-09
 H 5.3E-09
 H 8.2E-10
 H 1.6E-09
 H 1.6E-09
 H 1.6E-09
 H 1.6E-09
 H 4.3E-08
 H 2.5E-07 8.6E-10
 ! CD115 Class: D F1: 0.05000 12/10/87 22:48:34.7 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 1 1 1 1 1 1 1 1 1 1 1 1
 G 1.7E-11
 G 4.6E-10
 G 1.3E-09
 G 6.3E-09
 G 1.5E-08
 G 3.0E-11
 G 7.5E-11
 G 3.6E-11
 G 3.2E-10
 G 4.5E-11
 G 9.7E-12
 G 2.1E-10
 G 0.8E-10
 1 1 1 1 1 1 1 1 1 1 1
 H 1.1E-09
 H 1.7E-10
 H 2.9E-10
 H 1.1E-09
 H 2.4E-09
 H 9.0E-11
 H 1.2E-10
 H 9.2E-11
 H 1.4E-10
 H 1.1E-10
 H 8.7E-11
 H 1.7E-09
 H 8.6E-09
 ! IM115M Class: D F1: 0.02000 12/10/87 23:02:05.5 Acute Sv/Bq
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 1 1 1 1 1 1 1 1 1 1 1 1 1
 G 1.0E-12

DOSINC.DAT

G 2.0E-10
 G 3.1E-10
 G 5.0E-10
 G 3.0E-10
 G 2.0E-12
 G 5.7E-12
 G 1.2E-12
 G 2.2E-11
 G 3.2E-12
 G 1.0E-13
 G 4.2E-12
 G 0.1E-12
 G 5.9E-12
 1 1 1 1 1 1 1 1 1 1 1 1
 H 1.3E-10
 H 3.1E-11
 H 4.7E-11
 H 0.5E-11
 H 5.4E-11
 H 0.5E-12
 H 5.1E-12
 H 2.2E-12
 H 5.4E-12
 H 3.2E-12
 H 2.5E-12
 H 1.4E-11
 H 2.2E-11
 H 0.5E-12
 ! IM111 Class: D F1: 0.02000 12/10/87 23:07:40.5 Acute Sv/Bq
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 1 1 1 1 1 1 1 1 1 1 1 1 1
 Q 7.3E-12
 Q 1.0E-10
 Q 4.9E-10
 Q 1.1E-09
 Q 2.0E-09
 Q 3.5E-11
 Q 9.9E-11
 Q 3.0E-11
 Q 4.2E-10
 Q 4.2E-11
 Q 1.2E-12
 Q 4.7E-11
 Q 0.7E-11
 Q 4.1E-11
 1 1 1 1 1 1 1 1 1 1 1 1
 H 1.9E-10
 H 0.6E-11
 H 1.1E-10
 H 2.0E-10
 H 3.3E-10

H 1.1E-10
H 0.0E-11
H 1.0E-11
H 0.4E-11
H 0.9E-11
H 1.9E-11
H 0.2E-10
H 4.4E-10
H 1.5E-10

! IN114M Class: D F1: 0.02000 12/10/87 23:16:20.2 Acute Sv/Bq

14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

G 0.0E-12
G 1.0E-09
G 2.0E-09
G 1.5E-08
G 4.4E-08
G 7.0E-10
G 2.0E-10
G 1.2E-11
G 1.3E-10
G 1.0E-11
G 3.5E-12
G 2.0E-09
G 4.0E-09
G 1.0E-09

1 1 1 1 1 2 1 1 1 1 1 2 2 2

H 2.0E-09
H 0.1E-10
H 5.3E-10
H 2.5E-09
H 0.9E-09
H 1.0E-08 1.2E-10
H 0.1E-09
H 0.0E-11
H 1.2E-10
H 1.4E-10
H 0.0E-11
H 4.7E-08 3.0E-10
H 9.0E-08 0.2E-10
H 2.4E-08 1.5E-10

! SN117M Class: W F1: 0.02000 12/10/87 23:24:23.7 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1 1 1

G 5.7E-12
G 2.4E-10
G 0.5E-10
G 2.9E-09
G 0.0E-09
G 5.2E-10
G 1.1E-10

DOSINC.DAT

5.972

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G 1.7E-11
 Q 2.2E-10
 G 2.4E-11
 Q 3.2E-12
 1 1 1 1 1 1 1 1 1
 H 6.2E-09
 H 1.6E-10
 H 2.8E-10
 H 1.2E-09
 H 3.4E-09
 H 2.2E-09
 H 2.7E-10
 H 1.9E-11
 H 1.1E-10
 H 6.4E-11
 H 3.1E-11
 ! SN119W Class: W F1: 0.02000 12/10/87 23:31:59.2 Acute Sv/Bq
 11 1 3 4 6 8 7 8 11 12 13 14
 1 1 1 1 1 3 2 1 1 1 1
 G 7.0E-12
 G 9.9E-11
 G 2.6E-10
 G 1.3E-09
 G 4.1E-09
 G 1.5E-10 3.1E-11 6.9E-12
 G 8.7E-11 1.2E-11
 G 7.1E-12
 G 4.0E-11
 G 8.5E-12
 G 7.0E-12
 2 1 1 1 1 3 3 1 1 1 1
 H 1.1E-00 4.3E-11
 H 8.0E-11
 H 1.5E-10
 H 8.0E-10
 H 2.0E-09
 H 8.6E-10 2.1E-10 4.8E-11
 H 3.6E-10 8.7E-11 2.0E-11
 H 4.0E-11
 H 6.0E-11
 H 6.7E-11
 H 4.2E-11
 ! SN121W Class: W F1: 0.02000 12/10/87 23:40:40.8 Acute Sv/Bq
 11 1 3 4 6 8 7 8 11 12 13 14
 2 1 1 1 1 7 8 2 2 2 2
 G 1.4E-11 7.1E-12
 G 6.3E-11
 G 1.6E-10
 G 1.1E-09
 G 4.3E-09
 G 3.0E-10 1.5E-10 7.8E-11 4.1E-11 2.2E-11 1.1E-11 6.9E-12

DOSINC.DAT

G 1.2E-10 5.8E-11 3.0E-11 1.8E-11 8.3E-12 4.4E-12
 G 1.4E-11 7.1E-12
 G 2.8E-11 7.1E-12
 G 1.5E-11 7.2E-12
 G 1.4E-11 7.1E-12
 2 2 2 2 2 8 6 3 3 3 3
 H 2.0E-08 1.7E-10
 H 9.5E-11 2.5E-11
 H 1.7E-10 2.0E-11
 H 8.2E-10 2.3E-11
 H 2.7E-09 3.0E-11
 H 1.8E-09 1.0E-09 5.5E-10 2.9E-10 1.5E-10 7.9E-11 4.1E-11 2.2E-11
 H 7.0E-10 4.0E-10 2.1E-10 1.1E-10 5.8E-11 3.1E-11
 H 8.7E-11 5.0E-11 2.6E-11
 H 9.4E-11 5.0E-11 2.6E-11
 H 9.6E-11 5.1E-11 2.7E-11
 H 8.8E-11 5.0E-11 2.6E-11
 ! SN121 Class: W F1: 0.02000 12/10/87 23:58:00.7 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1 1
 G 2.0E-13
 G 1.3E-10
 G 2.8E-10
 G 1.3E-09
 G 2.4E-09
 G 2.0E-12
 G 0.5E-13
 G 2.1E-13
 G 2.0E-13
 G 2.1E-13
 G 2.1E-13
 1 1 1 1 1 1 1 1 1 1 1
 H 5.3E-10
 H 3.7E-11
 H 8.0E-11
 H 3.7E-10
 H 0.8E-10
 H 0.5E-12
 H 3.6E-12
 H 9.0E-13
 H 8.7E-13
 H 8.9E-13
 H 8.8E-13
 ! SN123 Class: W F1: 0.02000 12/11/87 00:02:29.0 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 2 1 1 1 1 1
 G 3.0E-11
 G 5.9E-10
 G 1.5E-09
 G 0.8E-09
 G 2.6E-00

DOSINC.DAT

5.974

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G 8.3E-10 4.3E-11
 G 2.3E-10
 G 3.1E-11
 G 3.7E-11
 G 3.1E-11
 G 3.0E-11
 2 1 1 1 1 2 2 1 1 1 1
 H 8.1E-08 7.5E-11
 H 3.7E-10
 H 7.9E-10
 H 4.3E-09
 H 1.2E-08
 H 3.5E-09 3.0E-10
 H 1.3E-09 1.1E-10
 H 1.7E-10
 H 1.7E-10
 H 1.8E-10
 H 1.7E-10
 ! I 125 Class: D F1: 1.00000 12/11/87 00:10:55.5 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 15
 1 1 1 1 1 1 1 1 1 1 2 1
 G 4.5E-11
 G 8.2E-11
 G 3.5E-11
 G 3.4E-11
 G 3.8E-11
 G 2.6E-10
 G 1.9E-10
 G 2.6E-11
 G 3.5E-11
 G 1.4E-10
 G 3.2E-07 5.3E-10
 G 1.4E-10
 1 1 1 1 1 1 1 1 1 2 1
 H 1.1E-10
 H 2.1E-11
 H 2.2E-11
 H 2.2E-11
 H 2.4E-11
 H 1.8E-10
 H 1.2E-10
 H 1.7E-11
 H 2.2E-11
 H 8.9E-11
 H 2.0E-07 3.3E-10
 H 8.7E-11
 ! SN125 Class: W F1: 0.02000 12/11/87 00:10:05.8 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1
 G 1.6E-11
 G 1.0E-09

DOSINC.DAT

G 2.4E-09
 G 1.3E-08
 G 3.6E-08
 G 2.3E-10
 G 2.1E-10
 G 3.5E-11
 G 2.9E-10
 G 4.4E-11
 G 9.8E-12

1 1 1 1 1 3 1 1 1 1 1

H 2.3E-08
 H 5.0E-10
 H 1.0E-09
 H 5.4E-09
 H 1.5E-08
 H 9.8E-10 8.1E-11 3.4E-11
 H 7.3E-10
 H 5.1E-11
 H 1.6E-10
 H 9.4E-11
 H 7.7E-11

! SB125 Class: W F1: 0.01000 12/11/87 00:43:23.9 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17

1 1 1 1 1 1 1 1 1 1 1 1

G 1.3E-11
 G 2.5E-10
 G 7.7E-10
 G 2.4E-09
 G 6.4E-09
 G 9.7E-11
 G 1.2E-10
 G 5.1E-11
 G 5.3E-10
 G 6.2E-11
 G 5.4E-12
 G 6.2E-11

2 1 1 1 1 2 1 1 1 1 1 1

H 2.2E-08 1.7E-10
 H 6.2E-10
 H 5.0E-10
 H 1.4E-09
 H 3.4E-09
 H 1.0E-09 4.8E-11
 H 5.2E-10
 H 8.5E-11
 H 3.5E-10
 H 4.0E-10
 H 3.2E-10
 H 8.4E-10

! TE125M Class: W F1: 0.20000 12/11/87 00:58:34.7 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

DOSINC.DAT

1 1 1 1 1 2 2 1 1 1 1

G 4.4E-11

G 1.7E-10

G 3.6E-10

G 1.7E-09

G 4.7E-09

G 1.3E-08 1.6E-10

G 1.2E-09 1.5E-11

G 3.9E-11

G 1.3E-10

G 4.6E-11

G 4.0E-11

1 1 1 1 1 2 2 1 1 1 1

H 1.0E-08

H 1.1E-10

H 1.8E-10

H 7.7E-10

H 2.2E-09

H 1.2E-08 1.8E-10

H 1.2E-09 1.6E-11

H 3.6E-11

H 8.0E-11

H 7.1E-11

H 4.0E-11

! SN126 Class: W F1: 0.02000 12/11/07 01:07:00.6 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

3 3 3 3 3 7 6 3 3 3 3

G 3.0E-10 1.4E-10 7.3E-11

G 1.3E-09 9.7E-11 5.2E-11

G 4.1E-09 1.1E-10 6.1E-11

G 1.0E-08 1.0E-10 5.5E-11

G 4.4E-08 1.3E-10 6.7E-11

G 2.5E-09 1.2E-09 6.4E-10 3.4E-10 1.8E-10 9.0E-11 5.1E-11

G 1.5E-09 5.7E-10 3.0E-10 1.8E-10 8.5E-11 4.5E-11

G 4.2E-10 1.3E-10 6.7E-11

G 2.1E-09 1.4E-10 7.5E-11

G 4.9E-10 1.4E-10 7.7E-11

G 2.7E-10 1.3E-10 7.1E-11

4 4 4 4 4 8 7 4 5 5 4

H 1.5E-07 1.9E-09 3.4E-10 1.7E-10

H 3.9E-09 7.0E-10 3.6E-10 1.0E-10

H 3.7E-09 8.1E-10 4.3E-10 2.3E-10

H 9.0E-09 7.4E-10 3.9E-10 2.1E-10

H 2.4E-08 9.2E-10 4.7E-10 2.5E-10

H 1.5E-08 8.4E-09 4.5E-09 2.4E-09 1.3E-09 6.7E-10 3.6E-10 1.0E-10

H 8.3E-09 4.0E-09 2.1E-09 1.1E-09 5.9E-10 3.1E-10 1.7E-10

H 1.0E-09 8.9E-10 4.7E-10 2.5E-10

H 2.8E-09 1.0E-09 5.3E-10 2.8E-10 1.5E-10

H 3.3E-09 1.0E-09 5.4E-10 2.9E-10 1.5E-10

H 2.9E-09 9.6E-10 5.0E-10 2.7E-10

! SB126M Class: W F1: 0.01000 12/11/07 01:35:39.8 Acute Sv/Bq

DOSINC.DAT

5.977

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12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1 1

G 1.9E-12
 G 2.6E-10
 G 7.4E-11
 G 2.8E-11
 G 7.9E-12
 G 9.9E-13
 G 2.2E-12
 G 3.1E-13
 G 5.6E-12
 G 2.1E-12
 G 1.8E-13
 G 3.0E-12

1 1 1 1 1 1 1 1 1 1 1 1

H 5.8E-11
 H 4.1E-12
 H 1.4E-12
 H 1.1E-12
 H 1.4E-12
 H 7.0E-13
 H 9.6E-13
 H 2.3E-13
 H 4.9E-13
 H 8.7E-13
 H 7.7E-13
 H 1.6E-12

I SB126 Class: W F1: 0.01000 12/11/87 01:46:06.3 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1 1

G 6.8E-11
 G 1.2E-09
 G 3.8E-09
 G 8.1E-09
 G 1.9E-08
 G 2.3E-10
 G 6.0E-10
 G 2.8E-10
 G 2.9E-09
 G 3.5E-10
 G 1.7E-11
 G 3.0E-10

1 1 1 1 1 1 1 1 1 1 1 1

H 1.4E-08
 H 1.2E-09
 H 1.7E-09
 H 3.8E-09
 H 8.0E-09
 H 7.0E-10
 H 8.0E-10
 H 2.1E-10

H 1.3E-09
 H 6.6E-10
 H 4.8E-10
 H 1.2E-09
 I SB124 Class: W F1: 0.01000 12/11/87 01:59:51.3 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1
 Q 5.4E-11
 Q 9.7E-10
 Q 2.8E-09
 Q 6.7E-09
 Q 2.3E-08
 Q 2.0E-10
 Q 3.8E-10
 Q 1.9E-10
 Q 1.8E-09
 Q 2.3E-10
 Q 1.7E-11
 Q 2.2E-10
 1 1 1 1 1 1 1 1 1 1 1 1
 H 4.2E-08
 H 1.5E-09
 H 1.6E-09
 H 4.3E-09
 H 1.1E-08
 H 1.3E-09
 H 1.1E-09
 H 2.2E-10
 H 1.0E-09
 H 8.9E-10
 H 6.8E-10
 H 1.8E-09
 I SB127 Class: W F1: 0.01000 12/11/87 02:02:35.7 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1
 Q 1.6E-11
 Q 5.6E-10
 Q 1.6E-09
 Q 7.3E-09
 Q 2.0E-08
 Q 5.4E-11
 Q 1.3E-10
 Q 5.8E-11
 Q 6.1E-10
 Q 7.7E-11
 Q 4.4E-12
 Q 7.4E-11
 1 1 1 1 1 1 1 1 1 1 1 1
 H 6.9E-09
 H 3.2E-10
 H 7.1E-10

DOSINC.DAT

H 2.9E-09
H 7.6E-09
H 1.4E-10
H 1.0E-10
H 4.4E-11
H 2.6E-10
H 9.0E-11
H 6.0E-11
H 2.1E-10

! TE127M Class: W F1: 0.20000 12/11/87 02:26:17.4 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 3 3 1 1 1 1

G 9.7E-11
G 1.7E-10
G 3.9E-10
G 3.0E-09
G 1.1E-08
G 1.9E-08 1.8E-09 1.7E-10
G 6.0E-09 4.8E-10 4.3E-11
G 9.6E-11
G 1.3E-10
G 9.0E-11
G 9.6E-11

1 1 1 1 1 3 3 1 1 1 1

H 3.3E-08
H 1.9E-10
H 3.3E-10
H 1.8E-09
H 5.7E-09
H 1.9E-08 2.0E-09 1.9E-10
H 4.0E-09 5.1E-10 4.0E-11
H 9.6E-11
H 1.1E-10
H 1.1E-10
H 1.0E-10

! TE127 Class: W F1: 0.20000 12/11/87 02:42:13.3 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1 1

G 3.0E-12
G 2.4E-10
G 4.0E-10
G 1.2E-09
G 1.3E-09
G 8.0E-12
G 9.2E-12
G 3.0E-12
G 4.2E-12
G 3.1E-12
G 3.0E-12
1 1 1 1 1 1 1 1 1 1
H 4.3E-10

5.980

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DOSINC.DAT

H 4.5E-11
 H 7.3E-11
 H 2.2E-10
 H 2.4E-10
 H 6.1E-12
 H 6.8E-12
 H 1.9E-12
 H 2.1E-12
 H 2.0E-12
 H 1.9E-12

! TE123M Class: W F1: 0.20000 12/11/87 02:48:13.7 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 4 3 1 1 1 1

G 1.0E-10
 G 2.2E-10
 G 4.6E-10
 G 1.0E-09
 G 4.6E-09
 G 2.2E-09 2.6E-09 2.9E-10 3.4E-11
 G 2.1E-09 2.3E-10 2.7E-11
 G 9.1E-11
 G 2.0E-10
 G 1.2E-10
 G 9.1E-11

1 1 1 1 1 4 3 1 1 1 1
 H 1.3E-08
 H 2.5E-10
 H 2.7E-10
 H 8.2E-10
 H 2.2E-09
 H 2.1E-08 2.8E-09 3.3E-10 3.8E-11
 H 2.1E-09 2.6E-10 3.0E-11
 H 0.5E-11
 H 1.9E-10
 H 2.0E-10
 H 1.4E-10

! TE129M Class: W F1: 0.20000 12/11/87 02:57:24.0 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 15
 1 1 1 1 1 1 1 1 1 1 1

G 1.8E-10
 G 5.5E-10
 G 1.4E-09
 G 8.0E-09
 G 2.4E-08
 G 8.1E-09
 G 3.6E-09
 G 5.7E-07
 G 2.4E-10
 G 1.8E-10
 G 1.0E-11
 G 1.4E-10

1 1 1 1 1 1 1 1 1 1 1

H 3.9E-08

H 4.1E-10

H 7.3E-10

H 3.8E-09

H 1.1E-08

H 7.1E-09

H 3.1E-09

H 5.1E-07

H 1.8E-10

H 1.8E-10

H 3.1E-11

H 1.2E-10

! TE129 Class: W F1: 0.20000 12/11/87 03:28:14.7 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15

1 1 1 1 1 1 1 1 1 1 1 1

G 5.2E-13

G 4.0E-10

G 2.8E-10

G 1.9E-10

G 4.0E-11

G 8.1E-13

G 1.1E-12

G 5.9E-11

G 1.7E-12

G 8.4E-13

G 3.2E-14

G 5.5E-13

1 1 1 1 1 1 1 1 1 1 1

H 1.6E-10

H 1.6E-11

H 1.1E-11

H 7.7E-12

H 1.8E-12

H 9.8E-13

H 1.0E-12

H 8.0E-11

H 5.4E-13

H 5.7E-13

H 8.8E-14

H 2.7E-13

! TE131M Class: W F1: 0.20000 12/11/87 03:37:22.5 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15

1 1 1 1 1 1 1 1 1 1 1

G 5.4E-11

G 8.5E-10

G 1.8E-09

G 4.7E-09

G 8.1E-09

G 3.7E-10

G 2.4E-10

DOSINC.DAT

G 1.0E-08
G 7.3E-10
G 1.3E-10
G 3.8E-08
G 3.1E-10

1 1 1 1 1 1 1 1 1 1

H 2.2E-09
H 2.7E-10
H 4.9E-10
H 1.4E-09
H 2.4E-09
H 2.5E-10
H 1.4E-10
H 6.8E-09
H 2.3E-10
H 8.7E-11
H 3.2E-08
H 1.4E-10

! TE131 Class: W F1: 0.20000 12/11/87 04:09:40.6 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15

1 1 1 1 1 1 1 1 1 1 1

G 0.9E-13
G 3.3E-10
G 1.1E-10
G 3.4E-11
G 3.9E-12
G 4.8E-13
G 1.0E-12
G 7.4E-12
G 2.2E-12
G 7.9E-13
G 9.0E-10
G 2.0E-12

1 1 1 1 1 1 1 1 1 1 1

H 8.0E-11
H 5.4E-12
H 1.6E-12
H 6.8E-13
H 2.0E-13
H 4.9E-13
H 5.9E-13
H 2.0E-11
H 2.6E-13
H 4.1E-13
H 5.7E-10
H 9.7E-13

! TE132 Class: W F1: 0.20000 12/11/87 04:26:05.6 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15

1 1 1 1 1 1 1 1 1 1 1

G 1.0E-11
G 1.9E-10

DOSINC.DAT

5.983

9/30/88

G 4.5E-10
 Q 1.5E-09
 G 3.4E-09
 Q 5.9E-10
 Q 1.2E-10
 G 8.9E-09
 Q 2.3E-10
 G 3.0E-11
 G 4.1E-08
 G 2.8E-09

1 1 1 1 1 1 1 1 1 1 1

H 1.4E-09
 H 9.2E-11
 H 1.7E-10
 H 5.5E-10
 H 1.2E-09
 H 4.4E-10
 H 0.6E-11
 H 6.5E-09
 H 9.1E-11
 H 3.4E-11
 H 4.3E-08
 H 2.9E-09

I TE133M Class: W F1: 0.20000 12/11/87 04:41:54.6 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15
 1 1 1 1 1 1 1 1 1 1 1 1

G 0.3E-12
 G 0.7E-10
 G 4.1E-10
 G 2.0E-10
 G 5.5E-11
 G 4.9E-12
 G 1.2E-11
 Q 5.0E-11
 G 3.6E-11
 Q 9.6E-12
 Q 3.5E-09
 G 4.0E-11

1 1 1 1 1 1 1 1 1 1

H 2.1E-10
 H 2.6E-11
 H 1.4E-11
 H 1.0E-11
 H 2.0E-12
 H 3.1E-12
 H 4.0E-12
 H 9.2E-11
 H 2.4E-12
 H 3.7E-12
 H 2.2E-09
 H 2.5E-11

5.984

9/30/88

DOSINC.DAT

! TE133 Class: W F1: 0.20000 12/11/87 05:16:44.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15
1 1 1 1 1 1 1 1 1 1 1 1

G 7.0E-13
G 2.5E-10
G 4.4E-11
G 9.9E-12
G 1.6E-12
G 3.8E-13
G 7.8E-13
G 1.5E-12
G 1.8E-12
G 7.9E-13
G 8.0E-10
G 9.0E-12

1 1 1 1 1 1 1 1 1 1 1 1

H 4.8E-11
H 2.3E-12
H 4.5E-13
H 2.0E-13
H 1.0E-13
H 2.8E-13
H 3.7E-13
H 1.1E-11
H 1.4E-13
H 3.2E-13
H 5.0E-10
H 5.4E-12

! TE134 Class: W F1: 0.20000 12/11/87 05:38:53.9 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15
1 1 1 1 1 1 1 1 1 1 1 1

G 2.0E-12
G 2.3E-10
G 1.1E-10
G 0.4E-11
G 1.2E-11
G 1.6E-12
G 3.5E-12
G 1.2E-11
G 9.8E-12
G 2.8E-12
G 5.8E-10
G 0.3E-11

1 1 1 1 1 1 1 1 1 1 1 1

H 0.2E-11
H 8.8E-12
H 3.2E-12
H 2.0E-12
H 5.0E-13
H 1.2E-12
H 1.2E-12

DOSINC.DAT

5.985

9/30/88

H 2.5E-11
H 5.9E-13
H 1.1E-12
H 3.8E-10
H 3.8E-11
! I 134 Class: D F1: 1.00000 12/11/07 05:47:46.3 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15
1 1 1 1 1 1 1 1 1 1 1 1 1

G 1.8E-11
G 5.6E-10
G 2.1E-11
G 2.2E-11
G 1.9E-11
G 5.8E-11
G 5.9E-11
G 1.3E-11
G 1.6E-11
G 1.6E-11
G 4.4E-10
G 5.5E-11

1 1 1 1 1 1 1 1 1 1 1

H 1.5E-10
H 7.4E-11
H 7.7E-12
H 7.7E-12
H 7.5E-12
H 2.8E-11
H 2.8E-11
H 5.9E-12
H 6.4E-12
H 8.2E-12
H 2.8E-10
H 2.5E-11

! CS134M Class: D F1: 1.00000 12/11/07 05:53:13.8 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14
1 1 1 1 1 1 1 1 1 1 1

G 3.7E-12
G 1.1E-10
G 4.2E-12
G 4.8E-12
G 3.9E-12
G 1.8E-12
G 3.8E-12
G 3.7E-12
G 3.7E-12
G 3.7E-12
G 3.6E-12

1 1 1 1 1 1 1 1 1 1 1

H 6.5E-11
H 1.6E-11
H 1.9E-12

DOSINC.DAT

5.986

9/30/88

H 1.8E-12
H 1.8E-12
H 9.0E-13
H 1.8E-12
H 1.7E-12
H 1.7E-12
H 1.8E-12
H 1.7E-12

! I 135 Class: D F1: 1.00000 12/11/87 05:59:01.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15
1 1 1 1 1 1 1 1 1 1 1 1

G 1.1E-10
G 6.1E-10
G 1.2E-10
G 1.2E-10
G 1.4E-10
G 1.0E-09
G 3.6E-10
G 1.1E-10
G 1.2E-10
G 1.2E-10
G 3.2E-08
G 7.8E-10

1 1 1 1 1 1 1 1 1 1 1

H 6.2E-10
H 1.4E-10
H 6.1E-11
H 8.0E-11
H 7.1E-11
H 5.4E-10
H 1.9E-10
H 5.8E-11
H 6.2E-11
H 7.5E-11
H 1.6E-08
H 4.0E-10

! I 135 Class: D F1: 1.00000 12/11/87 06:05:25.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 15
1 1 1 1 1 1 1 1 1 1 1

G 5.7E-11
G 5.5E-10
G 6.7E-11
G 6.4E-11
G 7.4E-11
G 3.7E-10
G 2.8E-10
G 6.1E-11
G 6.7E-11
G 8.1E-11
G 1.4E-08
G 4.9E-10

DOSINC.DAT

5.987

9/30/88

1 1 1 1 1 1 1 1 1 1 1 1

H 4.6E-10

H 1.0E-10

H 3.2E-11

H 3.0E-11

H 3.5E-11

H 1.8E-10

H 1.3E-10

H 2.9E-11

H 3.2E-11

H 3.5E-11

H 0.8E-09

H 2.3E-10

! CS135 Class: D F1: 1.00000 12/11/87 00:10:11.0 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

3 3 4 3 4 3 3 3 3 3 3

G 1.7E-09 1.7E-10 1.7E-11

G 1.1E-09 1.0E-10 1.0E-11

G 1.9E-09 1.9E-10 1.9E-11 1.9E-12

G 1.8E-09 1.8E-10 1.8E-11

G 1.9E-09 1.9E-10 1.9E-11 1.9E-12

G 0.5E-10 0.5E-11 0.5E-12

G 1.7E-09 1.7E-10 1.7E-11

G 1.7E-09 1.7E-10 1.7E-11

G 1.7E-09 1.7E-10 1.7E-11

G 1.7E-09 1.7E-10 1.7E-11

G 1.7E-09 1.7E-10 1.7E-11

1 3 4 3 4 3 3 3 3 3 3

H 2.1E-10

H 0.7E-10 0.8E-11 0.8E-12

H 1.2E-09 1.2E-10 1.2E-11 1.2E-12

H 1.2E-09 1.2E-10 1.2E-11

H 1.2E-09 1.2E-10 1.2E-11 1.2E-12

H 5.4E-10 5.4E-11 5.4E-12

H 1.1E-09 1.1E-10 1.1E-11

H 1.1E-09 1.1E-10 1.1E-11

H 1.1E-09 1.1E-10 1.1E-11

H 1.1E-09 1.1E-10 1.1E-11

H 1.1E-09 1.1E-10 1.1E-11

! CS138 Class: D F1: 1.00000 12/11/87 00:27:57.7 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

1 1 1 1 1 1 1 1 1 1 1

G 0.9E-12

G 7.2E-10

G 1.1E-11

G 1.3E-11

G 9.5E-12

G 3.9E-12

G 6.4E-12

G 6.4E-12

G 6.3E-12

DOSINC.DAT

5.988

9/30/88

G 8.3E-12
 G 8.1E-12
 1 1 1 1 1 1 1 1 1 1
 H 1.6E-10
 H 7.9E-11
 H 4.1E-12
 H 4.2E-12
 H 3.7E-12
 H 2.4E-12
 H 3.6E-12
 H 3.8E-12
 H 3.6E-12
 H 4.2E-12
 H 3.8E-12
 ! BA139 Class: D F1: 0.10000 12/11/87 00:35:53.8 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1
 G 3.1E-13
 G 7.8E-10
 G 5.8E-10
 G 4.8E-10
 G 1.1E-10
 G 4.7E-13
 G 8.4E-13
 G 2.3E-13
 G 1.6E-12
 G 4.6E-13
 G 1.9E-13
 1 1 1 1 1 1 1 1 1 1
 H 2.8E-10
 H 9.2E-11
 H 7.4E-11
 H 6.3E-11
 H 1.6E-11
 H 2.6E-12
 H 2.9E-12
 H 1.6E-12
 H 1.8E-12
 H 1.7E-12
 H 1.7E-12
 ! BA140 Class: D F1: 0.10000 12/11/87 00:41:47.8 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1
 G 3.8E-11
 G 5.4E-10
 G 1.8E-09
 G 7.4E-09
 G 2.8E-08
 G 5.3E-10
 G 3.8E-10
 G 1.1E-10

DOSINC.DAT

5.989

9/30/88

G 9.4E-10
 G 1.3E-10
 G 2.6E-11
 1 1 1 1 1 1 1 1 1 1
 H 1.5E-09
 H 1.7E-10
 H 3.5E-10
 H 1.2E-09
 H 4.1E-09
 H 2.3E-09
 H 1.1E-09
 H 1.2E-10
 H 2.6E-10
 H 1.6E-10
 H 1.2E-10
 ! LA140 Class: D F1: 0.00100 12/11/87 05:57:06.0 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1
 G 4.1E-11
 G 1.1E-09
 G 3.0E-09
 G 9.1E-09
 G 1.7E-08
 G 9.9E-11
 G 2.0E-10
 G 1.3E-10
 G 1.4E-09
 G 1.0E-10
 G 0.5E-12
 G 1.7E-10
 1 1 1 1 1 1 1 1 1 1
 H 1.7E-09
 H 3.7E-10
 H 6.4E-10
 H 1.6E-09
 H 2.0E-09
 H 4.3E-10
 H 4.0E-10
 H 1.4E-10
 H 3.7E-10
 H 2.1E-10
 H 1.3E-10
 H 3.7E-09
 ! CS136 Class: D F1: 1.00000 12/11/87 07:04:18.4 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1
 G 2.7E-09
 G 3.1E-09
 G 3.7E-09
 G 3.5E-09
 G 3.7E-09

G 1.1E-09
 G 2.7E-09
 G 3.2E-09
 G 2.9E-09
 G 2.7E-09
 G 3.0E-09
 1 1 1 1 1 1 1 1 1 1
 H 1.9E-09
 H 1.0E-09
 H 2.3E-09
 H 2.2E-09
 H 2.3E-09
 H 0.0E-10
 H 1.7E-09
 H 2.0E-09
 H 1.8E-09
 H 1.7E-09
 H 1.9E-09
 ! BA141 Class: D F1: 0.10000 12/11/87 07:12:48.0 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1
 G 1.1E-12
 G 3.9E-10
 G 1.9E-10
 G 2.2E-10
 G 1.2E-10
 G 1.2E-12
 G 1.4E-12
 G 2.7E-13
 G 2.9E-12
 G 1.2E-12
 G 1.0E-13
 1 1 1 1 1 1 1 1 1 1
 H 1.2E-10
 H 3.9E-11
 H 2.3E-11
 H 3.1E-11
 H 1.7E-11
 H 3.0E-12
 H 1.8E-12
 H 0.2E-13
 H 1.1E-12
 H 1.2E-12
 H 1.0E-12
 ! LA141 Class: D F1: 0.00100 12/11/87 07:32:34.5 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1
 G 2.0E-13
 G 9.4E-10
 G 1.4E-09
 G 2.6E-09

DOSINC.DAT

G 1.6E-09
G 6.4E-13
G 1.1E-12
G 3.3E-13
G 3.9E-12
G 7.4E-13
G 5.5E-14
G 1.3E-12

1 1 1 1 1 1 1 1 1 1 1

H 6.6E-10
H 1.4E-10
H 2.1E-10
H 3.8E-10
H 2.3E-10
H 1.3E-10
H 3.7E-11
H 1.0E-11
H 1.1E-11
H 1.0E-11
H 1.0E-11
H 2.2E-10

! CE141 Class: Y F1: 0.00030 12/11/87 07:45:49.7 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 19

1 1 1 1 1 1 1 1 1 1 1 1 1

G 1.4E-12
G 2.3E-10
G 5.8E-10
G 3.8E-09
G 8.7E-09
G 2.4E-11
G 3.4E-11
G 7.7E-12
G 1.1E-10
G 1.1E-11
G 1.8E-13
G 1.9E-11
G 1.8E-11

1 1 1 1 1 1 1 1 1 1 1

H 1.6E-08
H 1.6E-10
H 2.8E-10
H 1.4E-09
H 4.1E-09
H 2.7E-10
H 9.0E-11
H 5.5E-12
H 5.5E-11
H 4.5E-11
H 2.6E-11
H 2.6E-10
H 2.2E-10

5.992

9/30/88

DOSINC.DAT

! BA142 Class: D F1: 0.10000 12/11/87 07:53:57.6 Acute Sv/Bq

11 1 3 4 5 6 7 8 11 12 13 14

1 1 1 1 1 1 1 1 1 1 1

G 1.7E-12

G 2.0E-10

G 1.1E-10

G 9.5E-11

G 2.6E-11

G 1.2E-12

G 3.0E-12

G 0.1E-13

G 1.0E-11

G 2.5E-12

G 2.5E-13

1 1 1 1 1 1 1 1 1 1 1

H 5.0E-11

H 2.1E-11

H 1.5E-11

H 1.3E-11

H 3.9E-12

H 1.2E-12

H 1.5E-12

H 0.6E-13

H 1.9E-12

H 1.4E-12

H 1.0E-12

! LA142 Class: D F1: 0.00100 12/11/87 08:04:52.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17

1 1 1 1 1 1 1 1 1 1 1 1

G 0.0E-12

G 0.0E-10

G 0.4E-10

G 7.8E-10

G 2.2E-10

G 0.0E-12

G 2.1E-11

G 5.0E-12

G 7.0E-11

G 1.0E-11

G 1.2E-12

G 2.2E-11

1 1 1 1 1 1 1 1 1 1 1

H 3.2E-10

H 1.3E-10

H 1.2E-10

H 1.1E-10

H 3.0E-11

H 1.3E-11

H 1.0E-11

H 7.5E-12

H 1.0E-11

5.993

9/30/88

DOSINC.DAT

H 1.2E-11
 H 9.3E-12
 H 4.1E-11
 ! CE143 Class: Y F1: 0.00030 12/11/87 08:10:45.1 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 19
 1 1 1 1 1 1 1 1 1 1 1 1
 G 3.9E-12
 G 5.6E-10
 G 1.4E-09
 G 5.6E-09
 G 1.2E-08
 G 1.7E-11
 G 5.2E-11
 G 1.6E-11
 G 2.2E-10
 G 2.4E-11
 G 4.4E-13
 G 2.2E-11
 G 2.3E-11
 1 1 1 1 1 1 1 1 1 1 1 1
 H 4.0E-09
 H 2.1E-10
 H 5.0E-10
 H 2.1E-09
 H 4.5E-09
 H 1.7E-11
 H 3.1E-11
 H 8.0E-12
 H 7.9E-11
 H 1.7E-11
 H 8.5E-12
 H 5.0E-11
 H 4.4E-11
 ! PR143 Class: Y F1: 0.00030 12/11/87 08:24:53.6 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 1 1 1 1 1 1 1 1 1 1 1 1
 G 8.6E-15
 G 3.6E-10
 G 8.9E-10
 G 5.1E-09
 G 1.5E-08
 G 1.1E-12
 G 1.0E-12
 G 8.6E-15
 G 8.6E-15
 G 8.6E-15
 G 8.7E-15
 G 8.8E-12
 G 1.7E-12
 1 1 1 1 1 1 1 1 1 1 1 1
 H 1.3E-08

DOSINC.DAT

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H 1.7E-10
H 4.1E-10
H 2.4E-09
H 7.0E-09
H 1.5E-11
H 1.5E-11
H 0.8E-14
H 9.7E-14
H 0.6E-14
H 0.8E-14
H 1.2E-10
H 2.5E-11
! ND147 Class: Y F1: 0.00030 12/11/87 08:32:59.7 Acute Sv/Bq
  12 1 3 4 5 6 7 8 11 12 13 14 17
    1 1 1 1 1 1 1 1 1 1 1 1
G 2.4E-12
G 3.0E-10
G 0.5E-10
G 4.6E-09
G 1.2E-08
G 2.0E-11
G 5.0E-11
G 1.4E-11
G 1.8E-10
G 1.9E-11
G 2.7E-13
G 1.9E-11
  7 1 1 1 1 9 1 1 1 1 1 1
H 1.0E-08 2.2E-10 1.2E-10 0.6E-11 3.8E-11 2.2E-11 1.3E-11
H 2.0E-10
H 4.4E-10
H 2.1E-09
H 5.7E-09
H 1.2E-10 3.0E-11 3.2E-11 3.1E-11 2.7E-11 2.2E-11 1.8E-11 1.4E-11 1.1E-11
H 7.7E-11
H 0.0E-12
H 0.5E-11
H 3.5E-11
H 1.9E-11
H 1.3E-10
! PM147 Class: Y F1: 0.00030 12/11/87 08:55:50.4 Acute Sv/Bq
  12 1 3 4 5 6 7 8 11 12 13 14 17
    1 1 1 1 1 10 2 1 1 1 1 6
G 1.4E-15
G 0.9E-11
G 1.8E-10
G 1.0E-09
G 3.2E-09
G 7.5E-11 5.4E-11 3.8E-11 2.7E-11 2.0E-11 1.4E-11 1.0E-11 7.2E-12 5.1E-12 3.7E-12
G 0.1E-12 4.3E-12
G 1.8E-15

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G 8.2E-15
 G 2.0E-15
 G 1.3E-15
 Q 2.0E-11 1.4E-11 1.0E-11 7.2E-12 5.1E-12 3.7E-12
 16 1 1 1 2 19 11 1 1 1 1 15
 H 3.5E-08 1.9E-08 1.0E-08 5.7E-09 3.2E-09 1.9E-09 1.1E-09 6.0E-10 4.3E-10 2.7E-10 1.6E-10 1.2E-10 7.9E-11 5.4E-11 3.0E-11

 H 3.5E-11
 H 9.2E-11
 H 5.4E-10
 H 1.6E-09 5.2E-11
 H 1.0E-09 2.8E-09 2.8E-09 2.8E-09 2.3E-09 1.9E-09 1.5E-09 1.2E-09 9.2E-10 8.9E-10 5.2E-10 3.9E-10 2.6E-10 2.1E-10 1.5E-10
 1.1E-10 8.0E-11 5.8E-11 4.2E-11
 H 1.4E-10 2.1E-10 2.2E-10 2.1E-10 1.9E-10 1.5E-10 1.2E-10 9.7E-11 7.4E-11 5.6E-11 4.2E-11
 H 4.5E-14
 H 4.9E-14
 H 5.9E-14
 H 5.2E-14
 H 4.7E-10 6.7E-10 7.3E-10 8.9E-10 6.0E-10 5.0E-10 4.0E-10 3.1E-10 2.4E-10 1.8E-10 1.4E-10 1.0E-10 7.4E-11 5.4E-11 4.0E-11

 I SM147 Class: W F1: 0.00030 12/11/07 09:16:21.2 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 1 1 1 1 50
 G 9.9E-13
 G 5.2E-10
 G 1.3E-09
 G 7.5E-09
 G 2.4E-08
 G 8.2E-08 5.8E-08 5.4E-08 5.0E-08 4.6E-08 4.3E-08 4.0E-08 3.7E-08 3.5E-08 3.2E-08 3.0E-08 2.8E-08 2.6E-08 2.4E-08 2.2E-08
 2.1E-08 1.9E-08 1.8E-08 1.7E-08 1.6E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08 1.0E-08 9.5E-09 8.8E-09 8.2E-09 7.6E-09
 7.1E-09 6.6E-09 6.1E-09 5.7E-09 5.3E-09 4.9E-09 4.6E-09 4.3E-09 4.0E-09 3.7E-09 3.4E-09 3.2E-09 3.0E-09 2.8E-09 2.6E-09
 2.4E-09 2.2E-09 2.1E-09 1.9E-09 1.8E-09
 G 4.9E-09 4.6E-09 4.3E-09 4.0E-09 3.7E-09 3.4E-09 3.2E-09 3.0E-09 2.8E-09 2.6E-09 2.4E-09 2.2E-09 2.1E-09 1.9E-09 1.8E-09
 1.7E-09 1.6E-09 1.4E-09 1.3E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.4E-10 8.7E-10 8.1E-10 7.5E-10 7.0E-10 6.5E-10 6.1E-10
 5.6E-10 5.3E-10 4.9E-10 4.5E-10 4.2E-10 3.9E-10 3.7E-10 3.4E-10 3.2E-10 2.9E-10 2.7E-10 2.6E-10 2.4E-10 2.2E-10 2.1E-10
 1.9E-10 1.8E-10 1.7E-10 1.5E-10 1.4E-10
 G 9.9E-13
 G 9.9E-13
 G 9.9E-13
 G 9.9E-13
 Q 1.7E-08 1.6E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08 1.0E-08 9.6E-09 8.9E-09 8.3E-09 7.7E-09 7.2E-09 6.7E-09 6.2E-09
 5.8E-09 5.4E-09 5.0E-09 4.7E-09 4.3E-09 4.0E-09 3.8E-09 3.5E-09 3.2E-09 3.0E-09 2.8E-09 2.6E-09 2.4E-09 2.3E-09 2.1E-09
 2.0E-09 1.8E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.5E-10 8.8E-10 8.2E-10 7.7E-10 7.1E-10
 6.6E-10 6.2E-10 5.7E-10 5.3E-10 5.0E-10
 2 1 1 1 1 50 50 1 1 1 1 50
 H 7.5E-08 6.5E-08
 H 8.6E-10
 H 1.1E-09
 H 4.2E-09
 H 1.2E-08
 H 2.2E-05 2.3E-05 2.2E-05 2.0E-05 1.9E-05 1.7E-05 1.6E-05 1.5E-05 1.4E-05 1.3E-05 1.2E-05 1.1E-05 1.0E-05 9.8E-06 9.1E-06

DOSINC.DAT

8.4E-06 7.9E-06 7.3E-06 6.8E-06 6.3E-06 5.9E-06 5.5E-06 5.1E-06 4.7E-06 4.4E-06 4.1E-06 3.8E-06 3.5E-06 3.3E-06 3.1E-06
 2.9E-06 2.7E-06 2.5E-06 2.3E-06 2.1E-06 2.0E-06 1.9E-06 1.7E-06 1.6E-06 1.5E-06 1.4E-06 1.3E-06 1.2E-06 1.1E-06 1.0E-06
 9.7E-07 9.0E-07 8.4E-07 7.8E-07 7.2E-07
 H 1.8E-06 1.9E-06 1.7E-06 1.6E-06 1.5E-06 1.4E-06 1.3E-06 1.2E-06 1.1E-06 1.0E-06 9.7E-07 9.0E-07 8.4E-07 7.8E-07 7.2E-07
 6.7E-07 6.3E-07 5.8E-07 5.4E-07 5.0E-07 4.7E-07 4.4E-07 4.1E-07 3.8E-07 3.5E-07 3.3E-07 3.0E-07 2.8E-07 2.6E-07 2.4E-07
 2.3E-07 2.1E-07 2.0E-07 1.8E-07 1.7E-07 1.6E-07 1.5E-07 1.4E-07 1.3E-07 1.2E-07 1.1E-07 1.0E-07 9.6E-08 8.9E-08 8.3E-08
 7.7E-08 7.2E-08 6.7E-08 6.2E-08 5.8E-08

H 4.0E-10
 H 4.0E-10
 H 4.0E-10
 H 4.0E-10

H 6.2E-08 6.4E-08 6.8E-08 5.8E-08 5.2E-08 4.8E-08 4.5E-08 4.2E-08 3.9E-08 3.6E-08 3.4E-08 3.1E-08 2.9E-08 2.7E-08 2.5E-08
 2.3E-08 2.2E-08 2.0E-08 1.9E-08 1.7E-08 1.6E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08 1.1E-08 9.8E-09 9.1E-09 8.5E-09
 7.9E-09 7.3E-09 6.8E-09 6.4E-09 5.9E-09 5.5E-09 5.1E-09 4.8E-09 4.4E-09 4.1E-09 3.8E-09 3.6E-09 3.3E-09 3.1E-09 2.9E-09
 2.7E-09 2.5E-09 2.3E-09 2.2E-09 2.0E-09

I PM140M Class: Y F1: 0.00030 12/11/87 09:19:51.1 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1

Q 4.4E-11

G 7.9E-10

G 2.6E-09

G 5.8E-09

G 1.4E-08

G 1.8E-10

G 4.4E-10

G 2.1E-10

G 2.2E-09

G 2.7E-10

G 6.4E-12

G 2.3E-10

2 1 1 1 1 1 1 1 1 1 1 1

H 3.6E-08 5.6E-11

H 2.8E-09

H 1.5E-09

H 3.2E-09

H 6.7E-09

H 1.4E-09

H 1.4E-09

H 1.3E-10

H 1.2E-09

H 1.2E-09

H 1.0E-09

H 2.8E-09

I PM140 Class: Y F1: 0.00030 12/11/87 09:34:49.5 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1

G 1.2E-11

G 9.5E-10

G 2.5E-09

G 1.2E-08

G 3.2E-08

DOSINC.DAT

5.997

9/30/88

Q 3.5E-11
 Q 9.9E-11
 Q 4.3E-11
 Q 4.8E-10
 Q 8.1E-11
 Q 1.9E-12
 Q 5.8E-11
 1 1 1 1 1 1 1 1 1 1 1
 H 1.4E-08
 H 4.8E-10
 H 1.1E-09
 H 5.2E-09
 H 1.4E-08
 H 7.4E-11
 H 1.1E-10
 H 2.1E-11
 H 2.2E-10
 H 7.3E-11
 H 3.9E-11
 H 1.9E-10
 ! PM149 Class: Y F1: 0.00030 12/11/87 09:42:41.3 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1
 G 1.7E-13
 G 4.2E-10
 Q 1.0E-09
 G 5.0E-09
 G 1.2E-08
 G 9.9E-13
 Q 2.3E-12
 G 7.8E-13
 G 9.3E-12
 Q 1.0E-12
 G 2.5E-14
 Q 1.9E-12
 1 1 1 1 1 1 1 1 1 1 1
 H 3.2E-09
 H 1.6E-10
 H 3.9E-10
 H 2.0E-09
 H 4.7E-09
 H 5.3E-12
 H 5.8E-12
 H 4.0E-13
 H 3.8E-12
 H 9.3E-13
 H 4.4E-13
 H 1.8E-11
 ! SM153 Class: W F1: 0.00030 12/11/87 09:50:00.7 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1

DOSINC.DAT

5.998

9/30/88

5.999

9/30/88

G 7.2E-13
 G 3.3E-10
 G 8.1E-10
 G 3.8E-09
 G 8.1E-09
 G 8.5E-12
 G 2.8E-11
 G 9.7E-12
 G 7.8E-11
 G 7.8E-12
 G 2.9E-14
 G 5.9E-12
 1 1 1 1 1 1 1 1 1 1
 H 2.1E-09
 H 1.1E-10
 H 2.7E-10
 H 1.2E-09
 H 2.8E-09
 H 1.8E-10
 H 7.1E-11
 H 2.7E-12
 H 2.8E-11
 H 7.2E-12
 H 2.9E-12
 H 1.9E-10
 ! EU158 Class: W F1: 0.00100 12/11/87 09:57:37.0 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 1 1 1 1 1 1 1 1 1 1 1 1
 G 3.3E-11
 G 8.8E-10
 G 2.4E-09
 G 8.4E-09
 G 2.3E-08
 G 1.2E-10
 G 2.5E-10
 G 1.2E-10
 G 1.2E-09
 G 1.5E-10
 G 5.3E-12
 G 1.8E-10
 G 1.8E-10
 1 1 1 1 1 1 1 1 1 1 1
 H 1.9E-08
 H 7.8E-10
 H 1.2E-09
 H 3.7E-09
 H 9.8E-09
 H 2.8E-09
 H 1.2E-09
 H 1.1E-10
 H 8.2E-10

DOSINC.DAT

H 3.8E-10
 H 2.3E-10
 H 1.3E-09
 H 3.8E-09
 ! GD153 Class: D Fl: 0.00030 12/11/87 10:06:12.1 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 1 1 1 1 1 3 1 1 1 1 1 1 2
 G 1.9E-12
 G 9.7E-11
 G 3.2E-10
 G 1.0E-09
 G 2.8E-09
 G 6.1E-11 1.3E-11 4.2E-12
 G 7.9E-11
 G 1.0E-11
 G 1.9E-10
 G 1.8E-11
 G 1.6E-13
 G 1.6E-11
 G 2.3E-11 3.7E-12
 3 2 2 3 2 7 5 1 2 2 2 3 6
 H 9.9E-10 2.7E-10 8.9E-11
 H 4.7E-10 1.6E-10
 H 5.0E-10 1.5E-10
 H 8.0E-10 2.1E-10 8.8E-11
 H 7.2E-10 9.8E-11
 H 6.2E-08 2.0E-08 6.7E-09 2.2E-09 7.2E-10 2.3E-10 7.7E-11
 H 7.3E-09 2.4E-09 7.9E-10 2.8E-10 8.4E-11
 H 1.5E-10
 H 3.1E-10 9.0E-11
 H 4.7E-10 1.5E-10
 H 2.0E-10 8.3E-11
 H 1.5E-09 3.2E-10 1.1E-10
 H 1.0E-08 5.9E-09 1.9E-09 6.3E-10 2.1E-10 6.8E-11
 ! TB160 Class: W Fl: 0.00030 12/11/87 10:15:10.4 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 16 17
 1 1 1 1 1 1 1 1 1 1 1 1 1
 G 2.7E-11
 G 6.1E-10
 G 1.9E-09
 G 5.9E-09
 G 1.6E-08
 G 1.5E-10
 G 2.6E-10
 G 1.0E-10
 G 1.2E-09
 G 1.4E-10
 G 4.3E-12
 G 1.6E-10
 G 1.3E-10
 1 1 1 1 1 2 2 1 1 1 1 1 2

DOSINC.DAT

5.1000

9/30/88

H 3.0E-08
 H 1.4E-09
 H 1.4E-09
 H 3.4E-09
 H 7.4E-09
 H 2.4E-08 8.5E-10
 H 4.4E-09 1.4E-10
 H 2.8E-10
 H 9.3E-10
 H 9.5E-10
 H 8.5E-10
 H 2.1E-09
 H 9.0E-09 2.9E-10
 I H0108W Class: W F1: 0.00038 12/11/07 10:24:20.7 Acute Sv/Bq
 13 1 3 4 5 6 7 8 11 12 13 14 17 18
 3 0 1 2 1 37 13 1 1 1 1 34 41
 G 5.0E-11 1.2E-11 1.1E-11
 G 7.0E-10 1.5E-11 1.4E-11 1.3E-11 1.2E-11 1.1E-11
 G 2.3E-09
 G 4.8E-09 1.1E-11
 G 1.1E-08
 G 3.0E-10 1.5E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.7E-11 9.0E-11 8.4E-11 7.8E-11 7.2E-11 6.7E-11 6.2E-11 5.8E-11
 5.4E-11 5.0E-11 4.7E-11 4.3E-11 4.0E-11 3.8E-11 3.5E-11 3.2E-11 3.0E-11 2.8E-11 2.6E-11 2.4E-11 2.3E-11 2.1E-11 1.9E-11
 1.8E-11 1.7E-11 1.6E-11 1.5E-11 1.4E-11 1.3E-11 1.2E-11
 G 4.5E-10 2.7E-11 2.5E-11 2.3E-11 2.1E-11 2.0E-11 1.8E-11 1.7E-11 1.6E-11 1.5E-11 1.4E-11 1.3E-11 1.2E-11
 G 1.8E-10
 G 2.0E-09
 G 2.4E-10
 G 8.5E-12
 G 3.1E-10 1.2E-10 1.1E-10 1.1E-10 9.9E-11 9.2E-11 8.8E-11 8.0E-11 7.4E-11 6.9E-11 6.4E-11 6.0E-11 5.5E-11 5.2E-11 4.8E-11
 4.5E-11 4.1E-11 3.9E-11 3.8E-11 3.3E-11 3.1E-11 2.9E-11 2.7E-11 2.5E-11 2.3E-11 2.2E-11 2.0E-11 1.9E-11 1.7E-11 1.6E-11
 1.5E-11 1.4E-11 1.3E-11 1.2E-11
 G 4.4E-10 1.9E-10 1.8E-10 1.7E-10 1.6E-10 1.4E-10 1.3E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.4E-11 8.7E-11 8.1E-11 7.5E-11
 7.0E-11 6.5E-11 6.0E-11 5.8E-11 5.2E-11 4.9E-11 4.5E-11 4.2E-11 3.9E-11 3.6E-11 3.4E-11 3.1E-11 2.9E-11 2.7E-11 2.5E-11
 2.3E-11 2.2E-11 2.0E-11 1.9E-11 1.8E-11 1.6E-11 1.5E-11 1.4E-11 1.3E-11 1.2E-11 1.1E-11
 50 50 50 50 45 50 50 37 48 50 41 50 50
 H 4.1E-08 5.3E-09 4.8E-09 4.3E-09 4.0E-09 3.7E-09 3.5E-09 3.2E-09 3.0E-09 2.8E-09 2.8E-09 2.4E-09 2.2E-09 2.1E-09 1.9E-09
 1.8E-09 1.7E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.2E-09 1.1E-09 1.0E-09 9.3E-10 8.7E-10 8.0E-10 7.5E-10 7.0E-10 6.5E-10
 6.0E-10 5.8E-10 5.2E-10 4.8E-10 4.5E-10 4.2E-10 3.9E-10 3.6E-10 3.4E-10 3.1E-10 2.9E-10 2.7E-10 2.3E-10 2.2E-10
 2.0E-10 1.9E-10 1.7E-10 1.6E-10 1.5E-10
 H 8.0E-09 8.1E-09 5.7E-09 5.3E-09 4.9E-09 4.8E-09 4.3E-09 4.0E-09 3.7E-09 3.4E-09 3.2E-09 3.0E-09 2.7E-09 2.6E-09 2.4E-09
 2.2E-09 2.1E-09 1.9E-09 1.8E-09 1.7E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.1E-09 9.9E-10 9.2E-10 8.8E-10 8.0E-10
 7.4E-10 6.9E-10 6.4E-10 6.0E-10 5.5E-10 5.1E-10 4.8E-10 4.4E-10 4.1E-10 3.8E-10 3.6E-10 3.3E-10 2.9E-10 2.7E-10
 2.5E-10 2.3E-10 2.1E-10 2.0E-10 1.9E-10
 H 4.7E-09 3.4E-09 3.2E-09 3.0E-09 2.8E-09 2.6E-09 2.4E-09 2.2E-09 2.1E-09 1.9E-09 1.8E-09 1.7E-09 1.5E-09 1.4E-09 1.3E-09
 1.2E-09 1.2E-09 1.1E-09 1.0E-09 9.3E-10 8.8E-10 8.0E-10 7.5E-10 6.9E-10 6.4E-10 6.0E-10 5.2E-10 4.8E-10 4.5E-10
 4.2E-10 3.9E-10 3.6E-10 3.3E-10 2.9E-10 2.7E-10 2.6E-10 2.6E-10 2.2E-10 2.0E-10 1.9E-10 1.7E-10 1.6E-10 1.5E-10
 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10
 H 7.2E-09 4.6E-09 4.3E-09 4.0E-09 3.7E-09 3.4E-09 3.2E-09 3.0E-09 2.8E-09 2.6E-09 2.4E-09 2.2E-09 2.1E-09 1.9E-09 1.8E-09
 1.7E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.2E-09 1.1E-09 1.0E-09 9.3E-10 8.8E-10 8.0E-10 7.5E-10 6.9E-10 6.5E-10 6.0E-10
 5.8E-10 5.2E-10 4.8E-10 4.5E-10 4.2E-10 3.9E-10 3.6E-10 3.4E-10 3.1E-10 2.9E-10 2.7E-10 2.5E-10 2.3E-10 2.2E-10 2.0E-10

DOSINC.DAT

5.1002

9/30/88

1.9E-10 1.7E-10 1.8E-10 1.5E-10 1.4E-10
 H 7.6E-09 1.8E-09 1.7E-09 1.8E-09 1.4E-09 1.3E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.4E-10 8.7E-10 8.1E-10 7.5E-10 7.0E-10
 8.5E-10 8.0E-10 5.8E-10 5.2E-10 4.9E-10 4.5E-10 4.2E-10 3.9E-10 3.6E-10 3.4E-10 3.1E-10 2.9E-10 2.7E-10 2.5E-10 2.3E-10
 2.2E-10 2.0E-10 1.9E-10 1.8E-10 1.8E-10 1.6E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.1E-10 9.8E-11 9.1E-11 8.5E-11 7.9E-11

 H 5.9E-08 8.0E-08 5.8E-08 5.2E-08 4.9E-08 4.5E-08 4.2E-08 3.9E-08 3.8E-08 3.4E-08 3.1E-08 2.9E-08 2.7E-08 2.5E-08 2.3E-08
 2.2E-08 2.0E-08 1.9E-08 1.8E-08 1.8E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08 1.1E-08 9.8E-09 9.1E-09 8.5E-09 7.9E-09
 7.3E-09 6.8E-09 6.3E-09 5.9E-09 5.5E-09 5.1E-09 4.7E-09 4.4E-09 4.1E-09 3.8E-09 3.5E-09 3.3E-09 3.0E-09 2.8E-09 2.6E-09
 2.4E-09 2.3E-09 2.1E-09 2.0E-09 1.8E-09
 H 1.2E-08 1.1E-08 1.0E-08 9.3E-09 8.8E-09 8.0E-09 7.5E-09 6.9E-09 6.4E-09 6.0E-09 5.8E-09 5.2E-09 4.8E-09 4.5E-09 4.2E-09
 3.9E-09 3.6E-09 3.3E-09 3.1E-09 2.9E-09 2.7E-09 2.5E-09 2.3E-09 2.2E-09 2.0E-09 1.9E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09
 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.7E-10 9.0E-10 8.4E-10 7.8E-10 7.2E-10 6.7E-10 6.3E-10 5.8E-10 5.4E-10 5.0E-10 4.7E-10
 4.3E-10 4.0E-10 3.8E-10 3.5E-10 3.2E-10
 H 1.1E-09 1.0E-09 9.7E-10 9.0E-10 8.4E-10 7.8E-10 7.3E-10 6.7E-10 6.3E-10 5.8E-10 5.4E-10 5.0E-10 4.7E-10 4.4E-10 4.1E-10
 3.8E-10 3.5E-10 3.3E-10 3.0E-10 2.8E-10 2.6E-10 2.4E-10 2.3E-10 2.1E-10 2.0E-10 1.8E-10 1.7E-10 1.6E-10 1.5E-10 1.4E-10
 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.4E-11 8.8E-11 8.2E-11
 H 3.1E-09 2.8E-09 1.9E-09 1.7E-09 1.8E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.8E-10 8.9E-10 8.3E-10 7.7E-10
 7.2E-10 6.7E-10 6.2E-10 5.8E-10 5.4E-10 5.0E-10 4.8E-10 4.3E-10 4.0E-10 3.7E-10 3.5E-10 3.2E-10 3.0E-10 2.8E-10 2.6E-10
 2.4E-10 2.2E-10 2.1E-10 1.9E-10 1.8E-10 1.7E-10 1.6E-10 1.4E-10 1.3E-10 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.3E-11 8.7E-11
 8.1E-11
 H 4.5E-09 3.2E-09 3.0E-09 2.7E-09 2.8E-09 2.4E-09 2.2E-09 2.1E-09 1.9E-09 1.8E-09 1.8E-09 1.5E-09 1.4E-09 1.3E-09 1.2E-09
 1.1E-09 1.1E-09 9.9E-10 9.2E-10 8.6E-10 8.0E-10 7.4E-10 6.9E-10 6.4E-10 5.9E-10 5.5E-10 5.1E-10 4.8E-10 4.4E-10 4.1E-10
 3.8E-10 3.6E-10 3.3E-10 3.1E-10 2.9E-10 2.7E-10 2.5E-10 2.3E-10 2.1E-10 2.0E-10 1.9E-10 1.7E-10 1.6E-10 1.5E-10 1.4E-10
 1.3E-10 1.2E-10 1.1E-10 1.0E-10 9.0E-11
 H 2.5E-09 1.4E-09 1.3E-09 1.2E-09 1.1E-09 1.0E-09 9.8E-10 8.9E-10 8.3E-10 7.7E-10 7.2E-10 6.7E-10 6.2E-10 5.8E-10 5.4E-10
 5.0E-10 4.6E-10 4.3E-10 4.0E-10 3.7E-10 3.5E-10 3.2E-10 3.0E-10 2.8E-10 2.6E-10 2.4E-10 2.2E-10 2.1E-10 1.9E-10 1.8E-10
 1.7E-10 1.6E-10 1.4E-10 1.3E-10 1.2E-10 1.2E-10 1.1E-10 1.0E-10 9.3E-11 8.7E-11 8.1E-11
 H 5.0E-08 5.0E-08 4.6E-08 4.3E-08 4.0E-08 3.7E-08 3.5E-08 3.2E-08 3.0E-08 2.8E-08 2.8E-08 2.4E-08 2.2E-08 2.1E-08 1.9E-08
 1.8E-08 1.7E-08 1.8E-08 1.4E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08 1.0E-08 9.3E-09 8.7E-09 8.1E-09 7.5E-09 7.0E-09 6.5E-09
 6.0E-09 5.8E-09 5.2E-09 4.8E-09 4.5E-09 4.2E-09 3.9E-09 3.8E-09 3.4E-09 3.1E-09 2.9E-09 2.7E-09 2.5E-09 2.3E-09 2.2E-09
 2.0E-09 1.9E-09 1.7E-09 1.6E-09 1.5E-09
 H 7.8E-08 7.0E-08 7.3E-08 6.8E-08 6.3E-08 5.9E-08 5.4E-08 5.1E-08 4.7E-08 4.4E-08 4.1E-08 3.8E-08 3.5E-08 3.3E-08 3.0E-08
 2.8E-08 2.6E-08 2.4E-08 2.3E-08 2.1E-08 2.0E-08 1.8E-08 1.7E-08 1.6E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08 1.0E-08
 9.5E-09 8.8E-09 8.2E-09 7.6E-09 7.1E-09 6.6E-09 6.1E-09 5.7E-09 5.3E-09 4.9E-09 4.6E-09 4.2E-09 3.9E-09 3.7E-09 3.4E-09
 3.2E-09 3.0E-09 2.7E-09 2.6E-09 2.4E-09
 ! W 101 Class: D F1: 0.30000 12/11/87 10:33:08.6 Acute Sv/Bq
 14 1 3 4 5 6 7 8 11 12 13 14 16 17 19
 1 1 1 1 1 2 2 1 1 1 1 2 1 2
 Q 4.2E-12
 Q 3.1E-11
 Q 7.7E-11
 Q 2.8E-10
 Q 5.1E-10
 Q 4.4E-11 3.2E-12
 Q 4.8E-11 2.1E-12
 Q 4.8E-12
 Q 5.5E-11
 Q 8.0E-12
 Q 2.8E-12
 Q 7.4E-11 6.7E-13
 Q 2.8E-11

DOSINC.DAT

5.1003

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G 0.8E-11 5.9E-13
  2 2 2 2 2 3 3 2 2 2 2 2 2 2
H 5.4E-11 3.2E-13
H 1.2E-11 1.6E-13
H 1.7E-11 2.3E-13
H 3.0E-11 1.9E-13
H 0.2E-11 2.9E-13
H 0.7E-11 5.6E-12 6.3E-13
H 5.0E-11 3.6E-12 3.4E-13
H 3.0E-12 1.3E-13
H 1.2E-11 2.2E-13
H 6.0E-12 2.8E-13
H 3.7E-12 2.0E-13
H 1.2E-10 1.2E-12
H 3.2E-11 3.8E-13
H 1.1E-10 1.0E-12
! W 185 Class: D F1: 0.30000 12/11/87 10:42:15.5 Acute Sv/Bq
  14 1 3 4 5 6 7 8 11 12 13 14 16 17 19
    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
G 2.0E-12
G 1.5E-10
G 2.6E-10
G 1.5E-09
G 4.5E-09
G 1.5E-10
G 5.2E-11
G 2.7E-12
G 2.9E-12
G 2.7E-12
G 2.7E-12
G 4.0E-10
G 7.3E-11
G 3.4E-10
  1 1 1 1 1 2 2 1 1 1 1 2 1 2
H 3.9E-10
H 2.5E-11
H 4.2E-11
H 2.4E-10
H 0.9E-10
H 2.0E-10 6.3E-12
H 9.0E-11 2.1E-12
H 4.7E-12
H 5.0E-12
H 4.7E-12
H 4.7E-12
H 7.0E-10 1.5E-12
H 1.3E-10
H 5.9E-10 1.3E-12
! W 187 Class: D F1: 0.30000 12/11/87 10:51:19.1 Acute Sv/Bq
  14 1 3 4 5 6 7 8 11 12 13 14 16 17 19
    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

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DOSINC.DAT

5.1004

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G 1.3E-11
Q 4.2E-10
Q 7.7E-10
Q 2.6E-09
Q 4.6E-09
Q 8.1E-11
Q 6.0E-11
Q 2.4E-11
Q 2.0E-10
Q 3.2E-11
Q 8.0E-12
Q 8.9E-11
Q 4.5E-11
Q 7.5E-11
  1 1 1 1 1 1 1 1 1 1 1 1
H 6.2E-10
H 7.9E-11
H 1.3E-10
H 4.1E-10
H 7.1E-10
H 1.1E-10
H 3.7E-11
H 1.5E-11
H 4.2E-11
H 2.0E-11
H 1.6E-11
H 9.7E-11
H 4.6E-11
H 8.7E-11
! RE107 Class: W F1: 0.00000 12/11/87 11:04:25.0 Acute Sv/Bq
13 1 3 4 5 6 7 8 11 12 13 14 22 17
  1 1 1 1 1 1 1 1 1 1 1 1 1
G 4.0E-13
G 2.2E-11
G 6.1E-13
G 2.4E-12
G 7.1E-12
G 2.0E-13
G 4.0E-13
G 4.0E-13
G 4.0E-13
G 4.0E-13
G 1.1E-11
G 2.2E-11
G 5.5E-13
  2 1 1 1 1 1 1 1 1 1 1 1
H 1.1E-10 9.4E-13
H 1.4E-11
H 3.5E-13
H 1.3E-12
H 3.7E-12

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DOSINC.DAT

H 1.3E-13
H 2.7E-13
H 2.7E-13
H 2.7E-13
H 2.7E-13
H 6.9E-12
H 1.4E-11
H 3.6E-13

I IR192 Class: Y F1: 0.01000 07/12/88 14:23:32.2 Acute Sv/Bq

14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

G 6.7E-11
G 5.5E-10
G 1.6E-09
G 4.9E-09
G 1.3E-08
G 9.9E-11
G 2.5E-10
G 1.3E-10
G 1.0E-09
G 1.5E-10
G 3.9E-11
G 4.4E-10
G 4.9E-10
G 4.8E-10

2 1 1 1 1 1 1 1 1 1 1 1 1 1

H 4.9E-08 1.1E-09

H 1.3E-09
H 8.9E-10
H 2.5E-09
H 8.1E-09
H 8.4E-10
H 8.7E-10
H 9.4E-11
H 5.8E-10
H 8.1E-10
H 6.0E-10
H 1.7E-09
H 9.5E-10
H 1.5E-09

I OS185 Class: D F1: 0.01000 07/12/88 14:38:36.9 Acute Sv/Bq

14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
1 1 1 1 1 1 1 1 1 1 2 1 1

G 5.3E-11
G 2.0E-10
G 8.8E-10
G 1.4E-09
G 2.8E-09
G 8.6E-11
G 2.1E-10
G 1.0E-10

DOSINC.DAT

5.1005

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G 8.4E-10
 G 1.3E-10
 G 2.0E-11
 G 2.6E-10 3.3E-12
 G 2.6E-10
 G 2.0E-10
 2 2 2 2 2 2 2 2 2 2 2 2 2 2
 H 1.7E-09 2.9E-11
 H 1.9E-09 3.6E-11
 H 1.9E-09 3.3E-11
 H 2.1E-09 3.6E-11
 H 1.9E-09 2.7E-11
 H 1.3E-09 2.3E-11
 H 1.6E-09 2.9E-11
 H 1.4E-09 2.0E-11
 H 1.3E-09 2.3E-11
 H 1.4E-09 2.0E-11
 H 1.2E-09 2.2E-11
 H 0.1E-09 1.5E-10
 H 0.8E-09 1.3E-10
 H 5.7E-09 1.1E-10
 I 05191 Class: D F1: 0.01000 07/12/88 14:37:58.8 Acute Sv/Bq
 14 1 3 4 5 6 7 8 11 12 13 14 17 18 19
 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 G 5.2E-12
 G 1.9E-10
 G 4.9E-10
 G 2.3E-09
 G 0.8E-09
 G 1.8E-11
 G 4.8E-11
 G 1.1E-11
 G 1.2E-10
 G 1.5E-11
 G 3.5E-12
 G 5.1E-11
 G 0.0E-11
 G 5.0E-11
 1 1 1 1 1 1 1 1 1 1 1 1
 H 4.4E-10
 H 1.8E-10
 H 2.0E-10
 H 4.7E-10
 H 1.1E-09
 H 1.4E-10
 H 1.9E-10
 H 1.8E-10
 H 1.9E-10
 H 1.7E-10
 H 1.8E-10
 H 1.9E-09

DOSINC.DAT

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H 2.2E-09
H 1.8E-09
! HG203 Class: D F1: 1.00000 12/11/87 11:23:19.1 Acute Sv/Bq
13 1 3 4 5 6 7 8 11 12 13 14 21 16
1 1 1 1 1 1 1 1 1 1 1 1 1
G 1.2E-09
G 1.3E-09
G 1.6E-09
G 1.5E-09
G 1.4E-09
G 9.7E-10
G 1.5E-09
G 1.1E-09
G 1.4E-09
G 1.3E-09
G 1.3E-09
G 1.2E-08
G 1.9E-08
1 1 1 1 1 1 1 1 1 1 1 1
H 8.6E-10
H 7.8E-10
H 1.0E-09
H 9.8E-10
H 9.0E-10
H 8.1E-10
H 9.3E-10
H 7.3E-10
H 8.7E-10
H 8.0E-10
H 8.3E-10
H 7.3E-09
H 1.2E-08
! PU236 Class: Y F1: 0.00010 02/23/88 14:26:23.1 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 27 17 9 1 1 1 20
G 8.8E-13
G 1.3E-09
G 3.5E-09
G 1.9E-08
G 5.9E-08
G 4.8E-08 3.7E-08 2.9E-08 2.2E-08 1.7E-08 1.3E-08 1.0E-08 8.0E-09 6.2E-09 4.8E-09 3.7E-09 2.8E-09 2.2E-09 1.7E-09 1.3E-09
1.0E-09 7.9E-10 6.1E-10 4.7E-10 3.6E-10 2.8E-10 2.2E-10 1.7E-10 1.3E-10 1.0E-10 7.8E-11 6.0E-11
G 3.8E-09 2.9E-09 2.3E-09 1.8E-09 1.4E-09 1.1E-09 8.2E-10 6.3E-10 4.9E-10 3.8E-10 2.9E-10 2.3E-10 1.7E-10 1.3E-10 1.0E-10
8.1E-11 6.2E-11
G 5.2E-10 4.0E-10 3.1E-10 2.4E-10 1.9E-10 1.5E-10 1.2E-10 9.0E-11 7.0E-11
G 4.4E-12
G 9.7E-13
G 8.5E-13
G 1.3E-08 9.8E-09 7.4E-09 5.8E-09 4.3E-09 3.2E-09 2.4E-09 1.8E-09 1.4E-09 1.1E-09 8.0E-10 6.1E-10 4.6E-10 3.5E-10 2.8E-10
2.0E-10 1.5E-10 1.1E-10 8.7E-11 6.8E-11
16 1 1 1 1 24 14 1 1 1 1 17

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DOSINC.DAT

H 6.4E-05 3.5E-05 1.9E-05 1.1E-05 8.5E-06 3.8E-06 2.3E-06 1.5E-06 9.2E-07 6.0E-07 4.0E-07 2.7E-07 1.8E-07 1.3E-07 9.3E-08
 6.8E-08
 H 7.3E-10
 H 1.8E-09
 H 9.7E-09
 H 2.9E-08
 H 3.2E-06 4.9E-06 5.5E-06 5.5E-06 5.1E-06 4.5E-06 3.8E-06 3.1E-06 2.6E-06 2.1E-06 1.7E-06 1.3E-06 1.0E-06 8.1E-07 6.3E-07
 4.9E-07 3.9E-07 3.0E-07 2.3E-07 1.8E-07 1.4E-07 1.1E-07 8.4E-08 6.5E-08
 H 2.5E-07 3.9E-07 4.4E-07 4.4E-07 4.0E-07 3.5E-07 3.0E-07 2.5E-07 2.0E-07 1.6E-07 1.3E-07 1.0E-07 8.2E-08 6.4E-08
 H 3.5E-08
 H 8.3E-11
 H 8.8E-11
 H 8.8E-11
 H 8.8E-07 1.3E-06 1.5E-06 1.4E-06 1.3E-06 1.1E-06 9.5E-07 7.7E-07 6.2E-07 4.9E-07 3.9E-07 3.8E-07 2.3E-07 1.8E-07 1.4E-07
 1.1E-07 8.1E-08
 ! PU242 Class: Y F1: 0.00010 02/23/88 14:35:03.3 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 G 7.3E-13
 G 1.2E-09
 G 2.8E-09
 G 1.7E-08
 G 5.1E-08
 G 4.5E-08 4.5E-08 4.4E-08 4.3E-08 4.3E-08 4.2E-08 4.2E-08 4.1E-08 4.0E-08 4.0E-08 3.9E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08
 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08
 3.0E-08 2.9E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.5E-08
 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08
 G 3.7E-09 3.7E-09 3.8E-09 3.8E-09 3.5E-09 3.5E-09 3.4E-09 3.4E-09 3.3E-09 3.3E-09 3.2E-09 3.2E-09 3.2E-09 3.1E-09 3.1E-09
 3.0E-09 3.0E-09 2.9E-09 2.9E-09 2.9E-09 2.8E-09 2.8E-09 2.7E-09 2.7E-09 2.7E-09 2.6E-09 2.6E-09 2.6E-09 2.5E-09 2.5E-09
 2.5E-09 2.4E-09 2.4E-09 2.4E-09 2.3E-09 2.3E-09 2.3E-09 2.2E-09 2.2E-09 2.2E-09 2.1E-09 2.1E-09 2.1E-09 2.1E-09 2.0E-09
 2.0E-09 2.0E-09 1.9E-09 1.9E-09 1.9E-09
 G 4.9E-10 4.9E-10 4.9E-10 4.8E-10 4.8E-10 4.8E-10 4.7E-10 4.7E-10 4.7E-10 4.6E-10 4.6E-10 4.6E-10 4.5E-10 4.5E-10 4.5E-10
 4.4E-10 4.4E-10 4.4E-10 4.4E-10 4.3E-10 4.3E-10 4.3E-10 4.2E-10 4.2E-10 4.2E-10 4.2E-10 4.1E-10 4.1E-10 4.1E-10 4.0E-10
 4.0E-10 4.0E-10 4.0E-10 3.9E-10 3.9E-10 3.9E-10 3.8E-10 3.8E-10 3.8E-10 3.7E-10 3.7E-10 3.7E-10 3.7E-10 3.6E-10
 3.6E-10 3.6E-10 3.6E-10 3.5E-10 3.5E-10
 G 3.9E-12
 G 9.8E-13
 G 7.1E-13
 G 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08 1.0E-08 9.8E-09 9.3E-09 9.0E-09 8.7E-09 8.4E-09 8.1E-09 7.8E-09 7.8E-09
 7.3E-09 7.1E-09 6.8E-09 6.8E-09 6.4E-09 6.1E-09 5.9E-09 5.7E-09 5.5E-09 5.4E-09 5.2E-09 5.0E-09 4.8E-09 4.7E-09 4.5E-09
 4.3E-09 4.2E-09 4.1E-09 3.9E-09 3.8E-09 3.7E-09 3.5E-09 3.4E-09 3.3E-09 3.2E-09 3.1E-09 3.0E-09 2.9E-09 2.8E-09 2.7E-09
 2.6E-09 2.5E-09 2.4E-09 2.3E-09 2.3E-09
 50 1 1 1 1 50 50 50 1 1 1 50
 H 6.0E-05 4.1E-05 2.9E-05 2.1E-05 1.8E-05 1.2E-05 9.4E-06 7.4E-06 6.0E-06 5.0E-06 4.2E-06 3.8E-06 3.2E-06 2.9E-06 2.6E-06
 2.4E-06 2.3E-06 2.2E-06 2.1E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.9E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
 H 8.5E-10
 H 1.4E-09
 H 8.2E-09
 H 2.5E-08

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H 3.1E-08 5.9E-08 8.5E-08 1.1E-05 1.3E-05 1.4E-05 1.5E-05 1.8E-05 1.7E-05 1.7E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05
1.8E-05 1.8E-05 1.8E-05 1.7E-05 1.7E-05 1.7E-05 1.7E-05 1.7E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05
1.5E-05 1.5E-05 1.5E-05 1.4E-05 1.4E-05 1.4E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05
1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.1E-05
H 2.5E-07 4.8E-07 7.8E-07 8.9E-07 1.8E-08 1.2E-08 1.3E-08 1.3E-08 1.4E-08 1.4E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08
1.5E-08 1.5E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08
1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08
1.8E-08 9.9E-07 9.8E-07 9.8E-07 9.5E-07
H 3.4E-08 6.4E-08 9.3E-08 1.2E-07 1.4E-07 1.8E-07 1.7E-07 1.8E-07 1.9E-07 2.8E-07 2.8E-07 2.8E-07 2.8E-07 2.1E-07 2.1E-07 2.1E-07
2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.8E-07 2.8E-07 2.8E-07 2.8E-07 2.8E-07 2.8E-07 2.8E-07 2.8E-07
1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07
1.8E-07 1.7E-07 1.7E-07 1.7E-07 1.7E-07
H 7.3E-11
H 8.2E-11
H 7.3E-11
H 8.4E-07 1.8E-08 2.3E-08 2.8E-08 3.3E-08 3.8E-08 3.9E-08 4.1E-08 4.2E-08 4.2E-08 4.2E-08 4.2E-08 4.1E-08 4.1E-08 4.0E-08
3.9E-08 3.8E-08 3.7E-08 3.6E-08 3.5E-08 3.4E-08 3.3E-08 3.2E-08 3.1E-08 3.0E-08 2.9E-08 2.8E-08 2.7E-08 2.6E-08 2.5E-08
2.4E-08 2.3E-08 2.3E-08 2.2E-08 2.1E-08 2.0E-08 2.0E-08 1.9E-08 1.8E-08 1.8E-08 1.7E-08 1.7E-08 1.6E-08 1.5E-08 1.5E-08
1.4E-08 1.4E-08 1.3E-08 1.3E-08 1.3E-08
! NP238 Class: W F1: 0.00100 02/23/88 14:55:57.0 Acute Sv/Bq
12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 50 1 1 1 1 1
Q 1.8E-11
Q 4.3E-10
Q 1.1E-09
Q 4.2E-09
Q 9.3E-09
Q 8.8E-11 5.8E-11 5.8E-11 5.5E-11 5.4E-11 5.3E-11 5.2E-11 5.2E-11 5.1E-11 5.0E-11 4.9E-11 4.9E-11 4.8E-11 4.7E-11 4.7E-11
4.8E-11 4.5E-11 4.5E-11 4.4E-11 4.3E-11 4.3E-11 4.2E-11 4.1E-11 4.1E-11 4.0E-11 4.0E-11 3.9E-11 3.8E-11 3.8E-11 3.7E-11
3.7E-11 3.8E-11 3.8E-11 3.5E-11 3.5E-11 3.4E-11 3.4E-11 3.3E-11 3.3E-11 3.2E-11 3.2E-11 3.1E-11 3.1E-11 3.0E-11 3.0E-11
3.0E-11 2.9E-11 2.9E-11 2.8E-11 2.8E-11
G 8.3E-11
G 3.2E-11
G 3.8E-10
G 4.8E-11
G 1.5E-12
G 4.6E-11
2 1 1 1 1 50 50 50 1 1 1 50
H 3.3E-09 9.8E-12
H 1.7E-10
H 3.8E-10
H 1.4E-09
H 3.8E-09
H 8.4E-09 8.6E-09 8.5E-09 8.4E-09 8.3E-09 8.2E-09 8.1E-09 8.0E-09 5.9E-09 5.8E-09 5.7E-09 5.7E-09 5.6E-09 5.6E-09 5.4E-09
5.3E-09 5.3E-09 5.2E-09 5.1E-09 5.0E-09 5.0E-09 4.9E-09 4.8E-09 4.7E-09 4.7E-09 4.6E-09 4.5E-09 4.5E-09 4.4E-09 4.3E-09
4.3E-09 4.2E-09 4.1E-09 4.1E-09 4.0E-09 4.0E-09 3.9E-09 3.8E-09 3.8E-09 3.7E-09 3.7E-09 3.6E-09 3.6E-09 3.5E-09 3.5E-09
3.4E-09 3.4E-09 3.3E-09 3.3E-09 3.2E-09
H 8.3E-10 5.3E-10 5.2E-10 5.1E-10 5.1E-10 5.0E-10 4.9E-10 4.8E-10 4.8E-10 4.7E-10 4.6E-10 4.6E-10 4.5E-10 4.4E-10 4.4E-10
4.3E-10 4.2E-10 4.2E-10 4.1E-10 4.0E-10 4.0E-10 3.9E-10 3.9E-10 3.8E-10 3.8E-10 3.7E-10 3.6E-10 3.6E-10 3.5E-10 3.5E-10
3.4E-10 3.4E-10 3.3E-10 3.3E-10 3.2E-10 3.2E-10 3.1E-10 3.1E-10 3.1E-10 3.0E-10 3.0E-10 2.9E-10 2.9E-10 2.8E-10 2.8E-10
2.8E-10 2.7E-10 2.7E-10 2.6E-10 2.6E-10

DOSINC.DAT

H 0.2E-11 4.3E-11 4.2E-11 4.1E-11 4.1E-11 4.0E-11 4.0E-11 3.9E-11 3.8E-11 3.8E-11 3.7E-11 3.7E-11 3.6E-11 3.6E-11 3.6E-11
 3.6E-11 3.4E-11 3.4E-11 3.3E-11 3.3E-11 3.2E-11 3.2E-11 3.1E-11 3.1E-11 3.0E-11 3.0E-11 2.9E-11 2.9E-11 2.9E-11 2.8E-11
 2.8E-11 2.7E-11 2.7E-11 2.7E-11 2.6E-11 2.6E-11 2.6E-11 2.6E-11 2.6E-11 2.4E-11 2.4E-11 2.4E-11 2.3E-11 2.3E-11 2.3E-11
 2.2E-11 2.2E-11 2.2E-11 2.1E-11 2.1E-11
 H 1.3E-10
 H 4.1E-11
 H 2.4E-11
 H 4.6E-10 3.6E-10 3.4E-10 3.3E-10 3.2E-10 3.2E-10 3.1E-10 3.0E-10 2.9E-10 2.9E-10 2.8E-10 2.7E-10 2.7E-10 2.6E-10 2.5E-10
 2.5E-10 2.4E-10 2.3E-10 2.3E-10 2.2E-10 2.2E-10 2.1E-10 2.1E-10 2.0E-10 2.0E-10 1.9E-10 1.9E-10 1.8E-10 1.8E-10 1.7E-10
 1.7E-10 1.7E-10 1.6E-10 1.6E-10 1.6E-10 1.6E-10 1.5E-10 1.5E-10 1.4E-10 1.4E-10 1.4E-10 1.3E-10 1.3E-10 1.3E-10 1.2E-10
 1.2E-10 1.1E-10 1.1E-10 1.1E-10 1.1E-10
 ! U 232 Class: Y F1: 0.00200 02/26/88 17:19:00.2 Acute Sv/Bq
 12 1 3 4 6 6 7 8 11 12 13 14 16
 1 1 1 1 1 50 50 1 1 1 1 31
 Q 8.3E-11
 Q 1.3E-09
 Q 3.3E-09
 Q 1.8E-08
 Q 6.6E-08
 Q 7.2E-09 8.5E-09 1.1E-08 1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.0E-08 9.9E-09 9.4E-09 8.8E-09 8.3E-09 7.9E-09
 7.4E-09 7.0E-09 6.8E-09 6.2E-09 5.8E-09 5.6E-09 5.1E-09 4.8E-09 4.8E-09 4.3E-09 4.0E-09 3.8E-09 3.6E-09 3.3E-09 3.2E-09
 3.0E-09 2.8E-09 2.6E-09 2.6E-09 2.3E-09 2.2E-09 2.1E-09 1.9E-09 1.8E-09 1.7E-09 1.6E-09 1.5E-09 1.4E-09 1.3E-09 1.3E-09
 1.2E-09 1.1E-09 1.0E-09 9.8E-10 9.2E-10
 G 6.2E-10 5.5E-10 6.8E-10 7.5E-10 7.7E-10 7.7E-10 7.5E-10 7.3E-10 6.9E-10 6.8E-10 6.3E-10 5.9E-10 5.6E-10 5.3E-10 5.0E-10
 4.7E-10 4.4E-10 4.1E-10 3.9E-10 3.6E-10 3.4E-10 3.2E-10 3.0E-10 2.9E-10 2.7E-10 2.5E-10 2.4E-10 2.2E-10 2.1E-10 2.0E-10
 1.9E-10 1.7E-10 1.6E-10 1.5E-10 1.4E-10 1.4E-10 1.3E-10 1.2E-10 1.1E-10 1.1E-10 1.0E-10 9.4E-11 8.9E-11 8.3E-11 7.8E-11
 7.4E-11 6.9E-11 6.5E-11 6.1E-11 5.8E-11
 G 8.2E-11
 G 6.8E-11
 G 8.1E-11
 G 8.2E-11
 G 1.4E-08 4.9E-09 5.4E-09 5.3E-09 4.8E-09 4.3E-09 3.8E-09 3.2E-09 2.7E-09 2.3E-09 2.0E-09 1.7E-09 1.4E-09 1.2E-09 9.8E-10
 8.2E-10 8.0E-10 6.7E-10 4.8E-10 4.0E-10 3.3E-10 2.8E-10 2.3E-10 2.0E-10 1.6E-10 1.4E-10 1.1E-10 9.6E-11 8.8E-11 8.7E-11
 6.6E-11
 50 1 1 1 1 28 1 1 1 1 10
 H 1.2E-04 1.6E-04 1.4E-04 1.2E-04 9.9E-05 7.9E-05 6.3E-05 6.1E-05 4.2E-05 3.5E-05 2.9E-05 2.5E-05 2.2E-05 2.0E-05 1.8E-05
 1.6E-05 1.5E-05 1.4E-05 1.4E-05 1.3E-05 1.2E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.0E-05
 1.0E-05 1.0E-05 1.0E-05 9.9E-06 9.8E-06 9.7E-06 9.6E-06 9.5E-06 9.4E-06 9.3E-06 9.2E-06 9.1E-06 9.0E-06 8.9E-06 8.8E-06
 8.7E-06 8.6E-06 8.5E-06 8.4E-06 8.3E-06
 H 2.1E-09
 H 2.5E-09
 H 1.0E-08
 H 3.0E-08
 H 3.7E-08 8.0E-08 1.4E-07 1.8E-07 2.2E-07 2.6E-07 2.6E-07 2.7E-07 2.7E-07 2.7E-07 2.7E-07 2.6E-07 2.5E-07 2.4E-07 2.3E-07
 2.2E-07 2.1E-07 2.0E-07 1.9E-07 1.8E-07 1.7E-07 1.6E-07 1.6E-07 1.4E-07 1.3E-07 1.2E-07
 H 3.4E-09
 H 6.4E-10
 H 7.1E-10
 H 1.2E-09
 H 1.1E-09
 H 9.9E-08 1.5E-07 1.9E-07 2.1E-07 2.2E-07 2.1E-07 1.9E-07 1.8E-07 1.6E-07 1.4E-07

DOSINC.DAT

I TH232 Class: Y F1: 0.00020 02/26/88 19:09:58.4 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 4 4 4 4 4 50 50 4 4 4 4 13
 G 1.9E-10 1.7E-10 1.5E-10 1.4E-10
 G 1.1E-09 1.7E-10 1.5E-10 1.4E-10
 G 2.5E-09 1.7E-10 1.5E-10 1.4E-10
 G 1.4E-08 1.7E-10 1.5E-10 1.4E-10
 Q 4.2E-08 1.7E-10 1.5E-10 1.4E-10
 Q 1.2E-07 1.5E-07 1.9E-07 2.4E-07 2.9E-07 3.3E-07 3.8E-07 4.1E-07 4.4E-07 4.8E-07 4.8E-07 5.0E-07 5.1E-07 5.1E-07 5.2E-07
 5.2E-07 5.2E-07 5.1E-07 5.1E-07 5.0E-07 4.9E-07 4.9E-07 4.8E-07 4.7E-07 4.6E-07 4.5E-07 4.4E-07 4.2E-07 4.1E-07 4.0E-07
 3.9E-07 3.8E-07 3.7E-07 3.6E-07 3.5E-07 3.4E-07 3.3E-07 3.2E-07 3.1E-07 3.0E-07 2.9E-07 2.9E-07 2.8E-07 2.7E-07 2.6E-07
 2.5E-07 2.5E-07 2.4E-07 2.3E-07 2.2E-07
 G 1.0E-08 1.2E-08 1.5E-08 1.9E-08 2.3E-08 2.7E-08 3.0E-08 3.3E-08 3.5E-08 3.7E-08 3.9E-08 4.0E-08 4.1E-08 4.1E-08 4.2E-08
 4.2E-08 4.2E-08 4.1E-08 4.1E-08 4.0E-08 4.0E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.6E-08 3.5E-08 3.4E-08 3.3E-08 3.2E-08
 3.2E-08 3.1E-08 3.0E-08 2.9E-08 2.8E-08 2.7E-08 2.6E-08 2.5E-08 2.4E-08 2.4E-08 2.3E-08 2.2E-08 2.2E-08 2.1E-08
 2.0E-08 2.0E-08 1.9E-08 1.9E-08 1.8E-08
 G 1.9E-10 1.7E-10 1.5E-10 1.4E-10
 G 2.0E-10 1.7E-10 1.5E-10 1.4E-10
 G 1.9E-10 1.7E-10 1.5E-10 1.4E-10
 G 1.9E-10 1.7E-10 1.5E-10 1.4E-10
 Q 1.0E-09 1.4E-09 1.3E-09 1.2E-09 1.0E-09 8.5E-10 8.9E-10 5.4E-10 4.2E-10 3.2E-10 2.4E-10 1.8E-10 1.3E-10
 50 1 1 1 1 50 50 1 1 1 1 21
 H 5.1E-05 4.4E-05 4.2E-05 4.0E-05 3.7E-05 3.3E-05 3.0E-05 2.7E-05 2.4E-05 2.2E-05 2.0E-05 1.8E-05 1.7E-05 1.6E-05 1.5E-05
 1.4E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05
 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05
 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05
 H 7.7E-09
 H 8.2E-09
 H 1.4E-08
 H 2.8E-08
 H 4.3E-08 1.0E-05 1.9E-05 3.1E-05 4.4E-05 5.9E-05 7.3E-05 8.8E-05 9.8E-05 1.1E-04 1.2E-04 1.2E-04 1.3E-04 1.3E-04 1.3E-04
 1.4E-04 1.4E-04 1.4E-04 1.4E-04 1.4E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.1E-04 1.1E-04
 1.1E-04 1.0E-04 1.0E-04 9.9E-05 9.8E-05 9.3E-05 9.1E-05 8.8E-05 8.5E-05 8.3E-05 8.0E-05 7.8E-05 7.6E-05 7.3E-05 7.1E-05
 6.9E-05 6.7E-05 6.5E-05 6.3E-05 6.1E-05
 H 3.5E-07 8.2E-07 1.5E-06 2.5E-06 3.6E-06 4.8E-06 5.9E-06 6.9E-06 7.9E-06 8.7E-06 9.4E-06 9.9E-06 1.0E-05 1.1E-05 1.1E-05
 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.0E-05 1.0E-05 1.0E-05 9.8E-06 9.6E-06 9.3E-06 9.1E-06 8.9E-06
 8.8E-06 8.4E-06 8.2E-06 8.0E-06 7.7E-06 7.5E-06 7.3E-06 7.1E-06 6.9E-06 6.7E-06 6.5E-06 6.3E-06 6.1E-06 5.9E-06 5.7E-06
 5.5E-06 5.4E-06 5.2E-06 5.1E-06 4.9E-06
 H 7.1E-09
 H 7.1E-09
 H 7.2E-09
 H 7.2E-09
 H 5.8E-08 1.1E-07 1.9E-07 2.8E-07 3.2E-07 3.8E-07 3.9E-07 3.9E-07 3.7E-07 3.4E-07 3.1E-07 2.8E-07 2.4E-07 2.0E-07 1.7E-07
 1.4E-07 1.2E-07 9.8E-08 8.0E-08 6.5E-08 5.2E-08
 I RA228 Class: W F1: 0.20000 02/26/88 20:33:33.1 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 50 32 1 1 1 1
 G 1.4E-10
 G 2.8E-10
 G 1.1E-09
 G 5.8E-09

DOSINC.DAT

5.1011

9/30/88

G 2.1E-08
 G 2.5E-07 5.0E-07 5.0E-07 5.5E-07 5.1E-07 4.5E-07 3.9E-07 3.3E-07 2.0E-07 2.4E-07 2.0E-07 1.7E-07 1.4E-07 1.2E-07 1.0E-07
 0.5E-08 7.2E-08 0.0E-08 5.1E-08 4.3E-08 3.0E-08 3.1E-08 2.0E-08 2.2E-08 1.9E-08 1.0E-08 1.4E-08 1.2E-08 9.0E-09 0.3E-09
 7.1E-09 0.0E-09 5.1E-09 4.4E-09 3.7E-09 3.2E-09 2.7E-09 2.3E-09 2.0E-09 1.7E-09 1.4E-09 1.2E-09 1.1E-09 9.0E-10 7.7E-10
 0.8E-10 5.7E-10 4.9E-10 4.2E-10 3.0E-10
 G 2.7E-08 5.7E-08 0.5E-08 0.3E-08 5.0E-08 4.0E-08 4.0E-08 3.3E-08 2.7E-08 2.2E-08 1.0E-08 1.5E-08 1.2E-08 9.7E-09 7.9E-09
 0.4E-09 5.2E-09 4.3E-09 3.5E-09 2.9E-09 2.4E-09 1.9E-09 1.0E-09 1.3E-09 1.1E-09 0.9E-10 7.3E-10 0.0E-10 5.0E-10 4.1E-10
 3.4E-10 2.0E-10
 G 1.7E-10
 G 0.1E-10
 G 2.2E-10
 G 1.1E-10
 2 1 1 1 1 32 16 1 1 1 1
 H 0.4E-08 2.9E-07
 H 1.0E-09
 H 1.0E-09
 H 4.7E-09
 H 1.3E-08
 H 2.0E-07 5.4E-07 0.1E-07 5.9E-07 5.4E-07 4.0E-07 4.2E-07 3.0E-07 3.0E-07 2.0E-07 2.2E-07 1.0E-07 1.5E-07 1.3E-07 1.1E-07
 9.1E-08 7.7E-08 0.5E-08 5.5E-08 4.0E-08 3.9E-08 3.3E-08 2.0E-08 2.4E-08 2.0E-08 1.7E-08 1.4E-08 1.2E-08 1.0E-08 0.9E-09
 7.0E-09 0.5E-09
 H 2.9E-08 0.2E-08 7.0E-08 0.0E-08 0.1E-08 5.2E-08 4.3E-08 3.0E-08 2.9E-08 2.4E-08 1.9E-08 1.0E-08 1.3E-08 1.0E-08 0.5E-09
 0.9E-09
 H 5.5E-10
 H 9.9E-10
 H 1.3E-09
 H 1.1E-09
 ! AC228 Class: Y F1: 0.00100 02/20/88 21:48:41.8 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 17 10 4 1 1 1 13
 G 7.4E-12
 G 0.1E-10
 G 1.1E-09
 G 2.4E-09
 G 1.9E-09
 G 9.2E-10 0.4E-10 4.4E-10 3.1E-10 2.1E-10 1.6E-10 1.0E-10 7.0E-11 4.0E-11 3.3E-11 2.3E-11 1.0E-11 1.1E-11 7.0E-12 5.2E-12
 3.0E-12 2.5E-12
 G 1.1E-10 5.2E-11 3.0E-11 2.5E-11 1.7E-11 1.2E-11 0.2E-12 5.0E-12 3.9E-12 2.7E-12
 G 2.1E-11 7.0E-12 4.0E-12 3.4E-12
 G 1.5E-10
 G 2.3E-11
 G 9.7E-13
 G 2.0E-10 1.7E-10 1.2E-10 0.1E-11 5.5E-11 3.0E-11 2.0E-11 1.0E-11 1.2E-11 0.3E-12 5.7E-12 3.9E-12 2.0E-12
 12 1 1 1 1 17 9 1 1 1 1 13
 H 1.2E-07 5.9E-08 2.9E-08 1.5E-08 7.7E-09 4.1E-09 2.2E-09 1.2E-09 0.0E-10 3.9E-10 2.3E-10 1.4E-10
 H 1.1E-10
 H 1.9E-10
 H 4.1E-10
 H 3.4E-10
 H 0.5E-09 0.0E-09 0.7E-09 7.7E-09 0.3E-09 4.0E-09 3.7E-09 2.0E-09 2.0E-09 1.4E-09 1.0E-09 7.3E-10 5.1E-10 3.0E-10 2.5E-10
 1.7E-10 1.2E-10

DOSINC.DAT

H 5.4E-10 7.0E-10 7.0E-10 6.2E-10 5.1E-10 4.0E-10 3.0E-10 2.2E-10 1.8E-10
 H 7.9E-11
 H 2.6E-11
 H 1.1E-11
 H 6.6E-12
 H 1.0E-09 2.3E-09 2.3E-09 2.0E-09 1.7E-09 1.3E-09 9.8E-10 7.2E-10 5.2E-10 3.7E-10 2.6E-10 1.8E-10 1.3E-10
 ! TH226 Class: Y F1: 0.00028 02/28/88 22:30:31.3 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 18 12 1 1 1 1 4
 Q 1.2E-09
 Q 2.6E-09
 Q 5.0E-09
 Q 3.0E-08
 Q 1.3E-07
 Q 7.7E-07 5.3E-07 3.6E-07 2.4E-07 1.6E-07 1.1E-07 7.3E-08 5.0E-08 3.3E-08 2.3E-08 1.6E-08 1.0E-08 6.9E-09 4.7E-09 3.1E-09
 2.1E-09 1.4E-09 9.6E-10
 Q 6.3E-08 4.3E-08 2.9E-08 1.9E-08 1.3E-08 8.8E-09 5.9E-09 4.0E-09 2.7E-09 1.8E-09 1.2E-09 8.2E-10
 G 1.2E-09
 G 1.5E-09
 Q 1.2E-09
 G 1.2E-09
 Q 1.0E-08 5.1E-09 2.5E-09 1.2E-09
 12 1 1 1 1 17 10 1 1 1 1 3
 H 3.3E-04 1.6E-04 8.1E-05 4.1E-05 2.1E-05 1.1E-05 6.0E-06 3.3E-06 1.9E-06 1.1E-06 6.3E-07 3.8E-07
 H 4.8E-08
 H 4.8E-08
 H 6.6E-08
 H 1.3E-07
 H 2.6E-05 3.5E-05 3.5E-05 3.0E-05 2.5E-05 1.9E-05 1.4E-05 1.0E-05 7.4E-06 5.2E-06 3.6E-06 2.5E-06 1.7E-06 1.2E-06 8.2E-07
 5.8E-07 3.8E-07
 H 2.1E-06 2.8E-06 2.8E-06 2.5E-06 2.0E-06 1.5E-06 1.2E-06 8.4E-07 6.0E-07 4.2E-07
 H 4.3E-08
 H 4.4E-08
 H 4.8E-08
 H 4.5E-08
 H 3.8E-07 4.0E-07 3.5E-07
 ! RA224 Class: W F1: 0.20000 02/28/88 23:06:51.4 Acute Sv/Bq
 11 1 3 4 5 6 7 8 11 12 13 14
 1 1 1 1 1 1 1 1 1 1 1
 Q 8.7E-09
 G 1.3E-08
 Q 1.8E-08
 G 6.9E-08
 Q 1.9E-07
 Q 3.2E-07
 Q 2.7E-06
 G 8.7E-09
 G 9.5E-09
 G 8.8E-09
 Q 8.8E-09
 1 1 1 1 1 1 1 1 1 1 1

DOSINC.DAT

H 6.2E-06
H 8.4E-09
H 1.1E-08
H 3.8E-08
H 7.2E-08
H 2.3E-07
H 1.9E-08
H 6.4E-09
H 6.8E-09
H 6.4E-09
H 6.4E-09

I PB212 Class: D F1: 0.26000 02/26/88 23:30:02.0 Acute Sv/Bq

13 1 3 4 5 6 7 8 11 12 13 14 17 18
1 1 1 1 1 1 1 1 1 1 1 1

G 1.6E-09
G 2.9E-09
G 5.8E-09
G 1.7E-08
G 2.8E-08
G 1.8E-07
G 1.7E-08
G 1.7E-09
G 2.8E-09
G 1.7E-09
G 1.8E-09
G 2.5E-08
G 1.3E-08

1 1 1 1 1 1 1 1 1 1 1 1

H 1.8E-07
H 3.6E-09
H 4.8E-09
H 5.5E-09
H 6.8E-09
H 3.9E-07
H 3.5E-08
H 3.4E-09
H 3.4E-09
H 3.4E-09
H 3.4E-09
H 5.2E-08
H 2.8E-08

I BI212 Class: W F1: 0.05000 02/26/88 23:43:11.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 16
1 1 1 1 1 1 1 1 1 1 1

G 1.1E-11
G 1.6E-09
G 1.1E-09
G 7.1E-10
G 1.4E-10
G 3.9E-11
G 1.8E-11

DOSINC.DAT

5.1014

9/30/88

G 8.0E-12
 G 2.9E-11
 G 1.3E-11
 G 7.7E-12
 G 1.2E-09
 1 1 1 1 1 1 1 1 1 1
 H 3.0E-08
 H 1.1E-10
 H 9.4E-11
 H 8.0E-11
 H 6.0E-11
 H 2.4E-10
 H 6.7E-11
 H 4.9E-11
 H 5.0E-11
 H 5.0E-11
 H 5.0E-11
 H 7.8E-09
 ! PU238 Class: Y F1: 0.00010 02/26/88 23:48:37.2 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 27 17 9 1 1 1 26
 G 8.0E-13
 G 1.3E-09
 G 3.5E-09
 G 1.9E-08
 G 5.9E-08
 G 4.8E-08 3.7E-08 2.9E-08 2.2E-08 1.7E-08 1.3E-08 1.0E-08 8.0E-09 6.2E-09 4.8E-09 3.7E-09 2.8E-09 2.2E-09 1.7E-09 1.3E-09
 1.0E-09 7.9E-10 6.1E-10 4.7E-10 3.8E-10 2.8E-10 2.2E-10 1.7E-10 1.3E-10 1.0E-10 7.8E-11 6.0E-11
 Q 3.8E-09 2.9E-09 2.3E-09 1.8E-09 1.4E-09 1.1E-09 8.2E-10 6.3E-10 4.9E-10 3.8E-10 2.9E-10 2.3E-10 1.7E-10 1.3E-10 1.0E-10
 0.1E-11 6.2E-11
 G 5.2E-10 4.0E-10 3.1E-10 2.4E-10 1.9E-10 1.5E-10 1.2E-10 9.0E-11 7.0E-11
 G 4.4E-12
 G 9.7E-13
 G 8.5E-13
 G 1.3E-08 9.8E-09 7.4E-09 5.8E-09 4.3E-09 3.2E-09 2.4E-09 1.8E-09 1.4E-09 1.1E-09 8.0E-10 6.1E-10 4.6E-10 3.5E-10 2.8E-10
 2.0E-10 1.5E-10 1.1E-10 8.7E-11 6.8E-11
 10 1 1 1 1 24 14 1 1 1 1 17
 H 6.4E-05 3.5E-05 2.0E-05 1.1E-05 6.5E-06 3.9E-06 2.3E-06 1.5E-06 9.3E-07 6.0E-07 4.0E-07 2.7E-07 1.9E-07 1.3E-07 9.3E-08
 6.8E-08
 H 7.3E-10
 H 1.8E-09
 H 9.7E-09
 H 2.9E-08
 H 3.2E-06 4.9E-06 5.5E-06 5.5E-06 5.1E-06 4.5E-06 3.8E-06 3.2E-06 2.6E-06 2.1E-06 1.7E-06 1.3E-06 1.0E-06 8.1E-07 6.4E-07
 5.0E-07 3.9E-07 3.0E-07 2.3E-07 1.8E-07 1.4E-07 1.1E-07 8.4E-08 6.5E-08
 H 2.6E-07 3.9E-07 4.4E-07 4.4E-07 4.0E-07 3.5E-07 3.0E-07 2.5E-07 2.0E-07 1.6E-07 1.3E-07 1.0E-07 8.2E-08 6.4E-08
 H 3.5E-08
 H 8.3E-11
 H 8.9E-11
 H 8.0E-11
 H 8.7E-07 1.3E-06 1.5E-06 1.4E-06 1.3E-06 1.1E-06 9.5E-07 7.8E-07 6.3E-07 5.0E-07 3.9E-07 3.0E-07 2.4E-07 1.8E-07 1.4E-07

DOSINC.DAT

1.1E-07 6.2E-08
! PU237 Class: Y F1: 0.00010 02/26/88 23:56:29.3 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 1 1 1 1 1 1 1

G 7.7E-13

G 3.8E-11

G 1.2E-10

G 3.9E-10

G 1.0E-09

G 9.0E-12

G 2.4E-11

G 4.4E-12

G 7.2E-11

G 7.0E-12

G 3.8E-14

G 5.7E-12

2 1 1 1 1 1 1 1 1 1 1

H 3.4E-09 9.2E-12

H 0.0E-11

H 0.1E-11

H 1.9E-10

H 4.0E-10

H 1.3E-10

H 7.1E-11

H 3.5E-12

H 3.5E-11

H 3.0E-11

H 2.1E-11

H 9.8E-11

! AM242M Class: W F1: 0.00100 02/27/88 00:07:02.9 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17

1 1 1 1 1 50 50 50 1 1 1 50

G 7.5E-13

G 8.9E-11

G 2.8E-10

G 2.4E-09

G 9.7E-09

G 2.3E-07 4.2E-07 4.5E-07 4.5E-07 4.5E-07 4.4E-07 4.4E-07 4.3E-07 4.3E-07 4.2E-07 4.2E-07 4.1E-07 4.1E-07 4.0E-07 4.0E-07

3.9E-07 3.9E-07 3.8E-07 3.8E-07 3.8E-07 3.7E-07 3.7E-07 3.6E-07 3.6E-07 3.6E-07 3.6E-07 3.4E-07 3.4E-07 3.4E-07 3.3E-07

3.3E-07 3.2E-07 3.2E-07 3.1E-07 3.1E-07 3.1E-07 3.0E-07 3.0E-07 2.9E-07 2.9E-07 2.9E-07 2.8E-07 2.8E-07 2.7E-07 2.7E-07

2.7E-07 2.8E-07 2.6E-07 2.8E-07 2.6E-07

Q 1.9E-08 3.4E-08 3.7E-08 3.7E-08 3.7E-08 3.8E-08 3.8E-08 3.8E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.3E-08

3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.7E-08

2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08

2.2E-08 2.2E-08 2.1E-08 2.1E-08 2.1E-08

Q 2.5E-09 4.8E-09 5.0E-09 5.0E-09 5.0E-09 5.0E-09 5.0E-09 5.0E-09 5.0E-09 5.0E-09 4.9E-09 4.9E-09 4.9E-09 4.8E-09 4.8E-09

4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.7E-09 4.7E-09 4.6E-09 4.6E-09 4.6E-09 4.5E-09 4.5E-09 4.5E-09 4.4E-09 4.4E-09 4.4E-09

4.4E-09 4.4E-09 4.3E-09 4.3E-09 4.3E-09 4.3E-09 4.2E-09 4.2E-09 4.2E-09 4.1E-09 4.1E-09 4.1E-09 4.1E-09 4.0E-09 4.0E-09

4.0E-09 4.0E-09 3.9E-09 3.9E-09 3.9E-09

G 2.9E-11

G 2.1E-12

DOSINC.DAT

5.1016

9/30/88

G 1.0E-13
 Q 0.9E-08 1.1E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07 9.9E-08 9.0E-08 9.3E-08 9.0E-08 8.7E-08 8.4E-08 8.1E-08
 7.9E-08 7.0E-08 7.4E-08 7.1E-08 6.9E-08 6.7E-08 6.4E-08 6.2E-08 6.0E-08 5.0E-08 5.0E-08 5.4E-08 5.3E-08 5.1E-08 4.9E-08
 4.0E-08 4.0E-08 4.4E-08 4.3E-08 4.2E-08 4.0E-08 3.9E-08 3.0E-08 3.0E-08 3.5E-08 3.4E-08 3.3E-08 3.2E-08 3.1E-08 2.9E-08
 2.0E-08 2.0E-08 2.7E-08 2.6E-08 2.5E-08
 2 1 1 1 1 50 50 50 1 1 1 50
 H 3.7E-08 1.1E-07
 H 2.0E-10
 H 4.4E-10
 H 2.1E-09
 H 0.7E-09
 H 2.0E-05 4.0E-05 5.2E-05 5.3E-05 5.2E-05 5.2E-05 5.1E-05 5.1E-05 5.0E-05 4.9E-05 4.9E-05 4.0E-05 4.0E-05 4.7E-05 4.7E-05
 4.0E-05 4.5E-05 4.5E-05 4.4E-05 4.4E-05 4.3E-05 4.3E-05 4.2E-05 4.2E-05 4.1E-05 4.1E-05 4.0E-05 4.0E-05 3.9E-05 3.9E-05
 3.0E-05 3.0E-05 3.7E-05 3.7E-05 3.0E-05 3.0E-05 3.5E-05 3.5E-05 3.4E-05 3.4E-05 3.3E-05 3.3E-05 3.2E-05 3.2E-05 3.2E-05
 3.1E-05 3.1E-05 3.0E-05 3.0E-05 2.9E-05
 H 2.1E-08 4.0E-08 4.3E-08 4.3E-08 4.3E-08 4.2E-08 4.2E-08 4.1E-08 4.1E-08 4.0E-08 4.0E-08 3.9E-08 3.9E-08 3.9E-08 3.0E-08
 3.0E-08 3.7E-08 3.7E-08 3.0E-08 3.0E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.1E-08
 3.1E-08 3.1E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.6E-08
 2.5E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08
 H 2.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.7E-07 5.7E-07 5.7E-07 5.7E-07 5.0E-07 5.0E-07
 5.0E-07 5.5E-07 5.5E-07 5.5E-07 5.4E-07 5.4E-07 5.4E-07 5.4E-07 5.3E-07 5.3E-07 5.3E-07 5.2E-07 5.2E-07 5.2E-07 5.1E-07
 5.1E-07 5.1E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 4.9E-07 4.9E-07 4.9E-07 4.9E-07 4.8E-07 4.8E-07 4.8E-07 4.7E-07 4.7E-07
 4.0E-07 4.0E-07 4.0E-07 4.5E-07 4.5E-07
 H 1.3E-10
 H 1.0E-10
 H 1.2E-10
 H 7.0E-08 1.3E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.0E-05 1.0E-05 9.0E-06 9.5E-06
 9.2E-06 8.0E-06 8.0E-06 8.3E-06 8.0E-06 7.0E-06 7.5E-06 7.3E-06 7.0E-06 6.0E-06 6.0E-06 6.4E-06 6.2E-06 5.9E-06 5.7E-06
 5.0E-06 5.4E-06 5.2E-06 5.0E-06 4.9E-06 4.7E-06 4.5E-06 4.4E-06 4.2E-06 4.1E-06 4.0E-06 3.0E-06 3.7E-06 3.0E-06 3.4E-06
 3.3E-06 3.2E-06 3.1E-06 3.0E-06 2.9E-06
 ! AM242 Class: W FI: 0.00100 02/27/88 01:12:00.5 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 3 1 1 1 1 4
 G 1.0E-13
 Q 2.1E-10
 G 4.5E-10
 G 1.7E-09
 G 2.0E-09
 G 9.0E-10 2.1E-10 5.1E-11 1.7E-11 1.0E-11 0.5E-12 0.0E-12 7.7E-12 7.0E-12 7.4E-12 7.9E-12 7.1E-12 7.0E-12 6.0E-12 6.7E-12
 6.5E-12 6.4E-12 6.3E-12 6.1E-12 6.0E-12 5.9E-12 5.0E-12 5.0E-12 5.4E-12 5.3E-12 5.2E-12 5.1E-12 5.0E-12 4.9E-12
 4.0E-12 4.7E-12 4.0E-12 4.5E-12 4.4E-12 4.3E-12 4.2E-12 4.1E-12 4.0E-12 4.0E-12 3.9E-12 3.0E-12 3.7E-12 3.7E-12 3.0E-12
 3.5E-12 3.4E-12 3.4E-12 3.3E-12 3.2E-12
 G 0.3E-11 1.7E-11 4.2E-12
 Q 1.1E-11
 Q 1.0E-11
 Q 9.0E-13
 Q 2.0E-14
 G 2.7E-10 5.7E-11 1.3E-11 4.4E-12
 1 1 1 1 1 50 4 2 1 1 1 25
 H 4.7E-08
 H 5.0E-11

H 1.1E-10
 H 4.0E-10
 H 0.5E-10
 H 9.0E-08 2.5E-08 8.0E-09 2.0E-09 1.2E-09 9.0E-10 9.3E-10 9.0E-10 8.8E-10 8.8E-10 8.4E-10 8.2E-10 8.1E-10 7.9E-10 7.7E-10
 7.6E-10 7.4E-10 7.2E-10 7.1E-10 6.9E-10 6.8E-10 6.8E-10 6.5E-10 6.3E-10 6.2E-10 6.1E-10 5.9E-10 5.8E-10 5.7E-10 5.6E-10
 5.4E-10 5.3E-10 5.2E-10 5.1E-10 5.0E-10 4.9E-10 4.8E-10 4.7E-10 4.6E-10 4.5E-10 4.4E-10 4.3E-10 4.2E-10 4.1E-10 4.0E-10
 3.9E-10 3.8E-10 3.6E-10 3.7E-10 3.6E-10
 H 8.0E-09 2.0E-09 4.0E-10 1.0E-10
 H 1.1E-09 2.7E-10
 H 4.7E-12
 H 2.9E-12
 H 2.5E-12
 H 2.7E-08 8.0E-09 1.0E-09 5.1E-10 2.0E-10 2.4E-10 2.2E-10 2.1E-10 2.0E-10 1.9E-10 1.8E-10 1.8E-10 1.7E-10 1.6E-10 1.5E-10
 1.5E-10 1.4E-10 1.4E-10 1.3E-10 1.2E-10 1.2E-10 1.1E-10 1.1E-10 1.1E-10 1.1E-10 1.0E-10
 ! CM242 Class: W F1: 0.00100 02/27/88 01:53:55.9 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 4 2 1 1 1 22
 G 9.0E-12
 G 1.5E-09
 G 3.5E-09
 G 2.0E-08
 G 6.3E-08
 G 2.9E-07 8.2E-08 1.5E-08 5.1E-09 3.0E-09 2.5E-09 2.3E-09 2.3E-09 2.2E-09 2.2E-09 2.1E-09 2.1E-09 2.0E-09 2.0E-09 2.0E-09
 1.9E-09 1.9E-09 1.8E-09 1.8E-09 1.8E-09 1.7E-09 1.7E-09 1.6E-09 1.6E-09 1.6E-09 1.5E-09 1.5E-09 1.5E-09 1.4E-09 1.4E-09
 1.4E-09 1.3E-09 1.3E-09 1.3E-09 1.3E-09 1.2E-09 1.2E-09 1.2E-09 1.2E-09 1.1E-09 1.1E-09 1.1E-09 1.1E-09 1.0E-09 1.0E-09
 1.0E-09 9.7E-10 9.5E-10 9.3E-10 9.1E-10
 G 2.4E-08 5.1E-09 1.2E-09 4.1E-10
 G 3.2E-09 6.9E-10
 Q 1.2E-11
 Q 9.1E-12
 Q 9.0E-12
 G 7.9E-08 1.7E-08 3.9E-09 1.3E-09 7.3E-10 6.0E-10 5.5E-10 5.3E-10 5.0E-10 4.8E-10 4.6E-10 4.4E-10 4.2E-10 4.1E-10 3.9E-10
 3.7E-10 3.6E-10 3.4E-10 3.3E-10 3.1E-10 3.0E-10 2.9E-10
 1 1 1 1 1 50 4 2 1 1 1 25
 H 1.4E-05
 H 1.8E-09
 H 2.5E-09
 H 1.0E-08
 H 3.0E-08
 H 2.9E-06 7.3E-06 1.0E-06 5.9E-07 3.5E-07 2.9E-07 2.7E-07 2.7E-07 2.6E-07 2.5E-07 2.5E-07 2.4E-07 2.4E-07 2.3E-07 2.3E-07
 2.2E-07 2.2E-07 2.1E-07 2.1E-07 2.0E-07 2.0E-07 2.0E-07 1.9E-07 1.9E-07 1.8E-07 1.8E-07 1.7E-07 1.7E-07 1.6E-07
 1.6E-07 1.6E-07 1.5E-07 1.5E-07 1.5E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.3E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.2E-07
 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.1E-07 1.1E-07
 H 2.4E-08 5.9E-07 1.4E-07 4.0E-08
 H 3.1E-07 8.0E-08
 H 9.4E-10
 H 9.4E-10
 H 9.4E-10
 H 7.9E-08 1.9E-08 4.0E-07 1.5E-07 8.0E-08 7.0E-08 6.5E-08 6.1E-08 5.9E-08 5.6E-08 5.4E-08 5.2E-08 5.0E-08 4.7E-08 4.5E-08
 4.4E-08 4.2E-08 4.0E-08 3.8E-08 3.7E-08 3.5E-08 3.4E-08 3.2E-08 3.1E-08 3.0E-08
 ! PU242 Class: Y F1: 0.00010 02/27/88 02:27:57.3 Acute Sv/Bq

DOSINC.DAT

5.1018

9/30/88

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12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 50 50 50 1 1 1 50
Q 7.3E-13
Q 1.2E-09
Q 2.0E-09
Q 1.7E-08
Q 5.1E-08
Q 4.5E-08 4.5E-08 4.4E-08 4.3E-08 4.3E-08 4.2E-08 4.2E-08 4.1E-08 4.0E-08 4.0E-08 3.9E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08
3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08
3.0E-08 2.9E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.5E-08
2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08
Q 3.7E-09 3.7E-09 3.6E-09 3.6E-09 3.5E-09 3.6E-09 3.4E-09 3.4E-09 3.3E-09 3.3E-09 3.2E-09 3.2E-09 3.2E-09 3.1E-09 3.1E-09
3.0E-09 3.0E-09 2.9E-09 2.9E-09 2.9E-09 2.8E-09 2.8E-09 2.7E-09 2.7E-09 2.7E-09 2.6E-09 2.6E-09 2.6E-09 2.5E-09 2.5E-09
2.5E-09 2.4E-09 2.4E-09 2.4E-09 2.3E-09 2.3E-09 2.3E-09 2.3E-09 2.2E-09 2.2E-09 2.1E-09 2.1E-09 2.1E-09 2.1E-09 2.0E-09
2.0E-09 2.0E-09 1.9E-09 1.9E-09 1.9E-09
Q 4.9E-10 4.9E-10 4.9E-10 4.8E-10 4.8E-10 4.8E-10 4.7E-10 4.7E-10 4.7E-10 4.6E-10 4.6E-10 4.6E-10 4.5E-10 4.5E-10 4.5E-10
4.4E-10 4.4E-10 4.4E-10 4.4E-10 4.3E-10 4.3E-10 4.3E-10 4.2E-10 4.2E-10 4.2E-10 4.2E-10 4.1E-10 4.1E-10 4.1E-10 4.0E-10
4.0E-10 4.0E-10 4.0E-10 3.9E-10 3.9E-10 3.9E-10 3.8E-10 3.8E-10 3.8E-10 3.7E-10 3.7E-10 3.7E-10 3.6E-10
3.6E-10 3.6E-10 3.6E-10 3.5E-10 3.5E-10
Q 3.9E-12
Q 9.0E-13
Q 7.1E-13
G 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08 1.0E-08 9.6E-09 9.3E-09 9.0E-09 8.7E-09 8.4E-09 8.1E-09 7.8E-09 7.6E-09
7.3E-09 7.1E-09 6.8E-09 6.8E-09 6.4E-09 6.1E-09 5.9E-09 5.7E-09 5.5E-09 5.4E-09 5.2E-09 5.0E-09 4.8E-09 4.7E-09 4.5E-09
4.3E-09 4.2E-09 4.1E-09 3.9E-09 3.8E-09 3.7E-09 3.5E-09 3.4E-09 3.3E-09 3.2E-09 3.1E-09 3.0E-09 2.9E-09 2.8E-09 2.7E-09
2.6E-09 2.5E-09 2.4E-09 2.3E-09 2.3E-09
50 1 1 1 1 50 50 50 1 1 1 50
H 6.0E-05 4.2E-05 3.0E-05 2.2E-05 1.0E-05 1.2E-05 9.4E-06 7.5E-06 6.0E-06 5.0E-06 4.2E-06 3.7E-06 3.2E-06 2.9E-06 2.6E-06
2.4E-06 2.3E-06 2.2E-06 2.1E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
H 6.5E-10
H 1.4E-09
H 8.3E-09
H 2.5E-08
H 3.1E-06 5.9E-06 8.5E-06 1.1E-05 1.3E-05 1.4E-05 1.5E-05 1.6E-05 1.7E-05 1.7E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05
1.8E-05 1.8E-05 1.8E-05 1.7E-05 1.7E-05 1.7E-05 1.7E-05 1.7E-05 1.6E-05 1.6E-05 1.6E-05 1.6E-05 1.6E-05 1.5E-05 1.5E-05
1.5E-05 1.5E-05 1.5E-05 1.4E-05 1.4E-05 1.4E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.2E-05
1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05
H 2.5E-07 4.9E-07 7.0E-07 8.9E-07 1.0E-06 1.2E-06 1.3E-06 1.3E-06 1.4E-06 1.4E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06 1.5E-06
1.5E-06 1.5E-06 1.5E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.3E-06 1.3E-06 1.3E-06 1.3E-06 1.3E-06 1.3E-06
1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.1E-06 1.1E-06 1.1E-06 1.1E-06 1.1E-06 1.1E-06 1.0E-06 1.0E-06 1.0E-06
1.0E-06 9.9E-07 9.0E-07 9.7E-07 9.5E-07
H 3.4E-08 6.5E-08 9.4E-08 1.2E-07 1.4E-07 1.6E-07 1.7E-07 1.8E-07 1.9E-07 2.0E-07 2.0E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07
2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.0E-07 2.0E-07 2.0E-07 2.0E-07 2.0E-07 2.0E-07 2.0E-07
2.0E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07
1.8E-07 1.8E-07 1.7E-07 1.7E-07 1.7E-07
H 7.3E-11
H 8.2E-11
H 7.4E-11
H 8.4E-07 1.0E-06 2.3E-06 2.0E-06 3.3E-06 3.7E-06 3.9E-06 4.1E-06 4.2E-06 4.2E-06 4.2E-06 4.2E-06 4.1E-06 4.1E-06 4.0E-06

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DOSINC.DAT

3.9E-08 3.3E-08 3.7E-08 3.6E-08 3.6E-08 3.4E-08 3.3E-08 3.2E-08 3.1E-08 3.0E-08 2.9E-08 2.8E-08 2.7E-08 2.6E-08 2.5E-08
 2.4E-08 2.3E-08 2.3E-08 2.2E-08 2.1E-08 2.0E-08 2.0E-08 1.9E-08 1.8E-08 1.8E-08 1.7E-08 1.7E-08 1.6E-08 1.5E-08 1.5E-08
 1.4E-08 1.4E-08 1.3E-08 1.3E-08 1.3E-08
 I NP238 Class: W F1: 0.00100 02/27/88 02:48:26.1 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 1 1 1 1 1 1
 G 1.0E-11
 Q 4.3E-10
 G 1.1E-09
 Q 4.2E-09
 G 9.3E-09
 G 8.0E-11 5.0E-11 5.0E-11 5.5E-11 5.4E-11 5.3E-11 5.2E-11 5.2E-11 5.1E-11 5.0E-11 4.9E-11 4.9E-11 4.8E-11 4.7E-11 4.7E-11
 4.6E-11 4.5E-11 4.5E-11 4.4E-11 4.3E-11 4.3E-11 4.2E-11 4.1E-11 4.1E-11 4.0E-11 4.0E-11 3.9E-11 3.8E-11 3.8E-11 3.7E-11
 3.7E-11 3.6E-11 3.6E-11 3.5E-11 3.5E-11 3.4E-11 3.4E-11 3.3E-11 3.3E-11 3.2E-11 3.2E-11 3.1E-11 3.1E-11 3.0E-11 3.0E-11
 3.0E-11 2.9E-11 2.9E-11 2.8E-11 2.8E-11
 G 8.3E-11
 G 3.2E-11
 G 3.8E-10
 G 4.8E-11
 G 1.5E-12
 G 4.8E-11
 2 1 1 1 1 50 50 50 1 1 1 50
 H 3.3E-09 9.0E-12
 H 1.7E-10
 H 3.8E-10
 H 1.4E-09
 H 3.0E-09
 H 6.4E-09 6.6E-09 6.5E-09 6.4E-09 6.3E-09 6.2E-09 6.1E-09 6.0E-09 5.9E-09 5.8E-09 5.8E-09 5.8E-09 5.7E-09 5.6E-09 5.6E-09 5.4E-09
 5.3E-09 5.3E-09 5.2E-09 5.1E-09 5.0E-09 5.0E-09 4.9E-09 4.8E-09 4.7E-09 4.7E-09 4.6E-09 4.6E-09 4.5E-09 4.4E-09 4.3E-09
 4.3E-09 4.2E-09 4.2E-09 4.1E-09 4.0E-09 4.0E-09 3.9E-09 3.9E-09 3.8E-09 3.7E-09 3.7E-09 3.6E-09 3.6E-09 3.5E-09 3.5E-09
 3.4E-09 3.4E-09 3.3E-09 3.3E-09 3.2E-09
 H 6.3E-10 5.3E-10 5.2E-10 5.1E-10 5.1E-10 5.0E-10 4.9E-10 4.8E-10 4.8E-10 4.7E-10 4.6E-10 4.6E-10 4.5E-10 4.4E-10 4.4E-10
 4.3E-10 4.2E-10 4.2E-10 4.1E-10 4.1E-10 4.0E-10 3.9E-10 3.9E-10 3.8E-10 3.8E-10 3.7E-10 3.7E-10 3.6E-10 3.5E-10 3.5E-10
 3.4E-10 3.4E-10 3.3E-10 3.3E-10 3.2E-10 3.2E-10 3.1E-10 3.1E-10 3.1E-10 3.0E-10 3.0E-10 2.9E-10 2.9E-10 2.8E-10 2.8E-10
 2.8E-10 2.7E-10 2.7E-10 2.6E-10 2.6E-10
 H 8.2E-11 4.3E-11 4.2E-11 4.1E-11 4.1E-11 4.0E-11 4.0E-11 3.9E-11 3.9E-11 3.8E-11 3.7E-11 3.7E-11 3.6E-11 3.6E-11 3.5E-11
 3.5E-11 3.4E-11 3.4E-11 3.3E-11 3.3E-11 3.2E-11 3.2E-11 3.1E-11 3.1E-11 3.0E-11 3.0E-11 2.9E-11 2.9E-11 2.9E-11 2.8E-11
 2.8E-11 2.7E-11 2.7E-11 2.7E-11 2.6E-11 2.6E-11 2.6E-11 2.6E-11 2.4E-11 2.4E-11 2.4E-11 2.3E-11 2.3E-11 2.3E-11
 2.2E-11 2.2E-11 2.2E-11 2.1E-11 2.1E-11
 H 1.3E-10
 H 4.1E-11
 H 2.4E-11
 H 4.6E-10 3.5E-10 3.4E-10 3.3E-10 3.2E-10 3.2E-10 3.1E-10 3.0E-10 2.9E-10 2.9E-10 2.8E-10 2.7E-10 2.7E-10 2.6E-10 2.5E-10
 2.5E-10 2.4E-10 2.4E-10 2.3E-10 2.2E-10 2.2E-10 2.1E-10 2.1E-10 2.0E-10 2.0E-10 1.9E-10 1.9E-10 1.8E-10 1.8E-10 1.7E-10
 1.7E-10 1.7E-10 1.6E-10 1.6E-10 1.5E-10 1.5E-10 1.5E-10 1.4E-10 1.4E-10 1.4E-10 1.3E-10 1.3E-10 1.3E-10 1.2E-10 1.2E-10
 1.2E-10 1.1E-10 1.1E-10 1.1E-10 1.1E-10
 I CM244 Class: W F1: 0.00100 02/27/88 03:03:59.6 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 Q 8.6E-12
 Q 1.3E-09

DOSINC.DAT

5.1020

9/30/88

Q 3.5E-09
 Q 1.9E-08
 Q 5.9E-08
 Q 5.3E-07 5.1E-07 4.8E-07 4.6E-07 4.3E-07 4.1E-07 3.9E-07 3.7E-07 3.5E-07 3.3E-07 3.2E-07 3.0E-07 2.9E-07 2.7E-07 2.6E-07
 2.4E-07 2.3E-07 2.2E-07 2.1E-07 2.0E-07 1.9E-07 1.8E-07 1.7E-07 1.6E-07 1.5E-07 1.4E-07 1.3E-07 1.2E-07 1.2E-07
 1.1E-07 1.1E-07 1.0E-07 9.8E-08 9.1E-08 8.8E-08 8.2E-08 7.8E-08 7.4E-08 7.0E-08 6.7E-08 6.3E-08 6.0E-08 5.7E-08 5.4E-08
 5.2E-08 4.9E-08 4.6E-08 4.4E-08 4.2E-08
 Q 4.3E-08 4.1E-08 3.9E-08 3.7E-08 3.5E-08 3.3E-08 3.2E-08 3.0E-08 2.9E-08 2.7E-08 2.6E-08 2.4E-08 2.3E-08 2.2E-08 2.1E-08
 2.0E-08 1.9E-08 1.8E-08 1.7E-08 1.6E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.0E-08 9.8E-09
 9.1E-09 8.8E-09 8.2E-09 7.8E-09 7.4E-09 7.0E-09 6.7E-09 6.3E-09 6.0E-09 5.7E-09 5.4E-09 5.1E-09 4.9E-09 4.6E-09 4.4E-09
 4.2E-09 4.0E-09 3.8E-09 3.6E-09 3.4E-09
 Q 5.9E-09 5.8E-09 5.4E-09 5.1E-09 4.9E-09 4.7E-09 4.5E-09 4.3E-09 4.1E-09 3.9E-09 3.7E-09 3.6E-09 3.4E-09 3.3E-09 3.1E-09
 3.0E-09 2.9E-09 2.7E-09 2.6E-09 2.5E-09 2.4E-09 2.3E-09 2.2E-09 2.1E-09 2.0E-09 1.9E-09 1.8E-09 1.7E-09 1.7E-09 1.6E-09
 1.5E-09 1.5E-09 1.4E-09 1.3E-09 1.3E-09 1.2E-09 1.2E-09 1.1E-09 1.1E-09 1.0E-09 9.7E-10 9.3E-10 8.9E-10 8.5E-10 8.1E-10
 7.8E-10 7.4E-10 7.1E-10 6.8E-10 6.5E-10
 Q 1.2E-11
 Q 8.8E-12
 Q 8.5E-12
 G 1.4E-07 1.3E-07 1.2E-07 1.1E-07 1.1E-07 9.9E-08 9.2E-08 8.8E-08 8.0E-08 7.4E-08 6.9E-08 6.4E-08 6.0E-08 5.5E-08 5.1E-08
 4.8E-08 4.5E-08 4.1E-08 3.8E-08 3.6E-08 3.3E-08 3.1E-08 2.9E-08 2.7E-08 2.5E-08 2.3E-08 2.2E-08 2.0E-08 1.9E-08 1.7E-08
 1.6E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.1E-08 1.0E-08 9.7E-09 9.0E-09 8.4E-09 7.0E-09 7.2E-09 6.7E-09 6.3E-09 5.8E-09
 5.4E-09 5.0E-09 4.7E-09 4.4E-09 4.1E-09
 2 1 1 1 1 50 50 50 1 1 1 50
 H 1.8E-05 1.5E-07
 H 1.8E-09
 H 2.7E-09
 H 1.0E-08
 H 3.0E-08
 H 5.8E-05 5.9E-05 5.0E-05 5.3E-05 5.0E-05 4.8E-05 4.5E-05 4.3E-05 4.1E-05 3.9E-05 3.7E-05 3.5E-05 3.3E-05 3.2E-05 3.0E-05
 2.8E-05 2.7E-05 2.6E-05 2.4E-05 2.3E-05 2.2E-05 2.1E-05 2.0E-05 1.9E-05 1.8E-05 1.7E-05 1.6E-05 1.5E-05 1.4E-05 1.4E-05
 1.3E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.0E-05 9.8E-06 9.1E-06 8.8E-06 8.2E-06 7.8E-06 7.4E-06 7.0E-06 6.7E-06 6.3E-06
 6.0E-06 5.7E-06 5.4E-06 5.1E-06 4.9E-06
 H 4.5E-06 4.0E-06 4.5E-06 4.3E-06 4.1E-06 3.9E-06 3.7E-06 3.5E-06 3.3E-06 3.2E-06 3.0E-06 2.8E-06 2.7E-06 2.6E-06 2.4E-06
 2.3E-06 2.2E-06 2.1E-06 2.0E-06 1.9E-06 1.8E-06 1.7E-06 1.6E-06 1.4E-06 1.4E-06 1.3E-06 1.2E-06 1.2E-06 1.1E-06
 1.1E-06 1.0E-06 9.8E-07 9.1E-07 8.8E-07 8.2E-07 7.8E-07 7.4E-07 7.0E-07 6.6E-07 6.3E-07 6.0E-07 5.7E-07 5.4E-07 5.1E-07
 4.9E-07 4.8E-07 4.4E-07 4.2E-07 4.0E-07
 H 8.2E-07 6.5E-07 6.3E-07 6.0E-07 5.7E-07 5.5E-07 5.2E-07 5.0E-07 4.8E-07 4.6E-07 4.4E-07 4.2E-07 4.0E-07 3.8E-07 3.6E-07
 3.5E-07 3.3E-07 3.2E-07 3.0E-07 2.9E-07 2.8E-07 2.7E-07 2.5E-07 2.4E-07 2.3E-07 2.2E-07 2.1E-07 2.0E-07 1.9E-07 1.9E-07
 1.8E-07 1.7E-07 1.6E-07 1.6E-07 1.5E-07 1.4E-07 1.4E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.0E-07 9.9E-08 9.5E-08
 9.1E-08 8.7E-08 8.3E-08 7.9E-08 7.5E-08
 H 1.0E-09
 H 1.0E-09
 H 9.9E-10
 H 1.5E-05 1.5E-05 1.4E-05 1.3E-05 1.2E-05 1.2E-05 1.1E-05 1.0E-05 9.3E-06 8.8E-06 8.0E-06 7.5E-06 7.0E-06 6.5E-06 6.0E-06
 5.8E-06 5.2E-06 4.8E-06 4.5E-06 4.2E-06 3.9E-06 3.8E-06 3.4E-06 3.1E-06 2.9E-06 2.7E-06 2.5E-06 2.3E-06 2.2E-06 2.0E-06
 1.9E-06 1.7E-06 1.6E-06 1.5E-06 1.4E-06 1.3E-06 1.2E-06 1.1E-06 1.1E-06 9.8E-07 9.1E-07 8.5E-07 7.9E-07 7.3E-07 6.8E-07
 6.3E-07 5.9E-07 5.5E-07 5.1E-07 4.7E-07
 ! PU244 Class: Y F1: 0.00010 02/27/88 03:38:04.0 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 Q 7.8E-12

G 1.3E-09
 Q 3.8E-09
 G 2.4E-08
 Q 8.4E-08
 Q 4.5E-08 4.5E-08 4.4E-08 4.3E-08 4.3E-08 4.2E-08 4.2E-08 4.1E-08 4.1E-08 4.0E-08 3.9E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08
 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08
 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.5E-08
 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08
 G 3.7E-09 3.8E-09 3.5E-09 3.5E-09 3.5E-09 3.4E-09 3.4E-09 3.3E-09 3.3E-09 3.2E-09 3.2E-09 3.1E-09 3.1E-09 3.1E-09 3.0E-09
 3.0E-09 2.9E-09 2.9E-09 2.8E-09 2.8E-09 2.8E-09 2.7E-09 2.7E-09 2.7E-09 2.6E-09 2.6E-09 2.6E-09 2.5E-09 2.5E-09 2.4E-09
 2.4E-09 2.4E-09 2.3E-09 2.3E-09 2.3E-09 2.3E-09 2.2E-09 2.2E-09 2.2E-09 2.1E-09 2.1E-09 2.1E-09 2.0E-09 2.0E-09 2.0E-09
 2.0E-09 1.9E-09 1.9E-09 1.9E-09 1.9E-09
 Q 5.7E-10 4.9E-10 4.9E-10 4.9E-10 4.8E-10 4.8E-10 4.8E-10 4.7E-10 4.7E-10 4.7E-10 4.6E-10 4.6E-10 4.6E-10 4.5E-10
 4.5E-10 4.5E-10 4.4E-10 4.4E-10 4.4E-10 4.3E-10 4.3E-10 4.3E-10 4.3E-10 4.2E-10 4.2E-10 4.2E-10 4.1E-10 4.1E-10 4.1E-10
 4.1E-10 4.0E-10 4.0E-10 4.0E-10 4.0E-10 3.9E-10 3.9E-10 3.9E-10 3.8E-10 3.8E-10 3.8E-10 3.8E-10 3.7E-10 3.7E-10 3.7E-10
 3.7E-10 3.6E-10 3.6E-10 3.6E-10 3.6E-10
 Q 4.8E-10
 G 5.2E-11
 Q 1.8E-12
 Q 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08 9.9E-09 9.8E-09 9.2E-09 8.9E-09 8.8E-09 8.3E-09 8.0E-09 7.8E-09 7.5E-09
 7.3E-09 7.0E-09 6.8E-09 6.5E-09 6.3E-09 6.1E-09 5.9E-09 5.7E-09 5.5E-09 5.3E-09 5.1E-09 5.0E-09 4.8E-09 4.6E-09 4.5E-09
 4.3E-09 4.2E-09 4.0E-09 3.9E-09 3.8E-09 3.6E-09 3.5E-09 3.4E-09 3.3E-09 3.2E-09 3.1E-09 3.0E-09 2.9E-09 2.8E-09 2.7E-09
 2.6E-09 2.5E-09 2.4E-09 2.3E-09 2.2E-09
 50 1 1 1 1 50 50 50 1 1 1 50
 H 5.9E-05 4.1E-05 2.9E-05 2.1E-05 1.8E-05 1.2E-05 9.2E-06 7.3E-06 5.9E-06 4.9E-06 4.1E-06 3.8E-06 3.2E-06 2.8E-06 2.6E-06
 2.4E-06 2.2E-06 2.1E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.9E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06
 H 3.0E-09
 H 2.7E-09
 H 1.4E-08
 H 4.4E-08
 H 3.1E-08 5.9E-08 8.5E-08 1.1E-07 1.3E-07 1.4E-07 1.5E-07 1.8E-07 1.7E-07 1.7E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07
 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.7E-07 1.7E-07 1.7E-07 1.7E-07 1.7E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07
 1.5E-07 1.5E-07 1.5E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.2E-07
 1.2E-07 1.2E-07 1.2E-07 1.2E-07 1.2E-07
 H 2.5E-07 4.8E-07 8.9E-07 8.7E-07 1.0E-06 1.1E-06 1.2E-06 1.3E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.5E-06 1.5E-06 1.5E-06
 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.4E-06 1.3E-06 1.3E-06 1.3E-06 1.3E-06 1.3E-06 1.3E-06 1.2E-06 1.2E-06
 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.1E-06 1.1E-06 1.1E-06 1.1E-06 1.1E-06 1.1E-06 1.0E-06 1.0E-06 1.0E-06 1.0E-06 1.0E-06
 9.9E-07 9.8E-07 9.8E-07 9.5E-07 9.4E-07
 H 3.4E-08 6.5E-08 9.5E-08 1.2E-07 1.4E-07 1.8E-07 1.7E-07 1.8E-07 1.9E-07 2.0E-07 2.0E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07
 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.1E-07 2.0E-07 2.0E-07 2.0E-07 2.0E-07 2.0E-07 2.0E-07
 2.0E-07 2.0E-07 2.0E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.9E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07
 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.7E-07
 H 5.0E-10
 H 1.8E-09
 H 1.2E-09
 H 8.3E-07 1.8E-06 2.3E-06 2.8E-06 3.3E-06 3.8E-06 3.9E-06 4.0E-06 4.1E-06 4.2E-06 4.2E-06 4.2E-06 4.1E-06 4.0E-06 4.0E-06
 3.9E-06 3.8E-06 3.7E-06 3.6E-06 3.5E-06 3.4E-06 3.3E-06 3.2E-06 3.1E-06 3.0E-06 2.9E-06 2.8E-06 2.7E-06 2.6E-06 2.5E-06
 2.4E-06 2.3E-06 2.3E-06 2.2E-06 2.1E-06 2.0E-06 2.0E-06 1.9E-06 1.8E-06 1.8E-06 1.7E-06 1.7E-06 1.6E-06 1.5E-06 1.5E-06
 1.4E-06 1.4E-06 1.3E-06 1.3E-06 1.3E-06

DOSINC.DAT

! U 240 Class: Y F1: 0.00200 02/27/88 03:50:03.4 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 16
1 1 1 1 1 50 1 1 1 1 1 1

G 3.9E-12

G 9.5E-10

G 2.1E-09

G 7.2E-09

G 1.0E-08

G 1.2E-11 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 1.0E-11 1.1E-11 1.2E-11 1.2E-11 1.3E-11 1.4E-11 1.4E-11
1.5E-11 1.6E-11 1.6E-11 1.7E-11 1.7E-11 1.8E-11 1.8E-11 1.9E-11 1.9E-11 2.0E-11 2.0E-11 2.1E-11 2.1E-11 2.1E-11 2.1E-11
2.1E-11 2.2E-11 2.2E-11 2.2E-11 2.2E-11 2.3E-11 2.3E-11 2.3E-11 2.3E-11 2.3E-11 2.4E-11 2.4E-11 2.4E-11 2.4E-11 2.4E-11
2.4E-11 2.4E-11 2.5E-11 2.5E-11 2.5E-11

G 2.7E-11

G 9.9E-12

G 1.3E-10

G 1.6E-11

G 5.9E-13

G 2.8E-11

6 1 1 1 1 1 1 1 1 1 1

H 2.3E-09 1.0E-11 7.2E-12 5.3E-12 3.9E-12 3.0E-12

H 2.5E-10

H 5.3E-10

H 1.9E-09

H 2.6E-09

H 9.8E-12

H 1.2E-11

H 2.9E-12

H 3.4E-11

H 8.8E-12

H 4.0E-12

H 2.0E-11

! CM245 Class: W F1: 0.00100 02/27/88 04:11:15.0 Acute Sv/Bq

12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 50 50 50 1 1 1 50

G 1.2E-11

G 1.4E-09

G 3.3E-09

G 2.0E-08

G 5.8E-08

G 5.0E-07 4.9E-07 4.8E-07 4.8E-07 4.7E-07 4.6E-07 4.6E-07 4.5E-07 4.5E-07 4.4E-07 4.3E-07 4.3E-07 4.2E-07 4.2E-07 4.1E-07
4.1E-07 4.0E-07 4.0E-07 3.9E-07 3.9E-07 3.8E-07 3.8E-07 3.7E-07 3.7E-07 3.6E-07 3.6E-07 3.5E-07 3.5E-07 3.4E-07 3.4E-07
3.3E-07 3.3E-07 3.3E-07 3.2E-07 3.2E-07 3.1E-07 3.1E-07 3.1E-07 3.0E-07 3.0E-07 3.0E-07 2.9E-07 2.9E-07 2.8E-07 2.8E-07
2.8E-07 2.7E-07 2.7E-07 2.7E-07 2.7E-07 2.6E-07

G 4.1E-08 4.0E-08 4.0E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08
3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.8E-08
2.7E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08
2.3E-08 2.2E-08 2.2E-08 2.2E-08 2.2E-08

G 5.5E-09 5.4E-09 5.4E-09 5.4E-09 5.3E-09 5.3E-09 5.2E-09 5.2E-09 5.2E-09 5.1E-09 5.1E-09 5.1E-09 5.1E-09 5.0E-09 5.0E-09
5.0E-09 4.9E-09 4.9E-09 4.9E-09 4.8E-09 4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.7E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09 4.6E-09
4.5E-09 4.5E-09 4.5E-09 4.5E-09 4.4E-09 4.4E-09 4.4E-09 4.4E-09 4.3E-09 4.3E-09 4.3E-09 4.3E-09 4.2E-09 4.2E-09 4.2E-09
4.2E-09 4.1E-09 4.1E-09 4.1E-09 4.1E-09

DOSINC.DAT

5.1023

9/30/88

G 1.4E-10
 G 2.3E-11
 G 0.7E-12
 Q 1.4E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07 1.0E-07 9.7E-08 9.3E-08 9.0E-08 8.7E-08 8.4E-08
 8.2E-08 7.9E-08 7.6E-08 7.4E-08 7.1E-08 6.9E-08 6.7E-08 6.4E-08 6.2E-08 6.0E-08 5.8E-08 5.6E-08 5.4E-08 5.3E-08 5.1E-08
 4.9E-08 4.8E-08 4.6E-08 4.5E-08 4.3E-08 4.2E-08 4.0E-08 3.9E-08 3.8E-08 3.6E-08 3.5E-08 3.4E-08 3.3E-08 3.2E-08 3.1E-08
 3.0E-08 2.9E-08 2.8E-08 2.7E-08 2.6E-08
 2 1 1 1 1 50 50 50 1 1 1 50
 H 1.7E-05 1.5E-07
 H 1.9E-09
 H 2.7E-09
 H 1.1E-08
 H 2.9E-08
 H 5.2E-05 5.7E-05 5.6E-05 5.8E-05 5.5E-05 5.4E-05 5.3E-05 5.3E-05 5.2E-05 5.1E-05 5.1E-05 5.0E-05 4.9E-05 4.9E-05 4.8E-05
 4.7E-05 4.7E-05 4.6E-05 4.6E-05 4.5E-05 4.4E-05 4.4E-05 4.3E-05 4.3E-05 4.2E-05 4.2E-05 4.1E-05 4.1E-05 4.0E-05 4.0E-05
 3.9E-05 3.9E-05 3.8E-05 3.8E-05 3.7E-05 3.7E-05 3.6E-05 3.6E-05 3.5E-05 3.5E-05 3.4E-05 3.4E-05 3.4E-05 3.3E-05 3.3E-05
 3.2E-05 3.2E-05 3.1E-05 3.1E-05 3.1E-05
 H 4.3E-08 4.7E-08 4.6E-08 4.5E-08 4.5E-08 4.4E-08 4.4E-08 4.3E-08 4.2E-08 4.2E-08 4.1E-08 4.1E-08 4.0E-08 4.0E-08 3.9E-08
 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08
 3.2E-08 3.1E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.7E-08
 2.6E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08
 H 5.7E-07 6.3E-07 6.3E-07 6.2E-07 6.2E-07 6.2E-07 6.1E-07 6.1E-07 6.0E-07 6.0E-07 6.0E-07 5.9E-07 5.9E-07 5.8E-07 5.8E-07
 5.8E-07 5.7E-07 5.7E-07 5.7E-07 5.6E-07 5.6E-07 5.6E-07 5.5E-07 5.5E-07 5.4E-07 5.4E-07 5.4E-07 5.3E-07 5.3E-07
 5.3E-07 5.2E-07 5.2E-07 5.2E-07 5.2E-07 5.1E-07 5.1E-07 5.1E-07 5.0E-07 5.0E-07 5.0E-07 4.9E-07 4.9E-07 4.9E-07
 4.8E-07 4.8E-07 4.8E-07 4.8E-07 4.7E-07
 H 1.1E-09
 H 1.2E-09
 H 1.1E-09
 H 1.4E-05 1.5E-05 1.5E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.1E-05 1.0E-05 9.9E-06
 9.5E-06 9.2E-06 8.9E-06 8.6E-06 8.3E-06 8.0E-06 7.8E-06 7.5E-06 7.3E-06 7.0E-06 6.8E-06 6.6E-06 6.4E-06 6.1E-06 5.9E-06
 5.7E-06 5.6E-06 5.4E-06 5.2E-06 5.0E-06 4.9E-06 4.7E-06 4.5E-06 4.4E-06 4.3E-06 4.1E-06 4.0E-06 3.8E-06 3.7E-06 3.6E-06
 3.5E-06 3.4E-06 3.3E-06 3.1E-06 3.0E-06
 I CM248 Class: W F1: 0.00100 02/27/88 04:35:22.0 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 G 0.3E-12
 G 1.3E-09
 G 3.3E-09
 G 1.8E-08
 G 5.7E-08
 Q 5.2E-07 5.1E-07 5.1E-07 5.0E-07 4.9E-07 4.8E-07 4.8E-07 4.7E-07 4.6E-07 4.6E-07 4.5E-07 4.5E-07 4.4E-07 4.3E-07 4.3E-07
 4.2E-07 4.2E-07 4.1E-07 4.0E-07 4.0E-07 3.9E-07 3.9E-07 3.8E-07 3.8E-07 3.7E-07 3.7E-07 3.6E-07 3.6E-07 3.5E-07 3.5E-07
 3.4E-07 3.4E-07 3.3E-07 3.3E-07 3.2E-07 3.2E-07 3.1E-07 3.1E-07 3.1E-07 3.0E-07 3.0E-07 2.9E-07 2.9E-07 2.8E-07 2.8E-07
 2.8E-07 2.7E-07 2.7E-07 2.7E-07 2.6E-07
 G 4.1E-08 4.0E-08 4.0E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08
 3.3E-08 3.2E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08
 2.7E-08 2.6E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08
 2.2E-08 2.1E-08 2.1E-08 2.1E-08 2.0E-08
 Q 5.7E-09 5.6E-09 5.6E-09 5.5E-09 5.5E-09 5.4E-09 5.4E-09 5.4E-09 5.3E-09 5.3E-09 5.3E-09 5.2E-09 5.2E-09 5.1E-09 5.1E-09
 5.1E-09 5.0E-09 5.0E-09 5.0E-09 4.9E-09 4.9E-09 4.9E-09 4.8E-09 4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.7E-09 4.6E-09 4.6E-09
 4.6E-09 4.5E-09 4.5E-09 4.5E-09 4.4E-09 4.4E-09 4.4E-09 4.3E-09 4.3E-09 4.3E-09 4.3E-09 4.2E-09 4.2E-09 4.2E-09 4.1E-09

DOSINC.DAT

4.1E-09 4.1E-09 4.8E-09 4.8E-09 4.8E-09
 G 8.0E-11
 G 1.5E-11
 G 8.3E-12
 G 1.4E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07 1.0E-07 9.8E-08 9.3E-08 9.0E-08 8.7E-08 8.4E-08
 8.1E-08 7.8E-08 7.5E-08 7.3E-08 7.0E-08 6.8E-08 6.6E-08 6.3E-08 6.1E-08 5.9E-08 5.7E-08 5.5E-08 5.3E-08 5.1E-08 5.0E-08
 4.8E-08 4.6E-08 4.5E-08 4.3E-08 4.2E-08 4.0E-08 3.9E-08 3.8E-08 3.6E-08 3.5E-08 3.4E-08 3.3E-08 3.2E-08 3.1E-08 2.9E-08
 2.8E-08 2.8E-08 2.7E-08 2.6E-08 2.5E-08
 2 1 1 1 1 50 50 50 1 1 1 50
 H 1.7E-05 1.5E-07
 H 1.7E-09
 H 2.8E-09
 H 9.8E-09
 H 2.9E-08
 H 5.4E-05 6.0E-05 6.9E-05 6.8E-05 6.7E-05 6.8E-05 6.8E-05 6.5E-05 6.4E-05 6.3E-05 6.3E-05 6.2E-05 6.1E-05 6.0E-05 6.0E-05
 4.9E-05 4.8E-05 4.8E-05 4.7E-05 4.6E-05 4.6E-05 4.5E-05 4.4E-05 4.4E-05 4.3E-05 4.3E-05 4.2E-05 4.1E-05 4.1E-05 4.0E-05
 4.0E-05 3.9E-05 3.9E-05 3.8E-05 3.8E-05 3.7E-05 3.7E-05 3.6E-05 3.6E-05 3.5E-05 3.5E-05 3.4E-05 3.4E-05 3.3E-05 3.3E-05
 3.2E-05 3.2E-05 3.1E-05 3.1E-05 3.0E-05
 H 4.3E-08 4.7E-08 4.6E-08 4.5E-08 4.5E-08 4.4E-08 4.4E-08 4.3E-08 4.2E-08 4.2E-08 4.1E-08 4.1E-08 4.0E-08 3.9E-08 3.9E-08
 3.8E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.2E-08
 3.1E-08 3.1E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.6E-08
 2.5E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08
 H 6.9E-07 6.5E-07 6.5E-07 6.4E-07 6.4E-07 6.3E-07 6.3E-07 6.3E-07 6.2E-07 6.2E-07 6.1E-07 6.1E-07 6.0E-07 6.0E-07 5.9E-07
 5.9E-07 5.9E-07 5.8E-07 5.8E-07 5.7E-07 5.7E-07 5.7E-07 5.6E-07 5.6E-07 5.5E-07 5.5E-07 5.4E-07 5.4E-07 5.4E-07
 5.3E-07 5.3E-07 5.2E-07 5.2E-07 5.2E-07 5.1E-07 5.1E-07 5.1E-07 5.0E-07 5.0E-07 4.9E-07 4.9E-07 4.8E-07 4.8E-07 4.8E-07
 4.8E-07 4.7E-07 4.7E-07 4.7E-07 4.6E-07
 H 1.0E-09
 H 1.1E-09
 H 9.9E-10
 H 1.4E-05 1.5E-05 1.5E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.0E-05 1.0E-05 9.8E-06
 9.4E-06 9.1E-06 8.8E-06 8.5E-06 8.2E-06 7.9E-06 7.7E-06 7.4E-06 7.2E-06 6.9E-06 6.7E-06 6.4E-06 6.2E-06 6.0E-06 5.8E-06
 5.6E-06 5.4E-06 5.2E-06 5.0E-06 4.9E-06 4.7E-06 4.5E-06 4.4E-06 4.2E-06 4.1E-06 4.0E-06 3.8E-06 3.7E-06 3.6E-06 3.4E-06
 3.3E-06 3.2E-06 3.1E-06 3.0E-06 2.9E-06
 ! CM247 Clasa: W Fl: 0.00100 02/27/08 04:48:06.1 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 G 2.2E-11
 G 1.3E-09
 G 3.5E-09
 G 2.8E-08
 G 6.1E-08
 G 4.7E-07 4.7E-07 4.8E-07 4.8E-07 4.5E-07 4.4E-07 4.4E-07 4.3E-07 4.3E-07 4.2E-07 4.1E-07 4.1E-07 4.0E-07 4.0E-07 3.9E-07
 3.9E-07 3.8E-07 3.8E-07 3.7E-07 3.7E-07 3.6E-07 3.6E-07 3.5E-07 3.5E-07 3.4E-07 3.4E-07 3.3E-07 3.3E-07 3.2E-07 3.2E-07
 3.1E-07 3.1E-07 3.1E-07 3.0E-07 3.0E-07 2.9E-07 2.9E-07 2.8E-07 2.8E-07 2.7E-07 2.7E-07 2.7E-07 2.6E-07 2.6E-07 2.6E-07
 2.8E-07 2.5E-07 2.5E-07 2.5E-07 2.4E-07
 G 3.7E-08 3.7E-08 3.8E-08 3.8E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.3E-08 3.2E-08 3.2E-08 3.1E-08 3.1E-08
 3.0E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.5E-08
 2.5E-08 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08 2.2E-08 2.1E-08 2.1E-08 2.1E-08 2.0E-08 2.0E-08 2.0E-08
 2.0E-08 2.0E-08 2.0E-08 1.9E-08 1.9E-08
 G 5.2E-09 5.1E-09 5.1E-09 5.0E-09 5.0E-09 5.0E-09 4.9E-09 4.9E-09 4.9E-09 4.8E-09 4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.7E-09
 4.6E-09 4.6E-09 4.6E-09 4.5E-09 4.5E-09 4.5E-09 4.4E-09 4.4E-09 4.4E-09 4.3E-09 4.3E-09 4.3E-09 4.2E-09 4.2E-09 4.2E-09

DOSINC.DAT

4.2E-09 4.1E-09 4.1E-09 4.1E-09 4.1E-09 4.0E-09 4.0E-09 4.0E-09 4.0E-09 3.9E-09 3.9E-09 3.9E-09 3.8E-09 3.8E-09 3.8E-09
 3.8E-09 3.7E-09 3.7E-09 3.7E-09 3.7E-09 3.7E-09
 Q 4.4E-10
 Q 5.0E-11
 Q 1.1E-11
 Q 1.9E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07 9.8E-08 9.5E-08 9.2E-08 8.9E-08 8.6E-08 8.3E-08 8.0E-08 7.7E-08
 7.5E-08 7.2E-08 7.0E-08 6.7E-08 6.5E-08 6.3E-08 6.1E-08 5.9E-08 5.7E-08 5.5E-08 5.3E-08 5.1E-08 4.9E-08 4.8E-08 4.6E-08
 4.4E-08 4.3E-08 4.2E-08 4.0E-08 3.9E-08 3.7E-08 3.6E-08 3.5E-08 3.4E-08 3.3E-08 3.1E-08 3.0E-08 2.9E-08 2.8E-08 2.7E-08
 2.6E-08 2.6E-08 2.5E-08 2.4E-08 2.3E-08
 2 1 1 1 1 50 50 50 1 1 1 50
 H 1.5E-05 1.4E-07
 H 2.8E-09
 H 3.4E-09
 H 1.2E-08
 H 3.1E-08
 H 5.8E-05 5.5E-05 5.4E-05 5.3E-05 5.2E-05 5.2E-05 5.1E-05 5.0E-05 5.0E-05 4.9E-05 4.8E-05 4.8E-05 4.7E-05 4.6E-05 4.6E-05
 4.5E-05 4.4E-05 4.4E-05 4.3E-05 4.3E-05 4.2E-05 4.1E-05 4.1E-05 4.0E-05 4.0E-05 3.9E-05 3.9E-05 3.8E-05 3.8E-05 3.7E-05
 3.7E-05 3.6E-05 3.6E-05 3.6E-05 3.5E-05 3.4E-05 3.4E-05 3.3E-05 3.3E-05 3.2E-05 3.2E-05 3.1E-05 3.1E-05 3.1E-05 3.0E-05
 3.0E-05 2.9E-05 2.9E-05 2.9E-05 2.8E-05
 H 3.9E-08 4.3E-08 4.2E-08 4.2E-08 4.1E-08 4.1E-08 4.0E-08 4.0E-08 3.9E-08 3.8E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08
 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 3.0E-08 2.9E-08
 2.9E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.7E-08 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08 2.4E-08
 2.3E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08
 H 5.4E-07 5.9E-07 5.9E-07 5.8E-07 5.8E-07 5.8E-07 5.7E-07 5.7E-07 5.6E-07 5.6E-07 5.6E-07 5.5E-07 5.5E-07 5.5E-07 5.4E-07
 5.4E-07 5.3E-07 5.3E-07 5.3E-07 5.2E-07 5.2E-07 5.2E-07 5.1E-07 5.1E-07 5.1E-07 5.0E-07 5.0E-07 5.0E-07 4.9E-07 4.9E-07
 4.9E-07 4.8E-07 4.8E-07 4.8E-07 4.7E-07 4.7E-07 4.7E-07 4.6E-07 4.6E-07 4.6E-07 4.5E-07 4.5E-07 4.5E-07 4.4E-07 4.4E-07
 4.4E-07 4.4E-07 4.3E-07 4.3E-07 4.3E-07
 H 1.4E-09
 H 1.7E-09
 H 1.4E-09
 H 1.3E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.1E-05 1.0E-05 1.0E-05 9.7E-06 9.3E-06 9.0E-06
 8.7E-06 8.4E-06 8.1E-06 7.9E-06 7.8E-06 7.3E-06 7.1E-06 6.8E-06 6.6E-06 6.4E-06 6.2E-06 6.0E-06 5.8E-06 5.6E-06 5.4E-06
 5.2E-06 5.0E-06 4.8E-06 4.7E-06 4.5E-06 4.4E-06 4.2E-06 4.1E-06 3.9E-06 3.8E-06 3.7E-06 3.6E-06 3.4E-06 3.3E-06 3.2E-06
 3.1E-06 3.0E-06 2.9E-06 2.8E-06 2.7E-06
 ! CM243 Class: W F1: 0.00100 02/27/88 00:04:47.9 Acute Sv/Bq
 12 1 3 4 5 8 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 Q 1.4E-11
 Q 1.5E-09
 Q 3.8E-09
 Q 2.2E-08
 Q 0.8E-08
 Q 5.3E-07 5.2E-07 5.0E-07 4.8E-07 4.8E-07 4.4E-07 4.3E-07 4.1E-07 3.9E-07 3.8E-07 3.7E-07 3.5E-07 3.4E-07 3.3E-07 3.1E-07
 3.0E-07 2.9E-07 2.8E-07 2.7E-07 2.6E-07 2.5E-07 2.4E-07 2.3E-07 2.2E-07 2.1E-07 2.1E-07 2.0E-07 1.9E-07 1.8E-07 1.8E-07
 1.7E-07 1.6E-07 1.6E-07 1.5E-07 1.5E-07 1.4E-07 1.4E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.0E-07 1.0E-07
 9.6E-08 9.3E-08 8.9E-08 8.6E-08 8.3E-08
 Q 4.4E-08 4.2E-08 4.0E-08 3.9E-08 3.7E-08 3.6E-08 3.5E-08 3.3E-08 3.2E-08 3.1E-08 3.0E-08 2.9E-08 2.8E-08 2.7E-08 2.6E-08
 2.5E-08 2.4E-08 2.3E-08 2.2E-08 2.1E-08 2.0E-08 2.0E-08 1.9E-08 1.8E-08 1.7E-08 1.7E-08 1.6E-08 1.6E-08 1.5E-08 1.4E-08
 1.4E-08 1.3E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08 9.8E-09 9.5E-09 9.1E-09 8.8E-09 8.4E-09 8.1E-09
 7.8E-09 7.5E-09 7.3E-09 7.0E-09 6.7E-09
 Q 5.9E-09 5.7E-09 5.6E-09 5.4E-09 5.2E-09 5.1E-09 4.9E-09 4.8E-09 4.6E-09 4.5E-09 4.3E-09 4.2E-09 4.1E-09 3.9E-09 3.8E-09

DOSINC.DAT

3.7E-09 3.0E-09 3.5E-09 3.4E-09 3.3E-09 3.2E-09 3.1E-09 3.0E-09 2.9E-09 2.8E-09 2.7E-09 2.6E-09 2.5E-09 2.5E-09 2.4E-09
 2.3E-09 2.3E-09 2.2E-09 2.1E-09 2.0E-09 2.0E-09 1.9E-09 1.9E-09 1.8E-09 1.8E-09 1.7E-09 1.6E-09 1.6E-09 1.5E-09 1.5E-09
 1.5E-09 1.4E-09 1.4E-09 1.3E-09 1.3E-09
 Q 1.9E-10
 Q 2.9E-11
 Q 9.7E-12
 Q 1.5E-07 1.4E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.0E-07 9.7E-08 9.1E-08 8.6E-08 8.1E-08 7.6E-08 7.2E-08 6.8E-08 6.4E-08
 6.0E-08 5.7E-08 5.4E-08 5.0E-08 4.8E-08 4.5E-08 4.2E-08 4.0E-08 3.8E-08 3.5E-08 3.3E-08 3.1E-08 3.0E-08 2.8E-08 2.6E-08
 2.5E-08 2.3E-08 2.2E-08 2.1E-08 2.0E-08 1.9E-08 1.7E-08 1.6E-08 1.6E-08 1.5E-08 1.4E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08
 1.0E-08 9.7E-09 9.1E-09 8.6E-09 8.1E-09
 2 1 1 1 1 50 50 50 1 1 1 50
 H 1.8E-05 1.8E-07
 H 2.1E-09
 H 3.1E-09
 H 1.2E-08
 H 3.3E-08
 H 5.8E-05 8.0E-05 5.8E-05 5.8E-05 5.4E-05 5.2E-05 5.0E-05 4.8E-05 4.6E-05 4.4E-05 4.3E-05 4.1E-05 3.9E-05 3.8E-05 3.7E-05
 3.5E-05 3.4E-05 3.3E-05 3.1E-05 3.0E-05 2.9E-05 2.8E-05 2.7E-05 2.6E-05 2.5E-05 2.4E-05 2.3E-05 2.2E-05 2.1E-05 2.1E-05
 2.0E-05 1.9E-05 1.8E-05 1.8E-05 1.7E-05 1.8E-05 1.6E-05 1.6E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05
 1.1E-05 1.1E-05 1.0E-05 1.0E-05 9.8E-06
 H 4.0E-08 4.9E-08 4.7E-08 4.5E-08 4.4E-08 4.2E-08 4.0E-08 3.9E-08 3.7E-08 3.6E-08 3.5E-08 3.3E-08 3.2E-08 3.1E-08 3.0E-08
 2.9E-08 2.8E-08 2.7E-08 2.6E-08 2.5E-08 2.4E-08 2.3E-08 2.2E-08 2.1E-08 2.0E-08 2.0E-08 1.9E-08 1.8E-08 1.7E-08 1.7E-08
 1.6E-08 1.6E-08 1.5E-08 1.4E-08 1.4E-08 1.3E-08 1.3E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08 9.8E-08 9.5E-08
 9.1E-08 8.8E-08 8.4E-08 8.1E-08 7.8E-08
 H 8.2E-07 8.7E-07 8.5E-07 8.3E-07 8.1E-07 5.9E-07 5.7E-07 5.5E-07 5.4E-07 5.2E-07 5.0E-07 4.9E-07 4.7E-07 4.6E-07 4.5E-07
 4.3E-07 4.2E-07 4.1E-07 3.9E-07 3.8E-07 3.7E-07 3.6E-07 3.5E-07 3.4E-07 3.3E-07 3.2E-07 3.1E-07 3.0E-07 2.9E-07 2.8E-07
 2.7E-07 2.6E-07 2.5E-07 2.5E-07 2.4E-07 2.3E-07 2.2E-07 2.2E-07 2.1E-07 2.0E-07 2.0E-07 1.9E-07 1.9E-07 1.8E-07 1.7E-07
 1.7E-07 1.6E-07 1.6E-07 1.5E-07 1.5E-07
 H 1.2E-09
 H 1.3E-09
 H 1.2E-09
 H 1.5E-05 1.6E-05 1.5E-05 1.4E-05 1.3E-05 1.3E-05 1.2E-05 1.1E-05 1.1E-05 1.0E-05 9.4E-06 8.9E-06 8.4E-06 7.9E-06 7.5E-06
 7.0E-06 6.8E-06 6.2E-06 5.9E-06 5.8E-06 5.2E-06 4.9E-06 4.7E-06 4.4E-06 4.1E-06 3.9E-06 3.7E-06 3.5E-06 3.3E-06 3.1E-06
 2.9E-06 2.7E-06 2.6E-06 2.4E-06 2.3E-06 2.2E-06 2.0E-06 1.9E-06 1.8E-06 1.7E-06 1.6E-06 1.5E-06 1.4E-06 1.4E-06 1.3E-06
 1.2E-06 1.1E-06 1.1E-06 1.0E-06 9.5E-07
 I PU243 Class: Y F1: 0.00010 02/27/88 06:51:22.4 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1
 Q 1.5E-13
 Q 1.8E-10
 Q 2.8E-10
 Q 5.8E-10
 Q 3.9E-10
 Q 5.8E-13
 Q 1.8E-12
 Q 1.5E-13
 Q 4.5E-12
 Q 5.8E-13
 Q 5.7E-16
 Q 8.7E-13
 18 1 1 1 1 50 1 1 1 1 1 31

DOSINC.DAT

H 1.9E-10 3.3E-12 2.3E-12 1.7E-12 1.3E-12 9.6E-13 7.5E-13 6.0E-13 4.8E-13 4.0E-13 3.4E-13 2.9E-13 2.6E-13 2.3E-13 2.1E-13
 1.9E-13
 H 2.5E-11
 H 4.0E-11
 H 8.2E-11
 H 5.5E-11
 H 1.7E-12 4.8E-13 6.7E-13 8.5E-13 1.0E-12 1.1E-12 1.2E-12 1.3E-12 1.3E-12 1.4E-12 1.4E-12 1.4E-12 1.4E-12 1.4E-12 1.4E-12
 1.4E-12 1.4E-12 1.4E-12 1.4E-12 1.4E-12 1.9E-12 1.3E-12 1.3E-12 1.3E-12 1.3E-12 1.3E-12 1.2E-12 1.2E-12 1.2E-12 1.2E-12
 1.2E-12 1.2E-12 1.1E-12 1.1E-12 1.1E-12 1.1E-12 1.1E-12 1.1E-12 1.1E-12 1.0E-12 1.0E-12 1.0E-12 1.0E-12 9.8E-13 9.7E-13
 9.8E-13 9.4E-13 9.3E-13 9.2E-13 9.1E-13
 H 6.3E-13
 H 5.8E-14
 H 6.8E-13
 H 2.5E-13
 H 1.1E-13
 H 7.2E-13 6.0E-09 6.0E-09 2.2E-13 2.6E-13 2.9E-13 3.0E-13 3.2E-13 3.3E-13 3.3E-13 3.3E-13 3.3E-13 3.2E-13 3.2E-13 3.1E-13
 3.0E-13 3.0E-13 2.9E-13 2.8E-13 2.7E-13 2.6E-13 2.6E-13 2.6E-13 2.4E-13 2.3E-13 2.2E-13 2.2E-13 2.1E-13 2.0E-13 2.0E-13
 1.9E-13
 I AM243 Class: W F1: 0.00100 02/27/88 07:16:36.1 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 50 50 50 1 1 1 50
 G 1.6E-11
 G 1.3E-09
 G 3.4E-09
 G 1.9E-08
 G 6.0E-08
 G 5.0E-07 4.9E-07 4.6E-07 4.8E-07 4.7E-07 4.6E-07 4.6E-07 4.5E-07 4.5E-07 4.4E-07 4.3E-07 4.3E-07 4.2E-07 4.2E-07 4.1E-07
 4.0E-07 4.0E-07 3.9E-07 3.9E-07 3.8E-07 3.8E-07 3.7E-07 3.7E-07 3.6E-07 3.6E-07 3.5E-07 3.5E-07 3.4E-07 3.4E-07 3.3E-07
 3.3E-07 3.2E-07 3.2E-07 3.1E-07 3.1E-07 3.1E-07 3.0E-07 3.0E-07 2.9E-07 2.9E-07 2.9E-07 2.8E-07 2.8E-07 2.7E-07 2.7E-07
 2.7E-07 2.6E-07 2.6E-07 2.6E-07 2.5E-07
 G 4.0E-08 3.9E-08 3.9E-08 3.8E-08 3.7E-08 3.7E-08 3.6E-08 3.6E-08 3.5E-08 3.5E-08 3.4E-08 3.4E-08 3.4E-08 3.3E-08 3.3E-08
 3.2E-08 3.2E-08 3.1E-08 3.1E-08 3.0E-08 3.0E-08 3.0E-08 2.9E-08 2.9E-08 2.8E-08 2.8E-08 2.8E-08 2.7E-08 2.7E-08 2.6E-08
 2.6E-08 2.6E-08 2.5E-08 2.5E-08 2.5E-08 2.4E-08 2.4E-08 2.4E-08 2.3E-08 2.3E-08 2.3E-08 2.2E-08 2.2E-08 2.2E-08 2.1E-08
 2.1E-08 2.1E-08 2.1E-08 2.0E-08 2.0E-08
 G 5.5E-09 5.4E-09 5.4E-09 5.4E-09 5.3E-09 5.3E-09 5.3E-09 5.2E-09 5.2E-09 5.1E-09 5.1E-09 5.1E-09 5.0E-09 5.0E-09 5.0E-09
 4.9E-09 4.9E-09 4.9E-09 4.8E-09 4.8E-09 4.8E-09 4.7E-09 4.7E-09 4.7E-09 4.6E-09 4.6E-09 4.6E-09 4.5E-09 4.5E-09 4.5E-09
 4.4E-09 4.4E-09 4.4E-09 4.4E-09 4.3E-09 4.3E-09 4.3E-09 4.2E-09 4.2E-09 4.2E-09 4.1E-09 4.1E-09 4.1E-09 4.1E-09 4.0E-09
 4.0E-09 4.0E-09 3.9E-09 3.9E-09 3.9E-09
 G 1.8E-10
 G 2.7E-11
 G 9.5E-12
 G 1.3E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07 9.8E-08 9.5E-08 9.2E-08 8.9E-08 8.6E-08 8.3E-08
 8.0E-08 7.7E-08 7.5E-08 7.2E-08 7.0E-08 6.7E-08 6.5E-08 6.3E-08 6.1E-08 5.8E-08 5.6E-08 5.5E-08 5.3E-08 5.1E-08 4.9E-08
 4.7E-08 4.6E-08 4.4E-08 4.3E-08 4.1E-08 4.0E-08 3.9E-08 3.7E-08 3.6E-08 3.5E-08 3.4E-08 3.2E-08 3.1E-08 3.0E-08 2.9E-08
 2.8E-08 2.7E-08 2.6E-08 2.5E-08 2.5E-08
 2 1 1 1 1 50 50 50 1 1 1 50
 H 1.7E-05 1.5E-07
 H 2.3E-09
 H 3.1E-09
 H 1.1E-08
 H 3.2E-08

DOSINC.DAT

H 5.2E-05 5.7E-05 5.8E-05 5.8E-05 5.5E-05 5.4E-05 5.3E-05 5.3E-05 5.2E-05 5.1E-05 5.0E-05 5.0E-05 4.9E-05 4.8E-05 4.8E-05
 4.7E-05 4.6E-05 4.6E-05 4.5E-05 4.5E-05 4.4E-05 4.3E-05 4.3E-05 4.2E-05 4.2E-05 4.1E-05 4.0E-05 4.0E-05 3.9E-05 3.9E-05
 3.8E-05 3.8E-05 3.7E-05 3.7E-05 3.6E-05 3.6E-05 3.5E-05 3.5E-05 3.4E-05 3.4E-05 3.3E-05 3.3E-05 3.2E-05 3.2E-05 3.1E-05
 3.1E-05 3.1E-05 3.0E-05 3.0E-05 2.9E-05
 H 4.2E-06 4.5E-06 4.5E-06 4.4E-06 4.4E-06 4.3E-06 4.2E-06 4.2E-06 4.1E-06 4.1E-06 4.0E-06 4.0E-06 3.9E-06 3.9E-06 3.8E-06
 3.7E-06 3.7E-06 3.6E-06 3.6E-06 3.5E-06 3.5E-06 3.4E-06 3.4E-06 3.4E-06 3.3E-06 3.3E-06 3.2E-06 3.2E-06 3.1E-06 3.1E-06
 3.0E-06 3.0E-06 3.0E-06 2.9E-06 2.9E-06 2.8E-06 2.8E-06 2.8E-06 2.7E-06 2.7E-06 2.6E-06 2.6E-06 2.6E-06 2.5E-06 2.5E-06
 2.5E-06 2.4E-06 2.4E-06 2.4E-06 2.3E-06
 H 5.8E-07 6.3E-07 6.3E-07 6.2E-07 6.2E-07 6.2E-07 6.1E-07 6.1E-07 6.0E-07 6.0E-07 5.9E-07 5.9E-07 5.9E-07 5.8E-07 5.8E-07
 5.7E-07 5.7E-07 5.7E-07 5.6E-07 5.6E-07 5.5E-07 5.5E-07 5.5E-07 5.4E-07 5.4E-07 5.4E-07 5.3E-07 5.3E-07 5.2E-07 5.2E-07
 5.2E-07 5.1E-07 5.1E-07 5.1E-07 5.0E-07 5.0E-07 5.0E-07 4.9E-07 4.9E-07 4.9E-07 4.8E-07 4.8E-07 4.8E-07 4.7E-07 4.7E-07
 4.7E-07 4.6E-07 4.6E-07 4.6E-07 4.5E-07
 H 1.2E-09
 H 1.5E-09
 H 1.2E-09
 H 1.4E-05 1.5E-05 1.5E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.1E-05 1.0E-05 1.0E-05 9.7E-06
 9.3E-06 9.0E-06 8.7E-06 8.4E-06 8.1E-06 7.8E-06 7.6E-06 7.3E-06 7.1E-06 6.8E-06 6.6E-06 6.4E-06 6.2E-06 5.9E-06 5.7E-06
 5.5E-06 5.4E-06 5.2E-06 5.0E-06 4.8E-06 4.7E-06 4.5E-06 4.3E-06 4.2E-06 4.1E-06 3.9E-06 3.8E-06 3.7E-06 3.5E-06 3.4E-06
 3.3E-06 3.2E-06 3.1E-06 3.0E-06 2.9E-06
 ! MP239 Class: W F1: 0.00100 02/27/88 07:39:30.5 Acute Sv/Bq
 12 1 3 4 5 6 7 8 11 12 13 14 17
 1 1 1 1 1 1 1 1 1 1 1 1
 G 2.5E-12
 G 3.5E-10
 G 8.0E-10
 G 3.9E-09
 G 8.8E-09
 G 2.9E-11
 G 4.7E-11
 G 1.1E-11
 G 1.7E-10
 G 1.7E-11
 G 2.1E-13
 G 1.5E-11
 1 1 1 1 1 50 1 1 1 1 1 1
 H 2.3E-09
 H 1.2E-10
 H 2.9E-10
 H 1.3E-09
 H 2.9E-09
 H 1.1E-09 2.6E-11 2.5E-11 2.5E-11 2.5E-11 2.5E-11 2.5E-11 2.5E-11 2.5E-11 2.4E-11 2.4E-11 2.4E-11 2.4E-11 2.4E-11 2.4E-11
 2.3E-11 2.3E-11 2.3E-11 2.3E-11 2.3E-11 2.3E-11 2.2E-11 2.2E-11 2.2E-11 2.2E-11 2.2E-11 2.2E-11 2.1E-11 2.1E-11 2.1E-11
 2.1E-11 2.1E-11 2.1E-11 2.1E-11 2.0E-11 2.0E-11 2.0E-11 2.0E-11 2.0E-11 2.0E-11 2.0E-11 1.9E-11 1.9E-11 1.9E-11 1.9E-11
 1.9E-11 1.9E-11 1.9E-11 1.9E-11 1.8E-11
 H 1.4E-10
 H 1.5E-11
 H 5.8E-11
 H 1.8E-11
 H 7.5E-12
 H 9.8E-11
 ! CM248 Class: W F1: 0.00100 02/27/88 07:52:50.8 Acute Sv/Bq

DOSINC.DAT

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12 1 3 4 5 6 7 8 11 12 13 14 17
1 1 1 1 1 50 50 50 1 1 1 50
G 4.9E-10
G 1.1E-08
G 3.2E-08
G 9.8E-08
G 2.8E-07
G 1.9E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08 1.6E-08 1.5E-08
1.5E-08 1.6E-08 1.6E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.3E-08 1.2E-08
1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.0E-08 1.0E-08 1.0E-08 1.0E-08
9.9E-07 9.8E-07 9.7E-07 9.6E-07 9.4E-07
Q 1.6E-07 1.6E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.4E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.2E-07
1.2E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07 1.1E-07 1.1E-07 1.1E-07 1.0E-07 1.0E-07 1.0E-07 1.0E-07 1.0E-07 9.8E-08
9.7E-08 9.8E-08 9.4E-08 9.3E-08 9.2E-08 9.1E-08 8.9E-08 8.8E-08 8.7E-08 8.6E-08 8.4E-08 8.3E-08 8.2E-08 8.1E-08 8.0E-08
7.9E-08 7.8E-08 7.7E-08 7.6E-08 7.5E-08
G 2.4E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.9E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08 1.8E-08
1.8E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.7E-08 1.6E-08 1.6E-08 1.6E-08 1.6E-08 1.6E-08 1.6E-08
1.6E-08 1.6E-08 1.6E-08 1.6E-08 1.6E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.5E-08 1.4E-08 1.4E-08
1.4E-08 1.4E-08 1.4E-08 1.4E-08 1.4E-08
G 1.8E-08
G 2.5E-09
G 1.8E-10
G 4.9E-07 4.8E-07 4.8E-07 4.4E-07 4.3E-07 4.1E-07 4.0E-07 3.9E-07 3.7E-07 3.6E-07 3.6E-07 3.4E-07 3.2E-07 3.1E-07 3.0E-07
2.9E-07 2.8E-07 2.7E-07 2.6E-07 2.6E-07 2.6E-07 2.4E-07 2.3E-07 2.2E-07 2.1E-07 2.1E-07 2.0E-07 1.9E-07 1.9E-07 1.8E-07
1.7E-07 1.7E-07 1.6E-07 1.6E-07 1.5E-07 1.5E-07 1.4E-07 1.4E-07 1.3E-07 1.3E-07 1.2E-07 1.2E-07 1.1E-07 1.1E-07 1.1E-07
1.0E-07 1.0E-07 9.7E-08 9.3E-08 9.0E-08
2 1 1 1 1 50 50 50 1 1 1 50
H 8.2E-05 5.8E-07
H 5.7E-08
H 4.7E-08
H 8.6E-08
H 1.5E-07
H 1.9E-04 2.1E-04 2.1E-04 2.1E-04 2.0E-04 2.0E-04 2.0E-04 2.0E-04 1.9E-04 1.9E-04 1.9E-04 1.9E-04 1.8E-04 1.8E-04 1.8E-04
1.8E-04 1.7E-04 1.7E-04 1.7E-04 1.7E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.5E-04 1.5E-04 1.5E-04 1.5E-04 1.5E-04 1.4E-04
1.4E-04 1.4E-04 1.4E-04 1.4E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04
1.2E-04 1.1E-04 1.1E-04 1.1E-04 1.1E-04
H 1.5E-05 1.7E-05 1.7E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.6E-05 1.5E-05 1.5E-05 1.5E-05 1.5E-05 1.4E-05 1.4E-05
1.4E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.3E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.1E-05
1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.1E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 9.8E-06 9.7E-06 9.6E-06 9.4E-06 9.3E-06
9.2E-06 9.1E-06 8.9E-06 8.8E-06 8.7E-06
H 2.1E-06 2.3E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-06 2.1E-06 2.1E-06 2.1E-06 2.1E-06 2.1E-06 2.1E-06 2.1E-06
2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 2.0E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06 1.9E-06
1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06 1.7E-06
1.7E-06 1.7E-06 1.6E-06 1.6E-06 1.6E-06
H 2.5E-08
H 4.7E-08
H 2.2E-08
H 5.2E-05 5.6E-05 5.4E-05 5.2E-05 5.0E-05 4.8E-05 4.7E-05 4.6E-05 4.4E-05 4.2E-05 4.1E-05 3.9E-05 3.8E-05 3.7E-05 3.6E-05
3.4E-05 3.3E-05 3.2E-05 3.1E-05 3.0E-05 2.9E-05 2.8E-05 2.7E-05 2.6E-05 2.5E-05 2.4E-05 2.3E-05 2.3E-05 2.2E-05 2.1E-05
2.0E-05 2.0E-05 1.9E-05 1.8E-05 1.8E-05 1.7E-05 1.6E-05 1.6E-05 1.5E-05 1.5E-05 1.4E-05 1.4E-05 1.3E-05 1.3E-05 1.3E-05
1.2E-05 1.2E-05 1.1E-05 1.1E-05 1.1E-05

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DOSINC.DAT

GAMEN.DAT

Gamma Energies by Group (EXTGAM) 7-28-87 DLS

H 3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
BE10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
C 14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
N 13	0.00000	0.00000	1.02001	0.00000	0.00000	0.00000	0.00000	0.00000
F 18	0.00000	0.00000	0.98858	0.00000	0.00000	0.00000	0.00000	0.00000
NA22	0.00000	0.00000	0.91878	1.27374	0.00000	0.00000	0.00000	0.00000
NA24	0.00000	0.00000	0.00000	1.36849	0.00000	2.75275	0.00000	0.00000
P 32	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
P 33	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
S 35	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CL36	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
K 40	0.00003	0.00000	0.00000	0.15587	0.00000	0.00000	0.00000	0.00000
AR39	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
AR41	0.00000	0.00000	0.00000	1.28273	0.00087	0.00000	0.00000	0.00000
CA41	0.00041	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CA45	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SC46	0.00000	0.00000	0.88911	1.12035	0.00000	0.00000	0.00000	0.00000
CR51	0.00112	0.03146	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
MN54	0.00138	0.00000	0.83463	0.00000	0.00000	0.00000	0.00000	0.00000
MN56	0.00000	0.00000	0.83718	0.00220	0.49231	0.35995	0.00000	0.00000
FE55	0.00166	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FE59	0.00745	0.00087	0.00000	1.18014	0.00000	0.00000	0.00000	0.00000
CO57	0.12386	0.00000	0.00126	0.00000	0.00000	0.00000	0.00000	0.00000
CO58	0.00170	0.00000	0.96508	0.00000	0.00899	0.00000	0.00000	0.00000
CO60	0.00000	0.00000	0.00011	2.50570	0.00000	0.00000	0.00000	0.00000
NI59	0.00237	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NI63	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NI65	0.00000	0.01687	0.00370	0.51364	0.01439	0.00000	0.00000	0.00000
CU64	0.00125	0.00000	0.18263	0.00659	0.00000	0.00000	0.00000	0.00000
ZN65	0.00316	0.00000	0.01449	0.56612	0.00000	0.00000	0.00000	0.00000
ZN69M	0.00018	0.41621	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
ZN69	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
AS76	0.00000	0.00000	0.30271	0.09922	0.00591	0.02217	0.00000	0.00000
SE75	0.34231	0.05010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SE79	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
BR82	0.00804	0.00000	1.71753	0.90539	0.01424	0.00000	0.00000	0.00000
BR83	0.00000	0.00000	0.00745	0.00000	0.00000	0.00000	0.00000	0.00000
KR83M	0.00257	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
BR84	0.00071	0.00327	0.45220	0.14089	0.35633	0.83404	0.00000	0.00000
KR85M	0.11498	0.04265	0.00012	0.00000	0.00000	0.00000	0.00000	0.00000
KR85	0.00000	0.00000	0.00223	0.00000	0.00000	0.00000	0.00000	0.00000
KR87	0.00002	0.19928	0.08334	0.02757	0.05791	0.42498	0.00000	0.00000
RB87	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
KR88	0.05870	0.01545	0.13950	0.11115	0.22300	1.40675	0.00000	0.00000
RB88	0.00000	0.00000	0.12606	0.01658	0.39675	0.09705	0.00000	0.00000
KR89	0.05026	0.08839	0.37700	0.28430	0.33461	0.69989	0.00000	0.00000
RB89	0.00542	0.00000	0.15425	1.13866	0.07170	0.69822	0.00000	0.00000

GAMEN.DAT

SR89	0.00000	0.00000	0.00014	0.00000	0.00000	0.00000	0.00000
RB86	0.00000	0.00000	0.00000	0.09452	0.00000	0.00000	0.00000
SR85	0.00803	0.00000	0.51036	0.00000	0.00000	0.00000	0.00000
SR90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Y 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SR91	0.00459	0.00054	0.31013	0.36407	0.00736	0.00000	0.00000
Y 91M	0.00045	0.00000	0.53014	0.00000	0.00000	0.00000	0.00000
Y 91	0.00000	0.00000	0.00000	0.00361	0.00000	0.00000	0.00000
SR92	0.00717	0.01562	0.03786	1.27841	0.00000	0.00000	0.00000
Y 92	0.00000	0.01286	0.15965	0.06996	0.00915	0.00000	0.00000
Y 93	0.01830	0.00000	0.02261	0.01409	0.02695	0.00714	0.00000
M093	0.01069	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
ZR93	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NB93M	0.00195	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
ZR95	0.00000	0.00000	0.73495	0.00000	0.00000	0.00000	0.00000
NB95M	0.06628	0.00000	0.00002	0.00000	0.00000	0.00000	0.00000
NB95	0.00002	0.00011	0.76432	0.00000	0.00000	0.00000	0.00000
ZR97	0.00458	0.01049	0.06068	0.07473	0.03010	0.00000	0.00000
NB97M	0.00022	0.00000	0.72820	0.00000	0.00000	0.00000	0.00000
NB97	0.00002	0.00071	0.64925	0.01305	0.00178	0.00000	0.00000
NB94	0.00002	0.00000	1.57373	0.00000	0.00000	0.00000	0.00000
M099	0.01756	0.00502	0.13237	0.00000	0.00000	0.00000	0.00000
TC99M	0.12656	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
TC99	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
TC101	0.00928	0.27179	0.06165	0.00000	0.00000	0.00000	0.00000
RU103	0.00112	0.44393	0.03879	0.00000	0.00000	0.00000	0.00000
PD103	0.01440	0.00011	0.00000	0.00000	0.00000	0.00000	0.00000
RH103M	0.00172	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
RU105	0.05761	0.17903	0.57612	0.00650	0.00000	0.00000	0.00000
RH105	0.00073	0.07692	0.00000	0.00000	0.00000	0.00000	0.00000
RU106	0.00000	0.00000	0.17437	0.03051	0.00245	0.00000	0.00000
PD107	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PD109	0.01125	0.00000	0.00069	0.00000	0.00000	0.00000	0.00000
AG110M	0.00026	0.01667	2.13423	0.39763	0.21503	0.00000	0.00000
AG111	0.00315	0.02285	0.00037	0.00000	0.00000	0.00000	0.00000
CD109	0.01491	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CD113M	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CD115M	0.00000	0.00093	0.01333	0.00764	0.00000	0.00000	0.00000
CD115	0.00856	0.04191	0.15388	0.00000	0.00000	0.00000	0.00000
IN115M	0.00834	0.15733	0.00000	0.00000	0.00000	0.00000	0.00000
IN111	0.40503	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
IN114M	0.03982	0.00000	0.08549	0.00247	0.00000	0.00000	0.00000
SN117M	0.15751	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SN119M	0.01140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SN121M	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SN121	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SN123	0.00000	0.00000	0.00036	0.00653	0.00000	0.00000	0.00000
I 125	0.04154	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

GAMEN.DAT

SN125	0.00000	0.01113	0.08264	0.16128	0.00264	0.04542
SB125	0.02861	0.18259	0.22136	0.00000	0.00000	0.00000
TE125M	0.03503	0.00000	0.00000	0.00000	0.00000	0.00000
SN126	0.05658	0.00000	0.00000	0.00000	0.00000	0.00000
SB126M	0.00042	0.35528	1.18777	0.02913	0.00000	0.00000
SB126	0.02662	0.34950	2.32194	0.05508	0.00000	0.00000
SB124	0.00010	0.00143	0.77122	0.13805	0.83837	0.11972
SB127	0.03091	0.15835	0.46409	0.00854	0.00000	0.00000
TE127M	0.01115	0.00000	0.00007	0.00000	0.00000	0.00000
TE127	0.00022	0.00461	0.00000	0.00000	0.00000	0.00000
TE123M	0.14797	0.00000	0.00000	0.00000	0.00000	0.00000
TE129M	0.00810	0.00000	0.03134	0.00000	0.00000	0.00000
TE129	0.00787	0.03900	0.00390	0.00688	0.00000	0.00000
I 129	0.02464	0.00000	0.00000	0.00000	0.00000	0.00000
TE131M	0.07549	0.06372	0.85844	0.32604	0.04601	0.05658
TE131	0.10725	0.11211	0.12197	0.07737	0.00173	0.00000
I 131	0.02124	0.29740	0.06250	0.00000	0.00000	0.00000
XE131M	0.02010	0.00000	0.00000	0.00000	0.00000	0.00000
TE132	0.23070	0.00000	0.00000	0.00000	0.00000	0.00000
I 132	0.00710	0.01370	1.89129	0.31364	0.02796	0.03761
TE133M	0.10345	0.09246	1.64030	0.08973	0.16213	0.13001
TE133	0.00065	0.35257	0.16865	0.28513	0.10738	0.01416
I 133	0.00141	0.00271	0.54457	0.05798	0.00000	0.00000
XE133M	0.04145	0.00000	0.00000	0.00000	0.00000	0.00000
XE133	0.04529	0.00000	0.00000	0.00000	0.00000	0.00000
TE134	0.18445	0.15441	0.53035	0.00462	0.00000	0.00000
I 134	0.01398	0.06838	1.86253	0.39138	0.27176	0.01729
CS134M	0.02721	0.00000	0.00000	0.00000	0.00000	0.00000
CS134	0.00035	0.00694	1.47489	0.07291	0.00000	0.00000
I 130	0.00046	0.14385	1.83805	0.15632	0.00000	0.00000
I 135	0.01473	0.02267	0.12977	0.93328	0.42008	0.05455
XE135M	0.00418	0.00000	0.42650	0.00000	0.00000	0.00000
XE135	0.22665	0.00225	0.01904	0.00000	0.00000	0.00000
CS135	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XE137	0.00045	0.14038	0.00723	0.02363	0.01086	0.00516
CS137	0.00231	0.00000	0.56320	0.00000	0.00000	0.00000
XE138	0.10170	0.12420	0.03183	0.06156	0.34422	0.46233
CS138	0.00796	0.16570	0.11454	1.45862	0.04027	0.57390
CS139	0.00000	0.00060	0.01557	0.11743	0.09828	0.07431
BA139	0.02994	0.00000	0.00000	0.00532	0.00000	0.00000
BA140	0.01701	0.03693	0.13702	0.00000	0.00000	0.00000
LA140	0.00409	0.30205	0.37080	0.00503	1.52450	0.10980
CS136	0.09978	0.16693	0.82360	1.07774	0.00000	0.00000
BA141	0.16577	0.21519	0.20276	0.20700	0.07879	0.02127
LA141	0.00000	0.00000	0.00000	0.03549	0.00720	0.00000
CE141	0.07685	0.00000	0.00000	0.00000	0.00000	0.00000
BA142	0.09524	0.06134	0.23787	0.51066	0.00000	0.00000
LA142	0.00043	0.00372	0.45633	0.22278	0.38435	1.65135

GAMEN.DAT

CE143	0.15892	0.02352	0.08690	0.00403	0.00000	0.00000	0.00000
PR143	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CE144	0.01927	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PR144M	0.01185	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PR144	0.00000	0.00000	0.01031	0.00469	0.00000	0.01692	
ND147	0.04707	0.01636	0.07731	0.00000	0.00000	0.00000	
PM147	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
SM147	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
PM148M	0.04495	0.11520	1.62553	0.20563	0.00000	0.00000	
PM148	0.00007	0.00000	0.24504	0.32920	0.00000	0.00000	
PM149	0.00896	0.00000	0.00267	0.00000	0.00000	0.00000	
PM151	0.09890	0.14200	0.09536	0.00000	0.00000	0.00000	
SM151	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	
SM153	0.06042	0.00117	0.00000	0.00000	0.00000	0.00000	
EU152	0.08543	0.12011	0.31693	0.62590	0.00393	0.00000	
EU154	0.07828	0.00412	0.46221	0.66277	0.04586	0.00000	
EU155	0.06058	0.00000	0.00000	0.00000	0.00000	0.00000	
EU156	0.01587	0.00254	0.24981	0.55343	0.17001	0.35364	
GDI53	0.11049	0.00000	0.00000	0.00000	0.00000	0.00000	
T8160	0.12069	0.00868	0.59490	0.35739	0.00000	0.00000	
HO166M	0.25855	0.08869	1.21835	0.03137	0.00000	0.00000	
W 181	0.04035	0.00000	0.00000	0.00000	0.00000	0.00000	
W 185	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	
W 187	0.04032	0.11198	0.32391	0.00000	0.00000	0.00000	
RE187	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
OS185	0.05025	0.00000	0.65658	0.00000	0.00000	0.00000	
OS191	0.07427	0.00000	0.00000	0.00000	0.00000	0.00000	
IR192	0.10384	0.60181	0.11270	0.00000	0.00000	0.00000	
HG203	0.22871	0.00000	0.00000	0.00000	0.00000	0.00000	
TH230	0.00141	0.00000	0.00000	0.00000	0.00000	0.00000	
RA226	0.00673	0.00002	0.00000	0.00000	0.00000	0.00000	
RN222	0.09857	0.14232	0.40388	0.46074	0.47373	0.18035	
PB210	0.00451	0.00000	0.00000	0.00000	0.00000	0.00000	
BI210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
PO210	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	
U 232	0.00178	0.00000	0.00000	0.00000	0.00000	0.00000	
TH232	0.00120	0.00000	0.00000	0.00000	0.00000	0.00000	
RA228	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
AC228	0.04017	0.08358	0.62712	0.04824	0.12781	0.00000	
TH228	0.00307	0.00000	0.00000	0.00000	0.00000	0.00000	
RA224	0.00993	0.00008	0.00054	0.00000	0.00000	0.00000	
PB212	0.13789	0.01022	0.00000	0.00000	0.00000	0.00000	
BI212	0.01221	0.00236	0.37205	0.01203	0.05859	0.93758	
U 234	0.00148	0.00000	0.00000	0.00000	0.00000	0.00000	
U 236	0.00137	0.00000	0.00000	0.00000	0.00000	0.00000	
U 235	0.15251	0.00000	0.00000	0.00000	0.00000	0.00000	
TH231	0.02355	0.00000	0.00000	0.00000	0.00000	0.00000	
PA231	0.01784	0.01933	0.00000	0.00000	0.00000	0.00000	

GAMEN.DAT

AC227	0.00027	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
TH227	0.08702	0.02260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FR223	0.04329	0.00793	0.00302	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
RA223	0.13683	0.12143	0.03514	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
U 237	0.13957	0.00447	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NP237	0.03297	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PA233	0.04772	0.16986	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
U 233	0.00072	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
TH229	0.09477	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
RA225	0.01440	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
AC225	0.05383	0.13421	0.00483	0.00527	0.03374	0.00000	0.00000	0.00000	0.00000
U 238	0.00121	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
TH234	0.00954	0.00000	0.00504	0.00588	0.00000	0.00000	0.00000	0.00000	0.00000
PA234	0.18261	0.04548	1.42175	0.19064	0.12554	0.00000	0.00000	0.00000	0.00000
PU236	0.00182	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PU237	0.05363	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
AM242M	0.00470	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
AM242	0.01778	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CM242	0.00167	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PU242	0.00127	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NP238	0.00600	0.00000	0.28516	0.26293	0.00000	0.00000	0.00000	0.00000	0.00000
PU238	0.00160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CM244	0.00149	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PU244	0.00109	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
U 240	0.01831	0.00339	0.26342	0.04079	0.01450	0.00000	0.00000	0.00000	0.00000
PU240	0.00153	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CM245	0.07692	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PU241	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
AM241	0.02810	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CM246	0.00133	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CM247	0.02186	0.29550	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CM243	0.13261	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PU243	0.02228	0.00257	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
AM243	0.05833	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NP239	0.16029	0.01182	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
PU239	0.00065	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CM248	0.00105	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CF252	0.00111	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

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SI+CONT
ULI CONT
LLI CONT
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TB REG
LUNG (P REG)
RESP LYM NODE
BREAST
OVARIES
PANCREAS
COR BONE
TRA BONE (TRA BONE)
R MARROW
Y MARROW
SKIN
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THYROID
T BODY
CLOUD
ADRENALS
BRAIN
S WALL
ULI WALL
LLI WALL
GI TRACT BLADDER WALL
S WALL
SI+CONT
ULI WALL
LLI WALL
KIDNEYS
LIVER
LUNGS
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TB REG
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RESP LYM NODE
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SEE.IN

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COR BONE
CAN BONE
RED MARROW
Y MARROW
T MARROW
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THYROID
UTERUS
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SEE. IN

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CM
BK
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ES
FM
MD
NO
LR

PARAMS.DAT

GENII Input Parameters 29-Aug-88 RAP

1 1 1

1

1

0 70

Intake ends after ____ years:

2 1 1

50

50

0 70

Dose calculations end after ____ years:

3 1 1

1

1

0 70

Release ends after ____ years:

4 2 1

0

0

0 1000

There were ____ years of air deposition
prior to the beginning of the intake period:

5 2 1

0

0

0 1000

There were ____ years of irrigation deposition
prior to the beginning of the intake period:

6 2 1

0

0

0 1000

The inventory was disposed ____ years
prior to the beginning of the intake period:

7 2 1

0

0

0 1000

Loss of institutional control occurred
____ years prior to the intake period:

PARAMS.DAT

8 2 2

1.0

1.0

0.0 1.0

Fraction of roots in surface soil,
(top 15 cm layer):

9 1 2

0.0

0.0

0.0 1.0

Fraction of roots in deep soil:

10 2 2

0.0

0.0

0.0 1.0

Manual redistribution; deep soil/surface
soil dilution factor:

11 1 2

0.0

0.0

0.0 1.0

Chi/Q value (sec/m3):

12 1 2

0.0

0.0

0.0 1.0

E/Q value (sec/m3):

13 2 2

0.0

0.0

0.0 10.0

Population-weighted Chi/Q value
(person sec/m3):

14 2 1

1

1

1 16

Maximum individual is located in
sector index (1 = South):

15 2 2

1000.0

PARAMS.DAT

1000.0

100.0 100000.0

Maximum individual is located
_____ meters from release point:

16 2 0

T

Do you wish to calculate chi/Q grid
from joint frequency data (Y/N) ?

17 1 0

F

Is this an elevated release (Y/N) ?

18 1 0

T

Effective stack height (Y/N) ?

19 1 2

100.0

100.0

0.0 1000.0

Stack height (m):

20 1 2

1.0

1.0

0.0 5000.0

Stack flow (m3/s):

21 1 2

5.0

5.0

0.001 30.0

Stack radius (m):

22 1 2

100.0

100.0

0.0 300.0

Effluent temperature (degrees Celsius):

23 1 2

1.0

1.0

0.0 1.0

Surface water mixing ratio:

PARAMS.DAT

24 1 2
3.0E+3
3.0E+3
0.0 1.0E+6
Average river flow rate (m³/s):

25 1 2
100.0
100.0
0.0 1.0E+2
Average water flow rate (m/s):

26 2 2
0.0
0.0
0.0 1.0E+3
Transit time to irrigation withdrawal
location (hr):

27 2 2
0.0
0.0
0.0 1.0E+4
Rate of effluent discharge to receiving
water body (m³/s):

28 2 2
0.0
0.0
0.0 1.0E+4
Longshore distance from release point
to usage location (m):

29 1 2
0.0
0.0
0.0 1.0E+4
Offshore distance to water intake (m):

30 1 2
0.0
0.0
0.0 1.0E+3
Average water depth in surface water body (m):

31 1 2
0.0
0.0

PARAMS.DAT

0.0 1.0E+3

Average river width (m):

32 2 2

0.0

0.0

0.0 1.0E+2

Depth of effluent discharge point to
surface water (m):

33 1 2

0.0

0.0

0.0 1.0E+3

Waste form / package half life (yr):

34 1 2

0.0

0.0

0.0 1.0E+2

Waste / contaminated soil thickness (m):

35 1 2

0.0

0.0

0.0 1.0E+3

Depth of soil overburden (m):

36 2 0

T

Do you wish to consider biotic transport
during inventory decay/buildup period (Y/N):

37 2 0

T

Do you wish to consider biotic transport
during intake period (Y/N):

38 2 1

1

1

1 3

Pre-intake site condition (1- Arid non-agricultural,
2- Humid non-agricultural, 3- agricultural):

39 1 2

1.0

1.0

PARAMS.DAT

1.0 5.0E+6
Total population:

40 1 2
1.0
1.0
1.0E-12 10.0
Population-weighted E/Q value:

41 1 1
1
1
1 3
Surface soil source units (1-m2, 2-m3, 3-kg):

42 1 2
8766.0
8766.0
0.0 8766.0
Individual annual exposure time to plume (hr):

43 1 2
0.0
0.0
0.0 1.0
Unused

44 2 2
4380.0
2920.0
0.0 8766.0
Individual annual exposure time to soil
contamination (hr):

45 2 2
100.0
10.0
0.0 1000.0
Individual annual exposure time while
swimming (hr):

46 2 2
100.0
5.0
0.0 8766.0
Individual annual exposure time while
boating (hr):

PARAMS.DAT

47 2 2

500.0

17.0

0.0 1000.0

Individual annual exposure time from
shoreline activities (hr):

48 2 1

1

1

1 4

Shoreline type (1-river, 2-lake, 3-ocean,
4-tidal basin):

49 2 2

8.0

13.0

0.0 1000.0

Transit time for release to reach aquatic
recreation area (hr):

50 2 0

T

External Ground Exposure: Is irrigation
with contaminated water considered?

51 2 1

1

1

1 2

External Ground Exposure: irrigation water
source (1-ground water, 2-surface water):

52 2 2

40.0

40.0

0.0 100.0

External Ground Exposure: irrigation water
application rate (in/irrigation season):

53 2 2

6

6

0 12

External Ground Exposure: duration of
irrigation (mo/yr):

54 1 2

PARAMS.DAT

1.0
1.0
0.0 1.0
Fraction of plume passage time spent in plume:

55 1 2
8766.0
8766.0
0.0 8766.0
Individual annual inhalation exposure (hr):

56 2 1
0
0
0 2
Resuspension (0-not considered, 1-use Mass
Loading model, 2-use Anspaugh model):

57 1 2
1.0E-4
1.0E-4
1.0E-9 1.0E-2
Mass loading factor (g/m3):

58 1 2
1.0
1.0
0.0 15.0
Top soil available for resuspension (cm):

59 2 1
0
0
0 5.0E+6
Population ingesting aquatic foods,
0 defaults to total population (person):

60 2 2
0
0
0 5.0E+6
Population ingesting drinking water,
0 defaults to total population (person):

61 2 0
F
Do you wish to consider dose from contaminated
food exported out of the region?

PARAMS.DAT

62 2 1

1

1

1 2

Drinking water source (1-ground water,
2-surface water):

63 1 0

T

Is drinking water treated?

64 1 2

1.0

1.0

0.0 10.0

Holdup/transit time of drinking water (da):

65 2 2

730.0

440.0

0.0 1.0E+3

Per capita drinking water consumption rate
(L/yr):

66 2 0

F

Are aquatic foods harvested from salt water
(default is fresh water)?

67 2 0

F

Do you wish to consider uncontaminated food
imported into the region?

68 2 2

0.0

0.0

0.0 1000.0

Fish - Transit time for release to reach
harvest area (hr):

69 1 2

15000.0

15000.0

0.0 1.0E+6

Fish - Total production (kg/yr):

PARAMS.DAT

70 2 2

1.0

1.0

0.0 1.0E+3

Fish - Holdup between harvest and
consumption (da):

71 1 2

40.0

6.9

0.0 1.0E+2

Fish - Per capita consumption rate (kg/yr):

72 2 2

0.0

0.0

0.0 1000.0

Mollusc - Transit time for release to reach
harvest area (hr):

73 1 2

0.0

0.0

0.0 1.0E+6

Mollusc - Total production (kg/yr):

74 2 2

0.0

0.0

0.0 1.0E+3

Mollusc - Holdup between harvest and
consumption (da):

75 1 2

6.9

0.0

0.0 1.0E+2

Mollusc - Per capita consumption rate (kg/yr):

76 2 2

0.0

0.0

0.0 1000.0

Crustacea - Transit time for release to reach
harvest area (hr):

77 1 2

0.0

PARAMS.DAT

0.0

0.0 1.0E+6

Crustacea - Total production (kg/yr):

78 2 2

0.0

0.0

0.0 1.0E+3

Crustacea - Holdup between harvest and
consumption (da):

79 1 2

6.9

0.0

0.0 1.0E+2

Crustacea - Per capita consumption rate (kg/yr):

80 2 2

0.0

0.0

0.0 1000.0

Aquatic plants - Transit time for release to reach
harvest area (hr):

81 1 2

0.0

0.0

0.0 1.0E+6

Aquatic plants - Total production (kg/yr):

82 2 2

0.0

0.0

0.0 1.0E+3

Aquatic plants - Holdup between harvest and
consumption (da):

83 1 2

6.9

0.0

0.0 1.0E+2

Aquatic plants - Per capita consumption rate (kg/yr):

84 1 2

90.0

90.0

1.0 365.0

Leafy vegetables - Growing time (da):

PARAMS.DAT

85 2 1

2

2

0 2

Leafy vegetables - Irrigation source
(0-none, 1-ground water, 2-surface water):

86 2 2

35.0

35.0

0.0 100.0

Leafy vegetables - Irrigation rate
(in/irrigation season):

87 1 2

6.0

6.0

0.0 12.0

Leafy Vegetables - Irrigation duration (mo/yr):

88 1 2

1.5

1.5

0.0 10.0

Leafy vegetables - Yield (kg/m2):

89 1 2

0.0

0.0

0.0 1.0E+8

Leafy Vegetables - Total production (kg/yr):

90 2 2

1.0

14.0

0.0 365.0

Leafy Vegetables - Holdup between harvest and
consumption (da):

91 2 2

30.0

15.0

0.0 200.0

Leafy Vegetables - Per capita consumption
rate (kg/yr):

92 1 2

PARAMS.DAT

90.0

90.0

1.0 365.0

Other vegetables - Growing time (da):

93 2 1

2

2

0 2

Other vegetables - Irrigation source
(0-none, 1-ground water, 2-surface water):

94 2 2

40.0

40.0

0.0 100.0

Other vegetables - Irrigation rate
(in/irrigation season):

95 1 2

6.0

6.0

0.0 12.0

Other Vegetables - Irrigation duration (mo/yr):

96 1 2

4.0

4.0

0.0 10.0

Other vegetables - Yield (kg/m2):

97 1 2

0.0

0.0

0.0 1.0E+8

Other Vegetables - Total production (kg/yr):

98 2 2

5.0

14.0

0.0 365.0

Other Vegetables - Holdup between harvest and
consumption (da):

99 2 2

220.0

140.0

0.0 300.0

PARAMS.DAT

Other Vegetables - Per capita consumption
rate (kg/yr):

100 1 2
90.0
90.0
1.0 365.0

Fruit - Growing time (da):

101 2 1
2
2
0 2

Fruit - Irrigation source
(0-none, 1-ground water, 2-surface water):

102 2 2
35.0
35.0
0.0 100.0

Fruit - Irrigation rate (in/irrigation
season):

103 1 2
6.0
6.0
0.0 12.0

Fruit - Irrigation duration (mo/yr):

104 1 2
2.0
2.0
0.0 10.0

Fruit - Yield (kg/m2):

105 1 2
0.0
0.0
0.0 1.0E+8

Fruit - Total production (kg/yr):

106 2 2
5.0
14.0
0.0 365.0

Fruit - Holdup between harvest and
consumption (da):

PARAMS.DAT

107 1 2
330.0
64.0
0.0 500.0
Fruit - Per capita consumption rate (kg/yr):

108 1 2
90.0
90.0
1.0 365.0
Cereals - Growing time (da):

109 2 1
0
0
0 2
Cereals - Irrigation source
(0-none, 1-ground water, 2-surface water):

110 2 2
0.0
0.0
0.0 100.0
Cereals - Irrigation rate (in/irrigation
season):

111 1 2
0.0
0.0
0.0 12.0
Cereals - Irrigation duration (mo/yr):

112 1 2
0.8
0.8
0.0 10.0
Cereals - Yield (kg/m2):

113 1 2
0.0
0.0
0.0 1.0E+8
Cereals - Total production (kg/yr):

114 2 2
180.0
180.0
0.0 365.0

PARAMS.DAT

Cereals - Holdup between harvest and
consumption (da):

115 2 2

80.0

72.0

0.0 300.0

Cereal and bread - Per capita consumption
rate (kg/yr):

116 2 2

15.0

34.0

0.0 365.0

Meat (beef and pork) - Holdup between
harvest and consumption (da):

117 2 2

80.0

70.0

0.0 200.0

Meat (beef and pork) - Per capita
consumption rate (kg/yr):

118 2 2

0.0

0.0

0.0 1.0E+8

Meat (beef and pork) - Total production
(kg/yr):

119 2 2

1.0

1.0

0.0 1.0

Meat - Fraction of animal drinking water
that is contaminated:

120 2 2

0.25

0.25

0.0 1.0

Meat - Fraction of animal diet consisting of
contaminated grain:

121 1 2

90.0

90.0

PARAMS.DAT

1.0 365.0

Meat - Grain growing time (da):

122 2 1

0

0

0 2

Meat - Grain irrigation source (0-none,
1-ground water, 2-surface water):

123 2 2

35.0

35.0

0.0 100.0

Meat - Grain irrigation rate (in/irrigation
season):

124 1 2

6.0

6.0

0.0 12.0

Meat - Grain irrigation duration (mo/yr):

125 1 2

0.8

0.8

0.0 10.0

Meat - Grain yield (kg/m2):

126 1 2

180.0

180.0

0.0 365.0

Meat - Storage time for grain (da):

127 2 2

0.75

0.75

0.0 1.0

Meat - Fraction of animal diet consisting of
contaminated hay:

128 1 2

45.0

45.0

1.0 365.0

Meat - Hay growing time (da):

PARAMS.DAT

129 2 1

2

2

0 2

Meat - Hay irrigation source (0-none,
1-ground water, 2-surface water):

130 2 2

47.0

47.0

0.0 100.0

Meat - Hay irrigation rate (in/irrigation
season):

131 1 2

6.0

6.0

0.0 12.0

Meat - Hay irrigation duration (mo/yr):

132 1 2

2.0

2.0

0.0 10.0

Meat - Hay yield (kg/m2):

133 1 2

100.0

100.0

0.0 365.0

Meat - Storage time for hay (da):

134 2 2

1.0

34.0

0.0 365.0

Poultry- Holdup between harvest and
consumption (da):

135 1 2

18.0

8.5

0.0 50.0

Poultry - Per capita consumption rate (kg/yr):

136 1 2

0.0

0.0

PARAMS.DAT

0.0 1.0E+6

Poultry - Total production (kg/yr):

137 2 2

1.0

1.0

0.0 1.0

Poultry - Fraction of drinking water that is contaminated:

138 2 2

1.0

1.0

0.0 1.0

Poultry - Fraction of animal diet consisting of contaminated grain:

139 1 2

90.0

90.0

1.0 365.0

Poultry - Grain growing time (da):

140 2 1

0

0

0 2

Poultry - Grain irrigation source (0-none, 1-ground water, 2-surface water):

141 2 2

0.0

0.0

0.0 100.0

Poultry - Grain irrigation rate (in/irrigation season):

142 1 2

0.0

0.0

0.0 12.0

Poultry - Grain irrigation duration (mo/yr):

143 1 2

0.8

0.8

0.0 10.0

Poultry - Grain yield (kg/m2):

PARAMS.DAT

144 1 2

180.0

180.0

0.0 365.0

Poultry - Storage time for grain (da):

145 2 2

1.0

4.0

0.0 365.0

Milk- Holdup between harvest and
consumption (da):

146 1 2

270.0

230.0

0.0 1000.0

Milk - Per capita consumption rate (kg/yr):

147 1 2

0.0

0.0

0.0 1.0E+8

Milk - Total production (kg/yr):

148 2 2

1.0

1.0

0.0 1.0

Milk cow - Fraction of drinking water that is
contaminated:

149 2 2

0.25

0.25

0.0 1.0

Milk cow - Fraction of animal diet consisting
of contaminated hay:

150 1 2

45.0

45.0

1.0 365.0

Milk cow - Hay growing time (da):

151 2 1

2

PARAMS.DAT

2
0 2
Milk cow - Hay irrigation source (0-none,
1-ground water, 2-surface water):

152 2 2
47.0
47.0
0.0 200.0
Milk cow - Hay irrigation rate (in/irrigation
season):

153 1 2
6.0
6.0
0.0 12.0
Milk cow - Hay irrigation duration (mo/yr):

154 1 2
2.0
2.0
0.0 10.0
Milk cow - Hay yield (kg/m2):

155 1 2
100.0
100.0
0.0 365.0
Milk cow - Storage time for hay (da):

156 2 2
0.75
0.75
0.0 1.0
Milk cow - Fraction of animal diet consisting
of contaminated fresh forage:

157 1 2
30.0
30.0
1.0 365.0
Milk cow - Fresh forage growing time (da):

158 2 1
2
2
0 2
Milk cow - Fresh forage irrigation source

PARAMS.DAT

(0-none, 1-ground water, 2-surface water):

159 2 2

47.0

47.0

0.0 100.0

Milk cow - Fresh forage irrigation rate
(in/irrigation season):

160 2 2

6.0

6.0

0.0 12.0

Milk cow - Fresh forage irrigation duration
(mo/yr):

161 1 2

1.5

1.5

0.0 10.0

Milk cow - Fresh forage yield (kg/m2):

162 1 2

0.0

0.0

0.0 365.0

Milk cow - Storage time for fresh forage (da):

163 2 2

1.0

18.0

0.0 365.0

Eggs - Holdup between harvest and
consumption (da):

164 1 2

30.0

20.0

0.0 100.0

Eggs - Per capita consumption rate (kg/yr):

165 1 2

0.0

0.0

0.0 1.0E+8

Eggs - Total production (kg/yr):

166 2 2

PARAMS.DAT

1.0

1.0

0.0 1.0

Laying hen - Fraction of drinking water that is contaminated:

167 2 2

1.0

1.0

0.0 1.0

Laying hen - Fraction of animal diet consisting of contaminated grain:

168 1 2

90.0

90.0

1.0 365.0

Laying hen - Grain growing time (da):

169 2 1

0

0

0 2

Laying hen - Grain irrigation source (0-none, 1-ground water, 2-surface water):

170 2 2

0.0

0.0

0.0 100.0

Laying hen - Grain irrigation rate (in/irrigation season):

171 2 2

0.0

0.0

0.0 12.0

Laying hen - Grain irrigation duration (mo/yr):

172 1 2

0.8

0.8

0.0 10.0

Laying hen - Grain yield (kg/m2):

173 1 2

180.0

PARAMS.DAT

180.0

0.0 365.0

Laying hen - Storage time for grain (da):

174 1 1

1

1

1 2

POPOPT

175 1 1

1

1

0 3

XOQOPT

176 1 1

1

1

0 3

FOQOPT

177 1 2

0.0

0.0

1.0E-12 1.0

Food-weighted Chi/Q value (sec/m3):

178 1 1

1

1

0 3

MIXFLG

179 1 0

F

Is source area less than 1250 m2 (Y/N)?

180 2 2

1250.0

1250.0

0.0 1250.0

Source area for external dose modification
factor (m2):

181 1 1

0

0

PARAMS.DAT

0 3
IRELES

182 1 2
100.0
100.0
0.0 5000.0
Building cross-sectional area (m):

183 1 2
10.0
10.0
0.0 100.0
Building height (m):

184 1 0
F
Use building wake model (Y/N):

185 1 1
1
1
1 16
Which down-wind sector (1 = South):

APPRENTICE.DAT

Program GENII Input File ##### 8 Jul 88 ###
 Title:

OPTIONS===== Default =====
 Near-field scenario? (Far-field) NEAR-FIELD: narrowly-focused
 Population dose? (Individual) release, single site
 Acute release? (Chronic) FAR-FIELD: wide-scale release,
 data set used multiple sites
 Complete Complete
 TRANSPORT OPTIONS===== Section EXPOSURE PATHWAY OPTIONS===== Section
 Air Transport 1 Finite plume, external 5
 Surface Water Transport 2 Infinite plume, external 5
 Biotic Transport (near-field) 3,4 Ground, external 5
 Waste Form Degradation (near) 3,4 Recreation, external 5
 Inhalation uptake 5,6
 REPORT OPTIONS===== Drinking water ingestion 7,8
 Report AEDE only Aquatic foods ingestion 7,8
 Report by radionuclide Terrestrial foods ingestion 7,9
 Report by exposure pathway Animal product ingestion 7,10
 Debug report on screen Inadvertent soil ingestion

INVENTORY #####

Inventory input activity units: (1-pCi 2-uCi 3-mCi 4-Ci 5-Bq)
 Surface soil source units (1- m2 2- m3 3- kg)
 Equilibrium question goes here

Use when	----Release Terms----- transport selected			-----Basic Concentrations----- near-field scenario, optionally				
Release		Surface	Buried		Surface	Deep	Ground	Surface
Radio-	Air	Water	Waste	Air	Soil	Soil	Water	Water
nuclide	/yr	/yr	/m3	/L	/unit	/m3	/L	/L

Use when	----Derived Concentrations----- measured values are known			
Release	Terres.	Animal	Drink	Aquatic
Radio-	Plant	Product	Water	Food
nuclide	/kg	/kg	/L	/kg

TIME #####

Intake ends after (yr)
 Dose calc. ends after (yr)
 Release ends after (yr)

APPRENTICE.DAT

No. of years of air deposition prior to the intake period

No. of years of irrigation water deposition prior to the intake period

FAR-FIELD SCENARIOS (IF POPULATION DOSE) #####

Definition option: 1-Use population grid in file POP.IN

2-Use total entered on this line

NEAR-FIELD SCENARIOS #####

Prior to the beginning of the intake period: (yr)

When was the inventory disposed? (Package degradation starts)

When was LOIC? (Biotic transport starts)

Fraction of roots in upper soil (top 15 cm)

Fraction of roots in deep soil

Manual redistribution: deep soil/surface soil dilution factor

Source area for external dose modification factor (m2)

TRANSPORT #####

====AIR TRANSPORT=====SECTION 1=====

0-Calculate PM

Option: 1-Use chi/Q or PM value

2-Select MI dist & dir

3-Specify MI dist & dir

Chi/Q or PM value

MI sector index (1=S)

MI distance from release point (m)

Use jf data, (T/F) else chi/Q grid

Release type (0-3)

Stack release (T/F)

Stack height (m)

Stack flow (m3/sec)

Stack radius (m)

Effluent temp. (C)

Building x-section (m2)

Building height (m)

====SURFACE WATER TRANSPORT=====SECTION 2=====

Mixing ratio model: 0-use value, 1-river, 2-lake

Mixing ratio, dimensionless

Average river flow rate for: MIXFLG=0 (m3/s), MIXFLG=1,2 (m/s),

Transit time to irrigation withdrawal location (hr)

If mixing ratio model > 0:

Rate of effluent discharge to receiving water body (m3/s)

Longshore distance from release point to usage location (m)

Offshore distance to the water intake (m)

Average water depth in surface water body (m)

Average river width (m), MIXFLG=1 only

Depth of effluent discharge point to surface water (m), lake only

====WASTE FORM AVAILABILITY=====SECTION 3=====

Waste form/package half life, (yr)

Waste thickness, (m)

Depth of soil overburden, m

====BIOTIC TRANSPORT OF BURIED SOURCE=====SECTION 4=====

Consider during inventory decay/buildup period (T/F)?

APPRENTICE.DAT

Consider during intake period (T/F)?	1-Arid non agricultural
Pre-Intake site condition.....	2-Humid non agricultural
	3-Agricultural

EXPOSURE #####

=====EXTERNAL EXPOSURE=====SECTION 5=====

Exposure time:	Residential irrigation:
Plume (hr)	Consider: (T/F)
Soil contamination (hr)	Source: 1-ground water
Swimming (hr)	2-surface water
Boating (hr)	Application rate (in/yr)
Shoreline activities (hr)	Duration (mo/yr)
Shoreline type: (1-river, 2-lake, 3-ocean, 4-tidal basin)	
Transit time for release to reach aquatic recreation (hr)	
Average fraction of time submersed in acute cloud (hr/person hr)	

=====INHALATION=====SECTION 6=====

Hours of exposure to contamination per year
0-No resus- 1-Use Mass Loading 2-Use Anspaugh model
pension Mass loading factor (g/m3) Top soil available (cm)

=====INGESTION POPULATION=====SECTION 7=====

Atmospheric production definition (select option):
 0-Use food-weighted chi/Q , ($\text{food-sec}/\text{m}^3$), enter value on this line
 1-Use population-weighted chi/Q
 2-Use uniform production
 3-Use chi/Q and production grids (PRODUCTION will be overridden)
 Population ingesting aquatic foods, 0 defaults to total (person)
 Population ingesting drinking water, 0 defaults to total (person)
 Consider dose from food exported out of region (default=F)

Note below: S* or Source: 0-none, 1-ground water, 2-surface water
3-Derived concentration entered above

==== AQUATIC FOODS / DRINKING WATER INGESTION=====SECTION 8=====

Salt water? (default is fresh)

USE ? T/F	FOOD TYPE	TRAN- SIT hr	PROD- UCTION kg/yr	-CONSUMPTION- HOLDUP da	RATE kg/yr	DRINKING WATER
	FISH					Source (see above)
	MOLLUS					Treatment? T/F
	CRUSTA					Holdup/transit(da)
	PLANTS					Consumption (L/yr)

=====TERRESTRIAL FOOD INGESTION=====SECTION 9=====

APPRENTICE.DAT

USE ? T/F	FOOD TYPE	GROW TIME da	--IRRIGATION-- S RATE TIME * in/yr mo/yr		YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP RATE da kg/yr	
	LEAF V							
	ROOT V							
	FRUIT							
	GRAIN							

=====ANIMAL PRODUCTION CONSUMPTION=====SECTION 10=====

[illegible]

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